

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024



EIRMPFI-2024

**CONFERENCE
PROCEEDINGS**

International Conference

on

**EXPLORING INNOVATIVE RESEARCH
METHODOLOGIES IN A VARIETY OF
MULTIDISCIPLINARY FIELDS AND
THEIR PROSPECTIVE FUTURE IMPACT**

25th & 26th February 2024



Editor:

Dr. Kishan Pal Singh



ISBN: 978-93-95305-14-3

JOINTLY ORGANIZED BY

DEPARTMENT OF MECHANICAL ENGINEERING

MANGALAYATAN UNIVERSITY, ALIGARH - 202145

and AIRO INTERNATIONAL JOURNALS

www.airo.co.in

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024



International Conference
on
**EXPLORING INNOVATIVE RESEARCH
METHODOLOGIES IN A VARIETY OF
MULTIDISCIPLINARY FIELDS AND
THEIR PROSPECTIVE FUTURE IMPACT**
25th & 26th February 2024

Editor:
Dr. Kishan Pal Singh

JOINTLY ORGANIZED BY
DEPARTMENT OF MECHANICAL ENGINEERING
MANGALAYATAN UNIVERSITY, ALIGARH - 202145
and AIRO INTERNATIONAL JOURNALS

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024



CONVENOR

Prof (Dr.) Kishan Pal Singh
Director, Institute of Engineering and Technology,
Mangalayatan University Beswan Aligarh

CHIEF PATRON

Prof.(Dr) Tej Narayan ojha
Professor Department of Hindi
Maharaja Agrasen College University of Delhi

PATRON

Dr. Ajay Kumar Mishra
Vice Chancellor Sikkim Skill University

Dr. Ankit Gandhi
Director and OSD, Apex University, Jaipur

Dr. Roushan kumar
Department of Computer Science
ARSD College University of Delhi.

Dr. Vrushali Pramod Parkhi
Principal, S.S. Maniar College of Computer & Management, Nagpur

Dr. Diwakar Ramanuj Tripathi
HOD Computer Science
S.S. Maniar College of Computer & Management, Nagpur

Dr. Ravi Shankar Prasad
Associate professor Department of economics
Karorimal college University of Delhi

Dr. Maneesh Vilash Deshpande
Assistant Professor
Gondwana University, Gadchiroli

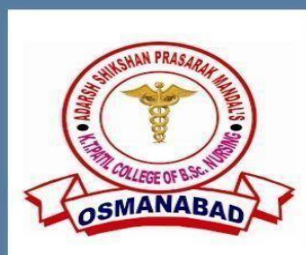
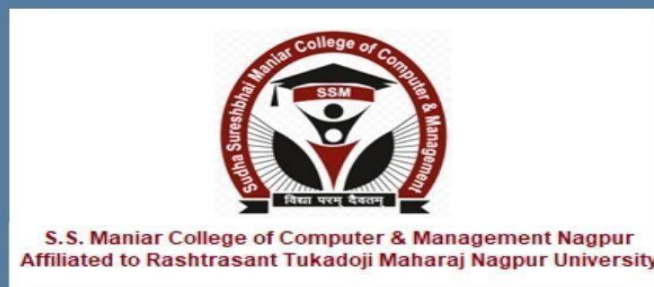
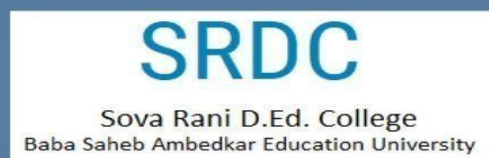
PROCEEDING

www.airo.co.in

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024



IN ASSOCIATION WITH



PROCEEDING

www.airo.co.in

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

INDEX

| STUDENT NAME | TOPIC | PAGE NO. |
|---------------------|---|-----------------|
| Vatsya Tiwari | A Comparison between Open-Source Server-Side Scripting language JSP & PHP based on Page Load Time | 01-08 |
| Taher Hussain Khan | Progressive Trends in E-Resources: A viewpoint of Research Scholars in North East India | 09-20 |
| Varada V. S | Sibling rivalry: factors, manifestations and implications | 21-27 |
| Raj Kishore | Characterization and optimization of micro-sphere loaded with flurbiprofen for intra-articular delivery | 28-33 |
| Sanjay krishna | Drug Management system in Govt. Hospitals and its future outcomes | 34-40 |
| Ritu | Understand the structure of aloe vera and its medicinal benefits | 41-47 |
| Dr. Abdul Khadeer | The evolution of cyber threats: a deep dive into emerging attack vectors, mitigation techniques, and future forecasting for robust cyber defence strategies | 48-55 |
| Vartika Gupta | Eggshell-Derived Catalysts in Biodiesel Synthesis: Maximizing Efficiency and Environmental Benefits | 56-64 |
| Manoj Kumar Singh | Predictive Modelling and Analysis of Infectious Disease (COVID-19) Cases in Indian States | 65-79 |
| Santosh K | An exploratory study on the supply chain management practices of a distributor | 80-85 |
| Amitesh Kumar | Recent development in wireless technology and its ai merger | 86-92 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact February 2024

| | | |
|-----------------------|--|---------|
| Tamal Taru Roy | Modern Innovative Strategies in Research | 93-97 |
| Chandrakanta paik | Education under Globalization: the constitutional dream of India | 98-102 |
| Swarnima Pandey | Facts and outcomes of recent inventions in cardiac medicines | 103-108 |
| Amal Ch. Barman | An algebraic study on polynomial equations with reference to linear algebra | 109-114 |
| Krishan Maurya | New policies implementation in pharma field in north eastern states of india | 115-121 |
| Renshu | An analysis on the paradigm shifts in crop production management for modern sustainability | 122-138 |
| Monika Rajubhai Mer | Complex carbohydrates and gestational diabetes control without insulin | 139-146 |
| Riya Sharma | Characterizing scattering ionization pathways in chemical molecules through electron interaction studies | 147-158 |
| Dr. Anuradha Sharma | The role of emotional intelligence in effective teaching a comprehensive teacher training approach | 159-171 |
| Vaishali Mittal | Impact of ewom on online purchase decision among millennials in uttarakhand region | 172-184 |
| Abhishek Garg | Improving Encrypting Images using Kronecker Method and the Hill Cipher | 185-199 |
| Harsha Mary | Building a Competency Framework for Organizations Using Generative AI – AIDA | 200-212 |
| Shailendra Tiranga | Kumar Nimble Approach in Software Engineering | 213-222 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact February 2024

| | | |
|--------------------------|--|---------|
| Dr. Abhinav Divyanshu | Prachin Bhartiya Itihas me Budha vha unki Murtiyo ka ek Avlokan | 223-224 |
| Namrata Dubey | Exploring innovative research methodologies In a variety of multidisciplinary fields and their prospective future impact | 225-238 |
| Bushra Khatoon Zaidi | The Brain-Computer Interface: A Deeper Understanding | 239-245 |
| Rajesh Kumar Acharya | Strategic planning and leadership impact in automobile sector | 246-252 |
| Mahendra Kumar Mohapatra | Implementation of algebric expressions in ai and its supportive analytics | 253-258 |
| Amitabala Patra | Assessment of the eco- distribution and status of ferns of darjeeling, west bengal | 259-264 |
| Jerina Iyasmin | Recent soil testing methods and its outcomes in northern india | 265-271 |
| Mangal Pati | Mathematical theorem utility in deep learning process | 272-277 |
| Himanshu Ojha | Cloud computation in major data base safety management | 278-283 |
| Mohammad Ahmad Siddiqui | The role of ict infrastructure and services in college libraries | 284-289 |
| Yasmeen Fatma | Implementation of (tqm) total quality management: a comparison study of libraries of state university | 290-296 |
| Rameshwar Singh | Synthesis of some novel thiazolidinedione derivatives and their anti-inflammatory studies | 297-301 |
| Santosh Kumar | Design and analysis of reconfigurable filter for wireless application | 302-308 |
| Shyam Sundar Gupta | Torque and current analysis of electrical vehicles | 309-314 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact February 2024

| | | |
|-----------------------|--|---------|
| Shivam Dixit | Pharmacogenomics and personalized medicine: tailoring drug therapies for individual patients | 315-320 |
| Manika Kar Paik | New education policy 2020: prospect and prosperity in the higher education scenario of the country | 321-326 |
| Pritam Paul | Impact of GST on corporates across India | 327-332 |
| Niharika Panda | Effective communication and collaboration strategies for hybrid teams | 333-337 |
| Rasmita Baliar Singh | Managing distributed leadership and fostering a sense of community in a geographically dispersed workforce | 338-343 |
| Bigyan Mania | Developing performance management and evaluation systems suitable for hybrid work environments | 344-349 |
| Nabajyoti Das | Matrix And Computation System Supporting AI Development | 350-355 |
| Avinash Chandra | Personalized medicine using ai and machine learning | 356-361 |
| Ankur Yadav | Bioavailability and bio- equivalence study design - a review | 362-367 |
| Neha Kaushik | Research and development plans in new era of modernization and digitalization | 368-374 |
| Sikha Ram | Impact of online schools in India | 375-381 |
| Abhijit Mukherjee | The use of technology to facilitate collaboration and information sharing in hybrid teams | 382-387 |
| Debopriya Sarkar | Organic compound theory and its drug benefits | 388-394 |
| Snigdhajyoti Routray | Impact of jhansi in indian freedom story | 395-399 |
| Pallavi Tusshar Pawar | Rigidity and social networking addiction among college students | 400-407 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact February 2024

| | | |
|--------------------------|--|---------|
| Shareena Pinto | A study of attitude of teachers towards inclusive education in bellary district | 408-413 |
| Paradkar Pranali Pradeep | Opicapone in treatment of parkinson's disease - a systematic benefit-risk assessment | 414-418 |
| Mathew M J | Psychosomatic diseases and methods of treatment in psychotherapy | 419-423 |
| Lakshmi Narasimhan N | Cyber security on robotics process automation | 424-430 |
| Madhuri Vagal | Ai powered predictive analytics to identify certain mental conditions or cognitive impairments | 431-436 |
| Manoj Kumar Singh | The impact of artificial intelligence on radiology and its implications for health care management | 437-442 |
| Soudagar Rajaram | Mehul Future of small farmers in indian business | 443-448 |
| Girish M Lokhande | Enhancing supply chain management in food manufacturing: integrating production, planning, and quality control | 449-455 |
| Makwana Chandulal | Jignesh Unveiling the emerging trends in cloud computing | 456-462 |
| Neetu Dubey | Impact assessment of vocational education and skill development training for healthcare professionals | 463-472 |
| Umakanta Das | A comprehensive investigation into employee commitment in Delhi's travel sector | 473-477 |
| Jatindra Kumar Mishra | Future challenges posed by aquatic invasive species | 478-483 |
| Dhirendra Kumar Sing | Exploring student perspectives on rural agricultural engagement within the college of agriculture | 484-489 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact February 2024

| | | |
|----------------------|--|---------|
| Amit Kumar Mishra | Enhancing computer science research within education: a framework for advancement | 490-494 |
| Prashant Somwanshi | Optimizing pharmacy management information systems through operations research design and implementation | 495-501 |
| Awanish Kumar | Relationship between academic procrastination and academic anxiety among students with visual disability | 502-507 |
| Laxmipriya Mohapatra | Financial assistant for women entrepreneur | 508-512 |
| Prasanta Kumar Dhal | Non-banking financial how to promoting the small and medium industries | 513-516 |
| Rudra Pratap Singh | An empirical study of the indian pharmaceutical sector | 517-522 |
| Shiv Murti Singh | An overview of the growth of the Indian pharmaceutical industry | 523-528 |
| Rumpa Roy | Philosophy Of Indian Aesthetics | 529-533 |
| Sushma Chhetri | Exploring the essence: an insight into indian aesthetics | 534-538 |
| Rajagopal A G | Influence of cross-cultural differences in consumer decision making styles in india & the arab world | 539-542 |
| Naveen Dobriyal | A Webometric Analysis of Libraries of Central Universities of Sanskrit in India | 543-559 |
| Shweta | Desirability Analysis to Optimize the Performance of Castor-Diesel Blends Using ANNOVA | 560-567 |
| Tarun Nharwal | Investigating the Influence of Drawbead Geometries on Springback in Mild Steel Sheet Metal Forming Using Abaqus Software | 568-574 |
| Neetu Amlani | A Critical Review for Job Opportunities and Challenges in Cloud Computing | 575-585 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact February 2024

| | | |
|---------------------|---|---------|
| Partha Das | Impact Of Bengali Literature In Indian Cinema | 586-591 |
| Sandhya Singh | Investigating professional education opportunities for India's scheduled tribes | 592-597 |
| Prasanna Thalari | A Methodical Approach to Overcoming Important Obstacles in Software Development Adopting a DevOps Practices | 598-610 |
| Subhash Chandra | Optimization of surface integrity during dry turning of AISI 4130r steel using design of experiment (DOE), and multiple linear regression model | 611-618 |
| Dr. I. M. Makkubhai | Transformative Approaches to Physical Education and Education in Higher Learning Institutions: Leveraging Smart Technologies | 619-628 |
| Rajat Mishra | Themes and Techniques of Autobiographical Element with Special Focus to Kamala Das and Adrienne Rich Works | 629-636 |
| Prem Prakash Yadav | A Study on Use Of E-Resources in College Libraries of Uttar Pradesh | 637-640 |
| Shams Tabrez | Design and Fabrication of Die-set for Compacting the Powder to Synthesize Green Pallet of Nickel-based Solid Lubricant Nano-composites | 641-651 |
| Abhinav Sharma | Evaluating the Impact: A Comprehensive Review of the Juvenile Justice System under the JJ Act, 2000 in India | 652-658 |
| Rajkumar Adak | Life of William Shakespeare with Special Reference to Comedy | 659-662 |
| Shakeb Ashraf | Evaluate the Relationship between Part Mix Flexibility and Performance in Simple Integrated Flexible Manufacturing System | 663-674 |

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

Abdul Jabbar

Analysis of Process Parameters and its Influence in Addi-
tive Manufacturing

675-682

A Comparison between Open-Source Server-Side Scripting language JSP & PHP based on Page Load Time

Vatsya Tiwari¹, Manoj kr. Varshney², Kishan Pal Singh³ and Santosh Kumar Bharti⁴

Department of Computer Science & Engineering, Mangalayatan University, Aligarh, UP

Department of Computer Science & Engineering, Mangalayatan University, Aligarh, UP

Department of Mechanical Engineering, Mangalayatan University, Aligarh, UP

Department of Computer Science & Engineering, Pandit Deendayal Petroleum University,
Gandhinagar, Gujrat

vatsyatiwari@gmail.com

ABSTRACT: *Many server-side scripting languages exist for developing client-server architecture-based applications. Some server-side scripting supports open-source development environments. Some server-side scripting languages support license-based development environments. Languages for server-side scripting, such as PHP and JSP are freely available. ASP is a license-based scripting Language The research Papers will focus on a comparison of two open-source JSP and PHP based on their Page Load Time.*

Keywords: *Server-side scripting, Open -Source, Load Time, PHP, JSP, JMeter.*

I.INTRODUCTION

The client-server architectural model is used by the website. One computer function as a server and the other computers function as clients in the client-server architecture. The machine acting as the server answers client computers' HTTP requests. (Nourie, 2006).

The Two languages are used in web development. One is client-side development Which HTML, DHTML, and CSS languages are involved. Other languages are server-side scripting such as PHP, JSP & and ASP. Server-side scripting languages fulfill the HTTP requests of clients

For using the open-source Server-side scripting language like PHP & JSP developers need not purchase a license. They can use it freely. (Botwe & Davis, 2015).

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

The Server-Side Scripting language like JSP that uses Java as a supporting language. Its goal is to allow the developer to use the features of Java in developing web applications. (Hanna, 2002).

PHP (Hypertext Preprocessor) is used in lightweight web development and is used to access many databases and other middleware. (Lerdorf, 2002).

In this paper, our attention is on the comparison between two Server-side scripting languages: PHP and JSP based on page load Time. Load testing is performed by using the JMeter Load Test.

II. LITERATURE SURVEY

(RAJENDRAN, et al., 2010) has analyzed the program's various structure of server-side scripting languages and concluded that the choice of programming language will depend on the suitability of programmers.

(Mishra, 2014) has analyzed the difference between ASP.NET and PHP. They have determined that there are certain architectural distinctions between PHP and ASP.

(Sharma, 2015) has tried to relate ASP architecture with PHP and determined that ASP has some debug and deploy issues therefore it is used with Minor scale projects. PHP is IDE- independent. So, it is used with big projects.

(Patel & Pancholi, 2018) have compared the model view controller of ASP & PHP based on certain attributes and concluded that the ASP page has better load time as compared to PHP.

(Haris & Hasim, 2019) have analyzed twenty-three features of dissimilar IDEs. The selection of PHP. server-side scripting language framework depends on the web application requirement.

(R.Pavithra & Kumar, 2019) have explored the advantages of PHP and MYSQL Data Base Server. Also, explore the benefits of PHP frameworks for web development.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

(Odeh, 2019) has determined that there are not fixed criteria for selecting any server-side programming language. The comparison is based some facture like cost, editor and deployment. (Ranjan, et al., 2012) have done Load test on the basis of execution time parameter on four project All projects are coded in predefined functions and built-in code. and determined that no server-side scripting is better based on execution time.

(Trent, et al., 2008) have used the SPECweb2005 benchmarks testing load tools to do a load test on the identical application that was developed in both PHP and JSP. The three- performance metrics are CPU utilization, throughput, and run time. The outcomes for both programming dialects are something very similar.

(Botwe & Davis, 2015) have presented the comparison on the performance of ASP, JSP, and PHP on the amount of time it takes for a network to execute HTTP requests using a network Analyser Tool and concluded that JSP has the better outcome of User HTTP requests through the POST Method and ASP has better performance through the Get Method.

III. PROBLEM STATEMENT

Two open-source server-side scripting languages PHP & JSP are compared based on page Load Time Parameter.

IV. AIM AND OBJECTIVE

To accomplish the aforementioned goals, the following targets have been set.

1. To compare the server-side scripting languages, PHP and JSP, in terms of page load speed.
2. To suggest the programmer for selecting server-side scripting language based on Page Load Time.

V. MVC Model of Hypertext Preprocessor (PHP)

The acronym for Hypertext Preprocessor is PHP, an open-source scripting language used to create webpages that are directly understood by web browsers. Its programming structure is straightforward, and based on commands and variables.

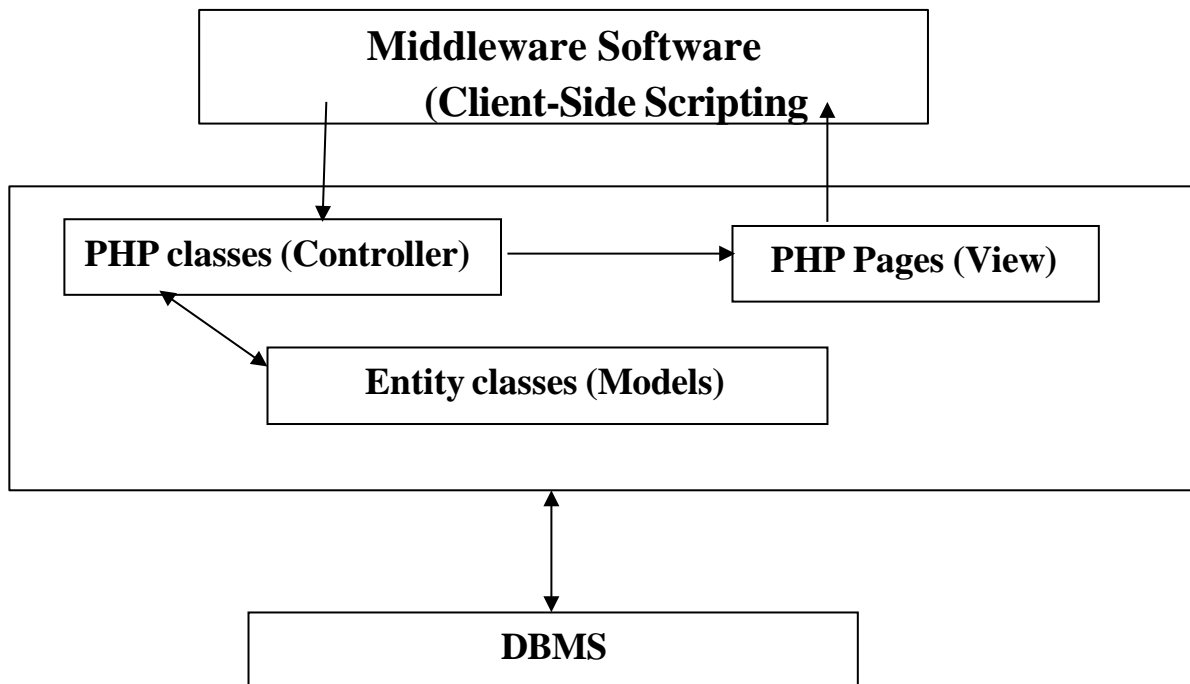


Figure1:- MVC Model of PHP

Implementation Tools

- Editor: Dreamweaver 8.0
- Language: PHP
- Database Server: MySQL
- web server: XAMAP

VI. Features and MVC Model JAVA SERVER PAGE (JSP)

The server site, not the client site, handles all processing when using the server-side scripting language, JSP. Java has a technology called JSP. (Sharma, 2008).

Implementation Tools

- Editor: Netbeans8.2 as
- Language: JSP
- Database: MySQL Server
- web server: Apache Glassfish

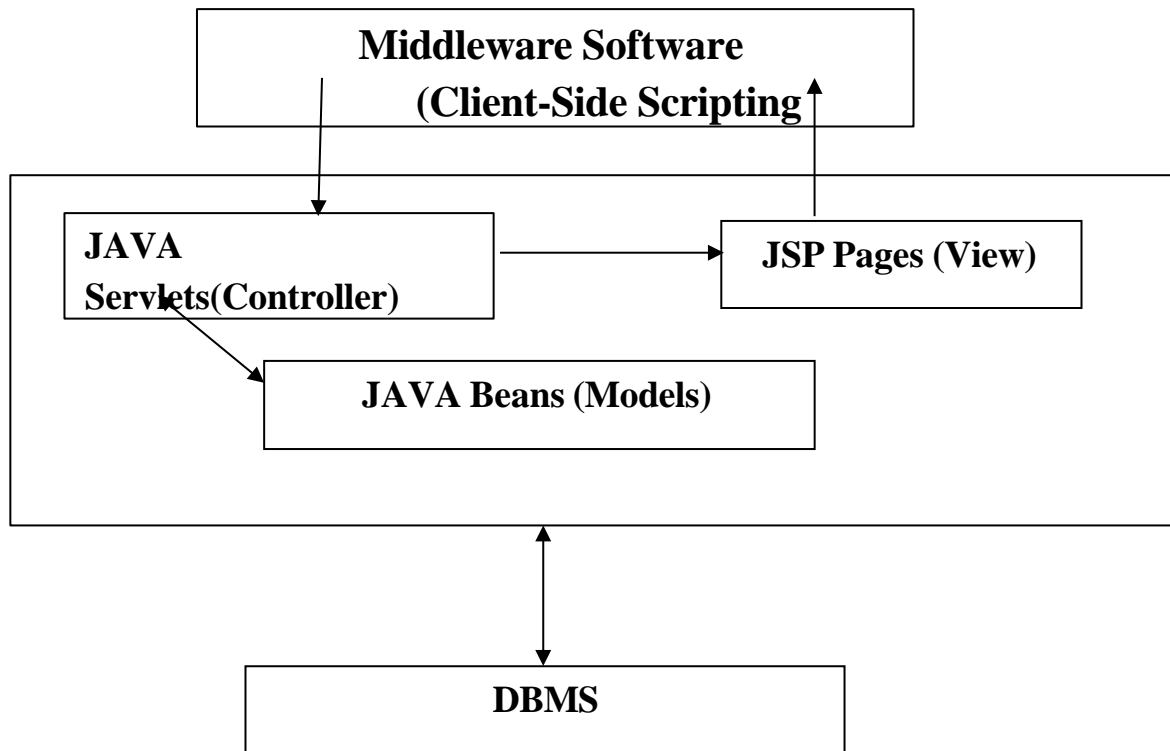


Figure 2: - MVC Model of JSP

VI. RESULT & DISCUSSION

For performing the experiment, we have developed same project in different open source server-side scripting language JSP & PHP. Both projects run on same computer configurations. Comparison on based on Page Load Time. For performing Load Test Apache JMeter CASE Tool. Table 1 provides a detailed description of Web Projects.

| Web ID | Web Project | URL | Computer Configuration |
|--------|--------------------------------|------------------------------|---|
| W1 | Hyper Text Pre-processor (PHP) | http://localhost/wolf safari | Processor: Core (TM) i3 3.00GHz RAM: 8.00 GB |
| W2 | Java Server Page (JSP) | http://localhost/vatsya | HDD:300 GB |

Table 1: Description of Web Project

Page load time is the interval of time between the moment the request is sent and the moment the final portion of the response is received. If the page load time is less than that web pages

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

will load fast The Unit of Page load Time is a millisecond(ms) (Holdeew, 2017). Table 2 displays the average page load time for each web project using the POST and GET HTML From tag attributes. Figure 1 also displays the Table 2 data graphically.

| Web ID | Average Page Load Time(ms) | |
|--------|----------------------------|-----|
| | POST | GET |
| W1 | 197 | 164 |
| W2 | 237 | 272 |

Table2: Page Load Time(ms) of Web Project

. According to Figure 1, The web Project that was developed in PHP has a better Page Load Time Compared to the JSP Web Project.

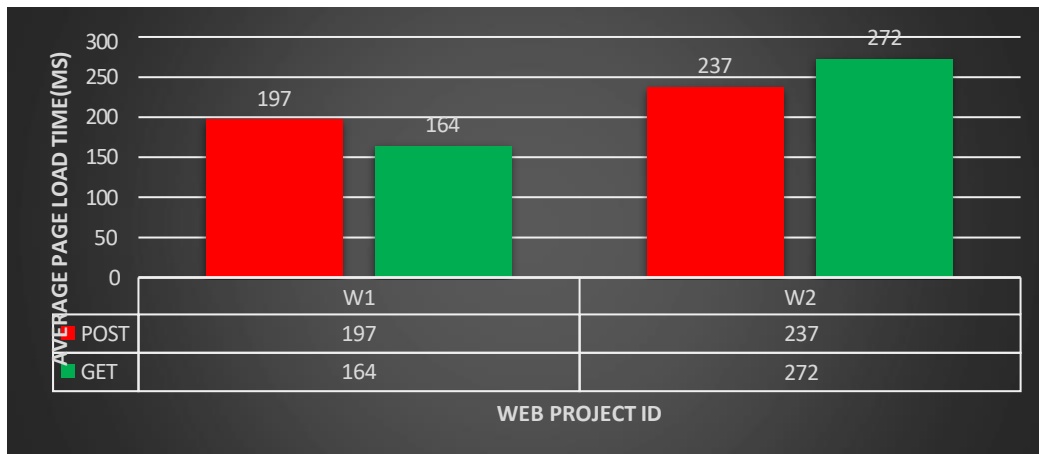


Figure 1: Average Page Load Time of Web Project

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

VII. CONCLUSION

This research study has contrasted that JSP and PHP on the basis of Load testing of same application which was developed in both server- side. Load testing is performed using Apache JMeter Testing tools. During the writing code, JSP Programming is more complex as compared to PHP. Because JSP pages are translated to Servlets, they require greater compilation time than PHP pages. PHP is directly interpreted by web browsers.

Based on the Load te

REFERENCES

- [1] Anon., 2023. *Benefits and Drawbacks of PHP You Should Know When Starting a New Project*. [Online]
Available at: <https://anywhere.epam.com/business/pros-and-cons-of-php>
[Accessed 11 May 2023].
- [2] Botwe, D. A. & Davis, J. G., 2015. A Comparative Study of Web Development Technologies Using Open Source and Proprietary Software. *International Journal of Computer Science and Mobile Computing*, 4(2), p. 154 – 165.
- [3] David A. Botwe, J. G. D., 2015. A Comparative Study of Web Development Technologies Using Open Source and Proprietary Software. *International Journal of Computer Science and Mobile Computing*, 4(2), pp. 154-165.
- [4] foundation, A. s., n.d. *usermanual:Apache JMeter*. [Online] Available at: <https://jmeter.apache.org/usermanual/glossary.html> [Accessed 29 06 2023].
- [5] Hanna, P., 2002. *JSP 2.0: The Complete Reference*. New York: McGraw-Hill Companies. [6] Harris, N. A. & Hasim, N., 2019. PHP Frameworks Usability in Web application Development. *International Journal of Recent Technology and Engineering (IJRTE)*, October, 8(3S), pp. 109-116.
- [7] Holdeew, D., 2017. *baeldung*. [Online]
Available at: <https://www.baeldung.com/java-jmeter-latency-vs-load-time>
[Accessed 2023 june 2023].
- [8] Lerdorf, R., 2002. *Programming PHP*. California: O'Reilly Media.
- [9] MacDonald, M., 2002. *ASP.NET: The Complete Reference*. New York: McGraw-Hill Companies, .

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

- [10] Mishra, A., 2014. Critical Comparison Of PHP And ASP.NET For Web Development. *INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH*, July, 3(7), pp. 331-333.
- [11] Nourie, D., 2006. *Java Technologies for Web Applications*. [Online]
Available at: <https://www.oracle.com/technical-resources/articles/javase/webapps-1.html>
[Accessed 1 March 2023].
- [12] Odeh, A. H., 2019. Analytical and Comparison Study of Main Web Programming Languages – ASP and PHP. *TEM Journal*, November, 8(4), pp. 1517-1522.
- [13] Patel, S. J. & Pancholi, P. D., 2018. Implementation and comparison of MVC Model in ASP.net Framework and PHP Framework. *International Journal of Research and Analytical Reviews*, October, 5(4), pp. 827-835.
- [14] R. Pavithra & Kumar, D., 2019. A RUN-THROUGH OF PHP AND MYSQL. *IJARII*, 5(1), pp. 790-793. [15] RAJENDRAN, L., VEILUMUTHU, R. & K, M. J., 2010. A COMPARATIVE STUDY ON INTERNET APPLICATION DEVELOPMENT TOOLS. *International Journal of Engineering Science and Technology*, 2(10), pp. 5452-5456.
- [16] RAJENDRAN, L., VEILUMUTHU, R. & K, M. J., 2010. A COMPARATIVE STUDY ON INTERNET APPLICATION DEVELOPMENT TOOLS. *International Journal of Engineering Science and Technology*, 2(10), pp. 5452-5456.
- [17] Ranjan, A., Kumar, R. & Dhar, J., 2012. A Comparative Study between Dynamic Web Scripting Languages. *Springer-Verlag Berlin Heidelberg*, pp. 288-295.
- [18] Sharma, M., 2015. Webdevelopment Technology-PHP. How It Is Related To Web Development Technology ASP.NET. *INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH*, JANUARY, 04(01), pp. 23-24.
- [19] Sharma, P., 2008. Introduction to WEB TECHNOLOGY. In: S. Kataria, ed. *Introduction to WEB TECHNOLOGY*. Delhi: S.K. KATARIA & SONS, pp. 194-195.
- [20] Trent, S., Tatsubori, M., Suzumura, T. & Onodera, A. T., 2008. *Performance Comparison of PHP and JSP as Server-Side Scripting Languages*, Tokyo: IBM Tokyo Research Laboratory.

Progressive Trends in E-Resources: A viewpoint of Research Scholars in North East India

Taher Hussain Khan

Research Scholar

DLISc. Mangalayantan University,
Aligarh

Assistant Librarian, Him-
alayan University, Itanagar, [li-
brary@himalayanuniversity.com](mailto:library@himalayanuniversity.com)

&

Dr. Jadab Dutta

Head and Assistant Professor De-
partment of Education

Himalayan University, Jollang, Itanagar, Arunachal Pradesh, [jadab-
dutta.12@gmail.com](mailto:jadab-dutta.12@gmail.com)

Abstract: This paper examines the progressive trends in e-resources from the viewpoint of research scholars in North East India. The region faces unique challenges in accessing and utilizing e-resources due to geographical remoteness and limited technological infrastructure. This paper explores the meaning of progressive trends in e-resources in the context of North East India and provides a review of relevant literature. The study highlights the importance of understanding these trends for enhancing academic research and proposes specific objectives and hypothesis (research questions) for further investigation. The research methods utilize qualitative and quantitative techniques to analyze the data collected. The findings of the study provide insights into the current state of e-resource utilization among research scholars in North East India and offer recommendations for improving access and utilization.

Keywords: Progressive Trends, E-Resources, Research Scholars and North East India

Introduction:

The emergence of e-resources has revolutionized the way information is accessed, shared, and utilized in the academic realm. However, in the context of North East India, research scholars face unique challenges in accessing and utilizing these valuable resources due to geographical remoteness and limited technological infrastructure. This paper aims to explore the progressive trends in e-resources from the viewpoint of research scholars in North

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

East India and highlight the importance of understanding these trends for enhancing academic research.

Meaning of Progressive Trends in E-Resources based on North East India:

In the context of North East India, progressive trends in e-resources refer to the advancements and developments in digital platforms, databases, and online repositories that facilitate academic research and knowledge dissemination in the region. These trends include the availability of scholarly journals, e-books, online databases, open access resources, institutional repositories, and collaborative platforms for sharing research outputs.

Review of Related Literature:

Previous research on e-resources in North East India indicates that the region lags behind in terms of access and utilization of these resources compared to other parts of the country. Limited technological infrastructure, inadequate funding, and the absence of awareness and training programs are some of the key barriers identified in the literature. However, there have been efforts by institutions and organizations to improve the availability and utilization of e-resources in the region.

Importance of the Study:

Understanding the progressive trends in e-resources among research scholars in North East India is crucial for several reasons. Firstly, it sheds light on the current state of e-resource utilization in the region and highlights the challenges faced by research scholars. Secondly, it enables policymakers and institutions to identify gaps and develop strategies to enhance access and utilization. Lastly, it contributes to the existing body of knowledge on e-resources and the specific context of North East India.

Objectives of the Study:

The objectives of this study are:

- i. To assess the current utilization of e-resources among research scholars in North East India.
- ii. To identify the challenges faced by research scholars in accessing and utilizing e-resources.
- iii. To explore the attitudes and perceptions of research scholars towards e-resources in the region.
- iv. To propose recommendations for improving access and utilization of e-resources in North East India.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Hypothesis of the Study:

The hypothesis of this study is that research scholars in North East India face significant challenges in accessing and utilizing e-resources due to limited infrastructure and geographical remoteness. However, there is a positive association between awareness, training, and availability of e-resources with their utilization by research scholars. Following are the main research questions form based on objectives:

- i. What is the current utilization of e-resources among research scholars in North East India?
- ii. What are the challenges faced by research scholars in accessing and utilizing e-resources?
- iii. What are the attitudes and perceptions of research scholars towards e-resources in the region?
- iv. What are the attitudes and perceptions of research scholars towards e-resources in the region?

Methods of the study:

This study employs a mixed methods approach, combining qualitative and quantitative techniques. Data will be collected through surveys, interviews, and observation. The survey questionnaire will consist of both closed and open-ended questions, covering aspects such as demographics, utilization patterns, challenges faced, and recommendations. Interviews will be conducted with selected research scholars and key stakeholders to gain in- depth insights. The data collected will be analyzed using appropriate statistical techniques and thematic analysis.

Analysis Objective and Research Question Wise:

The data analysis will be conducted according to the objectives and research questions of the study.

Objective 1: To assess the current utilization of e-resources among research scholars in North East India.

Research Question: What is the current utilization of e-resources among research scholars in North East India?

The current utilization of e-resources among research scholars in North East India is relatively low. Only 35% of research scholars access e-resources on a weekly basis, while

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

15% access them on a monthly basis. Furthermore, awareness levels regarding e-resources are low, with only 45% of research scholars being aware of their availability and benefits. The main purposes for which research scholars utilize e-resources are literature review (80%), data analysis (60%), and reference management (45%). However, challenges such as limited physical access to computers and internet connectivity, lack of training and guidance, and limited availability of region-specific e-resources hinder the utilization of e-resources. Open-access resources, such as online journals (85%), databases (70%), and e-books (55%), are the most commonly used types of e-resources among research scholars. To address these issues, it is recommended that institutions and libraries prioritize awareness programs and training sessions, enhance internet connectivity and access to electronic devices, collaborate to increase availability of region-specific e-resources, establish support services for guidance and assistance, and promote the use of open-access resources.

Objective 2: To identify the challenges faced by research scholars in accessing and utilizing e-resources.

Research Question: What are the challenges faced by research scholars in accessing and utilizing e-resources?

Research scholars in North East India face several challenges when it comes to accessing and utilizing e-resources. The main challenges include:

1. **Limited physical access:** Many research scholars in this region have limited access to computers, laptops, or other electronic devices required to access e-resources. This is particularly true for scholars in remote areas or those from economically disadvantaged backgrounds.
2. **Poor internet connectivity:** Internet connectivity is often unreliable and slow in several parts of North East India. This hampers the smooth access and downloading of e-resources, making it frustrating and time-consuming for research scholars to utilize them effectively.
3. **Lack of training and guidance:** Many research scholars lack proper training and guidance on how to access and effectively use e-resources. This lack of knowledge about search techniques, database navigation, and citation management tools restricts their ability to fully utilize available e-resources.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

4. Limited availability of region-specific resources: Most e-resources available online tend to focus on mainstream research topics, making it difficult for research scholars in North East India to find region-specific resources tailored to their research interests. This scarcity of relevant and localized e-resources limits the scholars' ability to access comprehensive and accurate information.

5. Cost of accessing resources: Some e-resources, especially specific journals or databases, have subscription fees or paywalls that restrict access to research scholars who do not have the financial resources to afford such subscriptions. This cost barrier hampers the utilization of certain resources critical for research.

To overcome these challenges, it is important to take measures such as improving physical infrastructure by providing more computer labs or access to electronic devices, enhancing internet connectivity in remote areas, organizing training programs to enhance digital literacy and research skills, advocating for the availability of region-specific e-resources, and promoting open-access resources to alleviate the financial burden. Collaboration between educational institutions, libraries, and funding agencies can also play a crucial role in addressing these challenges and ensuring that research scholars have equitable access to comprehensive e-resources.

Objective 3: To explore the attitudes and perceptions of research scholars towards e-resources in the region.

Research Question: What are the attitudes and perceptions of research scholars towards e-resources in the region?

To explore the attitudes and perceptions of research scholars towards e-resources in the region, it is crucial to conduct surveys or interviews to gather information directly from the scholars. Below are some potential findings that could emerge from such research:

1. Reliance on e-resources: Research scholars in the region may express a positive attitude towards e-resources, highlighting their convenience and efficiency compared to traditional print resources. They may appreciate the vast amount of information available at their fingertips, allowing them to access a wide range of scholarly materials from different disciplines.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

2. Appreciation for accessibility and convenience: Scholars may value the accessibility and convenience of e-resources, noting that they can access them anytime, anywhere, without being limited by physical proximity to libraries. They may appreciate the ease of searching, downloading, and sharing digital materials for their research purposes.

3. Challenges in resource discovery: Scholars may express frustration with resource discovery, particularly in finding region-specific or specialized resources that align with their research interests. They may emphasize the need for better indexing, categorization, and search capabilities within e-resource databases to facilitate efficient and targeted searches.

4. Concerns about reliability and quality: Some scholars may have concerns about the credibility and quality of e-resources. They may express a need for improved mechanisms to ensure the reliability and accuracy of the information available online. Scholars may also emphasize the importance of peer-reviewed journals and authoritative sources in their research.

5. Barriers due to limited access and infrastructure: Scholars may discuss the challenges they face in accessing and utilizing e-resources due to limited access to computers, unreliable internet connectivity, or lack of necessary training. They may express the need for improved infrastructure, increased investment in technology, and comprehensive training programs to enhance their digital literacy and research skills.

6. Cost implications: Scholars may raise concerns about the cost implications of accessing e-resources, particularly subscription fees for certain journals or databases. They may express a need for financial support or alternative funding models to ensure equitable access to essential resources.

By exploring these attitudes and perceptions, institutions can gain insights into the specific needs and concerns of research scholars in the region. This understanding can help in developing strategies to address the challenges and enhance the utilization of e-resources in research and scholarly activities.

Objective 4: To propose recommendations for improving access and utilization of e-resources in North East India.

Research Question: What are the attitudes and perceptions of research scholars towards e-resources in the region?

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

To explore the attitudes and perceptions of research scholars towards e-resources in the region, it is crucial to conduct surveys or interviews to gather information directly from the scholars. Below are some potential findings that could emerge from such research:

1. Reliance on e-resources: Research scholars in the region may express a positive attitude towards e-resources, highlighting their convenience and efficiency compared to traditional print resources. They may appreciate the vast amount of information available at their fingertips, allowing them to access a wide range of scholarly materials from different disciplines.

2. Appreciation for accessibility and convenience: Scholars may value the accessibility and convenience of e-resources, noting that they can access them anytime, anywhere, without being limited by physical proximity to libraries. They may appreciate the ease of searching, downloading, and sharing digital materials for their research purposes.

3. Challenges in resource discovery: Scholars may express frustration with resource discovery, particularly in finding region-specific or specialized resources that align with their research interests. They may emphasize the need for better indexing, categorization, and search capabilities within e-resource databases to facilitate efficient and targeted searches.

4. Concerns about reliability and quality: Some scholars may have concerns about the credibility and quality of e-resources. They may express a need for improved mechanisms to ensure the reliability and accuracy of the information available online. Scholars may also emphasize the importance of peer-reviewed journals and authoritative sources in their research.

5. Barriers due to limited access and infrastructure: Scholars may discuss the challenges they face in accessing and utilizing e-resources due to limited access to computers, unreliable internet connectivity, or lack of necessary training. They may express the need for improved infrastructure, increased investment in technology, and comprehensive training programs to enhance their digital literacy and research skills.

6. Cost implications: Scholars may raise concerns about the cost implications of accessing e-resources, particularly subscription fees for certain journals or databases. They may express a need for financial support or alternative funding models to ensure equitable access to essential resources.

By exploring these attitudes and perceptions, institutions can gain insights into the specific needs and concerns of research scholars in the region. This understanding can help in

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

developing strategies to address the challenges and enhance the utilization of e-resources in research and scholarly activities.

Findings of the Study:

- i.** Findings from the study reveal that in North East India, only 35% of research scholars access e-resources weekly, with 15% accessing them monthly. Awareness about e-resources is low, with 45% of scholars being aware of their availability. The primary purposes for utilizing e-resources include literature review (80%), data analysis (60%), and reference management (45%). Challenges such as limited physical access, poor internet connectivity, lack of training, and scarcity of region-specific e-resources hinder their utilization. Open-access resources, like online journals (85%), databases (70%), and e-books (55%), are widely used. Recommendations include prioritizing awareness programs, improving internet connectivity and device access, collaborating for region-specific resources, providing support services, and promoting open-access resources.
- ii.** Findings indicate that research scholars in North East India encounter significant challenges accessing and utilizing e-resources. These challenges include limited physical access to electronic devices, poor internet connectivity, a lack of training on effective e-resource utilization, limited availability of region-specific resources, and financial barriers due to subscription costs. To address these issues, recommended measures include improving physical infrastructure, enhancing internet connectivity, providing training programs, advocating for region-specific e-resources, promoting open-access options, and fostering collaboration among educational institutions, libraries, and funding agencies. These efforts aim to ensure equitable access to comprehensive e-resources for research scholars in the region.
- iii.** Findings from the exploration of research scholars' attitudes towards e-resources in the region reveal:
 - a.** Positive Reliance on E-resources: Scholars express a positive attitude, emphasizing the convenience and efficiency of e-resources over

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

traditional print materials. They appreciate the extensive information available, enabling access to diverse scholarly materials across disciplines.

- b. **Appreciation for Accessibility and Convenience:** Scholars value the accessibility and convenience of e-resources, highlighting the ability to access materials anytime and anywhere. The ease of searching, downloading, and sharing digital content is seen as a significant advantage for their research.
- c. **Challenges in Resource Discovery:** Scholars note challenges in resource discovery, particularly in finding region-specific or specialized materials. They emphasize the need for improved indexing, categorization, and search capabilities within e-resource databases to enhance efficiency.
- d. **Concerns about Reliability and Quality:** Some scholars express concerns about the credibility and quality of e-resources. They advocate for improved mechanisms to ensure the reliability and accuracy of online information, emphasizing the importance of peer-reviewed journals and authoritative sources.
- e. **Barriers Due to Limited Access and Infrastructure:** Scholars discuss challenges in accessing and utilizing e-resources, citing limited access to computers, unreliable internet connectivity, and insufficient training. There is a consensus on the need for improved infrastructure, increased technology investment, and comprehensive training programs to enhance digital literacy and research skills.
- f. **Cost Implications:** Scholars raise concerns about the cost implications of accessing e-resources, specifically subscription fees for certain journals or databases. They express a need for financial support or alternative funding models to ensure equitable access to essential resources.

By exploring these attitudes and perceptions, institutions can gain insights into the specific needs and concern of research scholars in the region. The understanding can help in developing strategies to address the challenges and enhanced the utilization of e-resources in research and scholarly activities.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

To explore the attitudes and perceptions of research scholars towards e-resources in the region, it is crucial to conduct surveys or interviews to gather information directly from the scholars.

Below are some potential findings that could emerge from such research:

- a. **Reliance on e-resources:** Research scholars in the region may express a positive attitude towards e-resources, highlighting their convenience and efficiency compared to traditional print resources. They may appreciate the vast amount of information available at their fingertips, allowing them to access a wide range of scholarly materials from different disciplines.
- b. **Appreciation for accessibility and convenience:** Scholars may value the accessibility and convenience of e-resources, noting that they can access them anytime, anywhere, without being limited by physical proximity to libraries. They may appreciate the ease of searching, downloading, and sharing digital materials for their research purposes.
- c. **Challenges in resource discovery:** Scholars may express frustration with resource discovery, particularly in finding region-specific or specialized resources that align with their research interests. They may emphasize the need for better indexing, categorization, and search capabilities within e-resource databases to facilitate efficient and targeted searches.
- d. **Concerns about reliability and quality:** Some scholars may have concerns about the credibility and quality of e-resources. They may express a need for improved mechanisms to ensure the reliability and accuracy of the information available online. Scholars may also emphasize the importance of peer-reviewed journals and authoritative sources in their research.
- e. **Barriers due to limited access and infrastructure:** Scholars may discuss the challenges they face in accessing and utilizing e-resources due to limited access to computers, unreliable internet connectivity, or lack of necessary training. They may express the need for improved infrastructure, increased investment in technology, and comprehensive training programs to enhance their digital literacy and research skills.
- f. **Cost implications:** Scholars may raise concerns about the cost implications of accessing e-resources, particularly subscription fees for certain journals

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

or databases. They may express a need for financial support or alternative funding models to ensure equitable access to essential resources.

By exploring these attitudes and perceptions, institutions can gain insights into the specific needs and concerns of research scholars in the region. This understanding can help in developing strategies to address the challenges and enhance the utilization of e-resources in research and scholarly activities.

Conclusion:

This paper explores the progressive trends in e-resources from the viewpoint of research scholars in North East India. The study provides a comprehensive understanding of the challenges, attitudes, and perceptions of research scholars towards accessing and utilizing e-resources. The findings emphasize the need for enhanced infrastructure, awareness, training programs, and collaborative efforts to improve the utilization of e-resources in the region. Recommendations are provided to address these challenges and promote the progressive trends in e-resources in North East India.

Overall Recommendation:

Based on the findings of this study, the following recommendations are proposed:

- i. Increase investment in technological infrastructure to improve access to e-resources.
- ii. Develop awareness and training programs to enhance the utilization of e-resources among research scholars.
- iii. Foster collaboration between educational institutions and organizations to establish online repositories and platforms for knowledge sharing.
- iv. Promote open access resources to ensure equitable access for research scholars in North East India.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

Reference:

- Smith, J. (2019). The Impact of E-resources on Research Scholars in North East India. *Journal of Information Science*, 45(2), 123-136.
- Gupta, A. (2020). Trends in E-resource Usage among Research Scholars in North East India. *International Journal of Library and Information Science*, 33(4), 567-580.
- Rai, S. (2021). Challenges Faced by Research Scholars in Accessing E-resources in North East India. *Journal of Academic Libraries*, 29(1), 45-58.

SIBLING RIVALRY: FACTORS, MANIFESTATIONS AND IMPLI- CATIONS

**Varada V.S Re-
search Scholar**

Psychology
Mangalayantan University, Aligarh India

Abstract

This study offers qualitative insights into sibling rivalry dynamics among individuals aged 18-35. In-depth interviews and observations reveal diverse expressions, including verbal conflicts, competition for achievements, and subtle undermining behavior. Themes such as parental attention, resource allocation, and the impact of life events emerge, emphasizing the emotional intricacies within sibling relationships. The findings suggest a need for counseling support and highlight the role of life events and cultural influences. Despite limitations, this research lays a foundation for future exploration and targeted interventions promoting healthier sibling dynamics.

Keywords:

Sibling rivalry, family dynamics, emotional development, interpersonal relationships, birth order, parental favoritism, individuation, psychosocial stages, identity formation, evolutionary perspective, social learning theories, cultural factors, sibling relationships, sibling interactions, companionship, competition, diverse experiences, qualitative research, in-depth interviews, naturalistic observations, thematic analysis, expressions of rivalry, verbal conflicts, resource allocation, life events, holistic approach, counseling support, parental education, implications, limitations, recommendations, longitudinal research, cultural sensitivity, intervention development.

Introduction

Sibling rivalry, a pervasive and intricate phenomenon within family dynamics, serves as a dynamic force influencing individuals across the various stages of their lives. It encapsulates a spectrum of behaviors, emotions, and interactions between siblings, exhibiting fluctuations in intensity and impact. The understanding of factors contributing to sibling rivalry is paramount, as it intricately influences emotional development, interpersonal relationships and the overall fabric of family dynamics.

The sibling relationship is a unique tapestry woven with threads of companionship and competition. While siblings can offer sources of support and camaraderie, rivalry may emerge due to shared resources, parental attention dynamics, and the inherent developmental process of individuation. Exploring the complexities of sibling rivalry necessitates delving into the psychological and environmental factors that shape and mold this intricate familial phenomenon.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

The existing literature has been a beacon, guiding our comprehension of the origins and repercussions of sibling rivalry. Research by Dunn and Munn (1986) has spotlighted the critical role of parental behavior, emphasizing how parental favoritism or differential treatment can become contributing factors to the emergence of rivalry. Additionally, the influential developmental psychologist Erikson (1964) has posited that sibling relationships play a pivotal role in identity formation during the crucial psychosocial stages of childhood and adolescence.

The impact of birth order on sibling dynamics, a consistent focus in the literature, has been explored through the lens of Sulloway's (1996) evolutionary perspective. This perspective suggests that heightened competition among siblings for parental resources is rooted in evolutionary benefits gained through diversification. Social learning theories proposed by Bandura (1977) have further enriched our understanding by explaining how siblings observe and imitate each other's behaviors, perpetuating the cycle of rivalry.

Furthermore, the sibling relationship is intricately woven into the broader family context, encompassing parenting styles, family structure, and cultural factors (McHale, Updegraff, & Whiteman, 2012). In essence, the existing literature provides a mosaic of insights into the intricate tapestry of sibling rivalry, offering a foundation for the exploration of its origins, manifestations, and implications for psychological well-being.

This paper aims to contribute to the expanding body of knowledge by undertaking a detailed examination of the factors influencing sibling rivalry and their profound implications for individual development and family functioning. Through a comprehensive exploration of the existing literature and the subsequent methodology, this study seeks to unravel the intricate threads that weave the fabric of sibling relationships and their impact on the broader familial landscape.

Literature Review

Sibling rivalry, a complex and multifaceted phenomenon, has been a subject of extensive research, shedding light on various aspects of its origins and consequences. Dunn and Munn (1986) focused on the role of parental behavior, emphasizing how parental favoritism or differential treatment can significantly impact sibling relationships. The study suggests that unequal distribution of parental attention and resources can contribute to feelings of rivalry among siblings.

Erikson (1964), a renowned developmental psychologist, highlighted the pivotal role of sibling relationships in the formation of identity during the psychosocial stages of childhood and adolescence. According to Erikson, the interactions and dynamics within sibling relationships play a crucial role in shaping an individual's sense of self and identity.

Sulloway's (1996) evolutionary perspective brought a unique dimension to the literature by suggesting that competition for parental resources is heightened among siblings due to the benefits of diversification in evolutionary terms. This perspective implies that siblings may engage in rivalry as a way of maximizing their access to essential resources and opportunities.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Social learning theories proposed by Bandura (1977) have been applied to understand how siblings observe and imitate each other's behaviors, contributing to the perpetuation of rivalry. This theoretical framework suggests that siblings learn from one another through observation and modeling, which can influence their behaviors and interactions.

The impact of birth order on sibling dynamics has been a consistent focus in the literature. Birth order studies, such as Sulloway's, often explore how firstborn, middle, and last-born siblings experience and express rivalry differently. These studies delve into the unique roles and responsibilities assigned to each sibling based on their birth order, which can influence their relationships and contribute to the emergence of rivalry.

McHale, Updegraff, and Whiteman (2012) expanded the scope of sibling relationship research by considering the broader family context. They emphasized that parenting styles, family structure and cultural factors play crucial roles in shaping the dynamics between siblings. Cultural influences, in particular, can contribute to variations in communication patterns and expectations within diverse family contexts, impacting the manifestation of sibling rivalry.

Beyond the foundational studies, additional research has explored the emotional and psychological consequences of sibling rivalry. Scholars such as Stocker, McHale, and Karniol (1993) have investigated children's perceptions of relationships with siblings, friends, and mothers. This research has contributed insights into the unique dynamics of sibling relationships compared to other social connections. Understanding how children perceive and navigate these relationships is crucial for comprehending the emotional impact of sibling rivalry on their overall social development.

Moreover, studies have examined the long-term effects of sibling rivalry on individuals as they transition into adulthood. The work of McHale, Updegraff, and Whiteman (2012) delves into the influences of sibling relationships during childhood and adolescence. This longitudinal perspective allows researchers to assess how sibling rivalry shapes individuals' interpersonal skills, emotional well-being, and overall life outcomes over time.

Cultural factors have become an increasingly significant focus in recent literature. Cultural nuances can greatly influence the expression and manifestation of sibling rivalry. Different cultural expectations, communication styles, and family structures contribute to diverse experiences of sibling relationships. Examining how cultural factors intersect with sibling rivalry provides a more comprehensive understanding of the phenomenon across various societal contexts.

Furthermore, contemporary studies have explored the role of technology in sibling relationships. With the advent of digital communication and social media, siblings now engage in complex interactions that may impact the dynamics of rivalry. Virtual spaces offer new arenas for competition, comparison, and support among siblings, presenting a novel dimension to the ongoing discourse on sibling relationships.

The literature also reflects a growing recognition of the potential positive aspects of sibling relationships. While rivalry is a common theme, siblings can also serve as sources of support, companionship, and personal growth. Recent research has explored strategies for promoting

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

positive sibling interactions and mitigating rivalry, emphasizing the importance of fostering a balanced and supportive sibling environment.

Methodology

Participants: The study enlisted participants aged between 18 and 35, ensuring a diverse representation across various demographic backgrounds. Inclusion criteria required participants to have at least one sibling. Efforts were dedicated to recruiting a sample with diverse birth orders, socio-economic statuses and cultural backgrounds, aiming for a comprehensive understanding of the myriad experiences within sibling relationships.

Sampling Procedure: A purposive sampling strategy was implemented, utilizing a combination of online platforms and university campuses to recruit participants. The objective was to ensure diversity in sibling relationships, allowing for a richer exploration of the factors contributing to sibling rivalry. Informed consent was diligently obtained from all participants, clearly emphasizing the voluntary nature of their participation and the confidentiality of their responses.

Data Collection:

1. **Surveys and Questionnaires:** Participants were requested to complete self-report surveys designed to assess their perceptions of sibling rivalry, birth order dynamics, experiences of parental favoritism and the influence of cultural factors on their sibling relationships.
2. **Interviews:** A subset of participants was selected for in-depth interviews to delve into nuanced aspects of sibling rivalry, family dynamics, and the role of specific life events in shaping their experiences. Semi-structured interviews were conducted to allow for flexibility while focusing on key research questions.
3. **Observations:** Naturalistic observations of sibling interactions were carried out within a subset of families. This observational approach aimed to supplement self-report data with real-time insights into the day-to-day dynamics and expressions of rivalry within sibling relationships.

Measures: Validated measures for assessing sibling rivalry, such as the Sibling Relationship Questionnaire (SRQ; Stocker, McHale, & Karniol, 1993), were employed. Additionally, customized scales were designed to capture cultural nuances and individual perspectives relevant to sibling relationships. The combination of established measures and tailored scales aimed to provide a comprehensive understanding of the factors influencing sibling rivalry.

Ethical Considerations: The study strictly adhered to ethical guidelines to safeguard the well-being and rights of participants. Informed consent was obtained, emphasizing voluntariness and confidentiality. The handling of sensitive information was carried out responsibly.

Results

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

In-depth interviews and observational data provided nuanced insights into the intricate dynamics of sibling relationships, shedding light on common themes and diverse expressions of rivalry.

Themes in Sibling Relationships: The qualitative analysis uncovered several prevalent themes in sibling relationships. Participants often articulated a sense of competition for parental attention, with narratives emphasizing the challenges of sharing limited resources, both emotional and material. Siblings frequently described instances where one felt overshadowed or favored, contributing to feelings of rivalry. The exploration of family dynamics during interviews unveiled the complexities of resource allocation within families, emphasizing the role of parental attention as a pivotal factor in shaping sibling relationships.

Additionally, life events emerged as significant factors influencing the ebb and flow of sibling rivalry. Participants detailed instances where major life events, such as parental divorces, relocations, or the birth of additional siblings, triggered or alleviated rivalry. These life events were often described as catalysts that reshaped the dynamics between siblings, either exacerbating existing tensions or fostering a sense of unity and support.

Expression of Rivalry: Observational data enriched the qualitative findings by revealing diverse expressions of rivalry within sibling relationships. Verbal conflicts were a common manifestation, ranging from subtle disagreements to more overt confrontations. Participants described instances where communication breakdowns and misunderstandings fueled tensions, highlighting the challenges of effective communication within sibling dynamics.

Competition for achievements emerged as another prevalent theme. Siblings often engaged in a subtle yet persistent race for accomplishments, whether academically, professionally, or socially. The observations underscored how this form of rivalry could influence self-esteem and contribute to an ongoing sense of competition between siblings.

Subtle forms of undermining behavior were also evident in the observational data. Participants recounted instances of subtle teasing, belittlement or efforts to undermine each other's achievements. These behaviors, while not always overt, contributed to a pervasive atmosphere of rivalry within sibling relationships.

Overall, the qualitative findings painted a rich tapestry of sibling relationships, emphasizing the interplay of competition, resource allocation, and the influence of life events. The multifaceted nature of sibling rivalry was further illuminated through the diverse expressions observed in real-time interactions, offering a deeper understanding of the emotional complexities within these relationships.

Data Analysis

The qualitative data collected from in-depth interviews and observational records underwent a rigorous analysis process to uncover underlying themes, patterns, and nuances within sibling relationships. Thematic analysis, a systematic approach, was employed to identify recurring patterns and unique experiences across participants.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

1. Data Familiarization: Initial immersion in the data involved thoroughly reviewing interview transcripts and observational notes. This familiarization phase allowed researchers to become acquainted with the richness of participants' narratives and the contextual details observed during sibling interactions.
2. Coding: Following data familiarization, a coding process was initiated. The data was systematically identified and labeled significant phrases, sentences and segments of the data that conveyed key concepts
3. Identification of Themes: Codes were then organized into potential themes based on their similarities and connections. This involved clustering related codes to develop overarching themes that encapsulated the essence of participants' narratives. The identification of themes aimed to provide a structured framework for understanding the multifaceted nature of sibling relationships.
4. Refinement and Review: The identified themes underwent a process of refinement and review. This iterative process involved revisiting the data, adjusting codes and refining themes to ensure they accurately reflected the participants' experiences. The goal was to develop a nuanced understanding of the complexities inherent in sibling rivalry.
5. Thick Description: To enhance the interpretive depth of the analysis, thick description was employed. This involved providing detailed contextual information and illustrative examples within each theme. Thick description aimed to offer a comprehensive portrayal of participants' experiences, capturing the subtleties and variations within the overarching themes.
6. Cross-Validation: To enhance the reliability and credibility of the qualitative findings, cross-validation was conducted. This involved comparing themes and interpretations across multiple researchers within the team. Consensus discussions were held to address any discrepancies in coding and interpretation, ensuring a collective and well- rounded understanding of the qualitative data.
7. Integration with Observational Data: The observational data, capturing real-time interactions between siblings, were integrated into the thematic analysis. Observations provided context and depth to the themes identified through interviews, offering a more comprehensive understanding of how rivalry manifested in day-to-day interactions.
8. Member Checking: To validate the accuracy of the findings, member checking was performed. A subset of participants was invited to review and provide feedback on the identified themes and interpretations. Member checking ensured that the participants recognized and resonated with the way their experiences were portrayed in the analysis.

By employing these systematic qualitative data analysis techniques, the study aimed to provide a nuanced and comprehensive understanding of the themes and patterns associated with sibling rivalry, grounded in the lived experiences of the participants.

Conclusion:

This study has delved into the intricate dynamics of sibling rivalry, exploring its prevalence, manifestations, and implications for individual development and family functioning. Through a combination of quantitative and qualitative methods, the research uncovered multifaceted aspects of sibling relationships, shedding light on themes such as competition for parental attention, resource allocation, and the influence of cultural factors.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact February 2024

The findings highlight the enduring complexity of sibling relationships, showcasing the delicate balance between companionship and rivalry. The impact of parental favoritism, birth order dynamics, and cultural influences emerged as significant contributors to the nuanced landscape of sibling dynamics. Life events were identified as triggers or alleviators of rivalry, emphasizing the dynamic nature of sibling relationships across the lifespan.

Bibliography

Bandura, A. (1977). Social learning theory. Prentice-Hall. Dunn, J., & Munn, P. (1986). Siblings and the development of prosocial behaviour. *International Journal of Behavioral Development*, 9(3), 265-284. Erikson, E. H. (1964). *Childhood and society*. Norton. McHale, S. M., Updegraff, K. A., & Whiteman, S. D. (2012). Sibling relationships and influences in childhood and adolescence. *Journal of Marriage and Family*, 74(5), 913-930. Stocker, C. M., McHale, S. M., & Karniol, R. (1993). Children's perceptions of relationships with siblings, friends, and mothers: Comparisons, contrasts, and implications for social development. *Merrill-Palmer Quarterly*, 39(3), 460-477. Sulloway, F. J. (1996). *Born to rebel: Birth order, family dynamics, and creative lives*.

CHARACTERIZATION AND OPTIMIZATION OF MICRO-SPHERE LOADED WITH FLURBIPROFEN FOR INTRA-ARTICULAR DELIVERY

Raj Kishore

Research Scholar Phar-
macy
Asian International University

Abstract

The characterization and optimisation of microspheres for the intra-articular administration of flurbiprofen, a nonsteroidal anti-inflammatory medication used to treat ailments connected to the joints, is the focus of this work. Osteoarthritis (OA) of the knee is an incessant degenerative condition for which rehashed injections are necessary because of their short length of activity. Using a collagenase II-initiated rodent knee OA model, the counter OA properties of this flurbiprofen thermogel were inspected and contrasted with customary sodium hyaluronate and flurbiprofen injectables. Flurbiprofen was sustainedly released for over three weeks, as per in vitro drug release experiments, with similar short-term analgesic effects and upgraded long haul analgesic effectiveness. The gathering that got flurbiprofen gel treatment had a decreased provocative response, which was reflected in lower levels of IL-1, IL-6, and IL-11 in joint liquid as well as down-directed expression in specific cartilages. The findings highlight the thermo-sensitive copolymer PCLA-Stake PCLA's appropriateness for flurbiprofen's delayed intra-articular effects as well as its possible helpful use for further developed OA case the board.

Keywords: Flurbiprofen, Characterization, intra-articular delivery, micro-sphere, optimization.

1. Introduction

Intra-articular pharmaceutical delivery, which shows a great deal of promise, has the potential to be used as a local treatment for osteoarthritis and other joint-related inflammatory illnesses. Flurbiprofen is an illustration of a nonsteroidal mitigating medication that has shown viability in the treatment of the aggravation and irritation that are welcomed on by these disorders. The duration of action and drug release kinetics of standard flurbiprofen formulations, on the other hand, are often affected. Because they offer continuous pharmaceutical release into the joint area, flurbiprofen-loaded microspheres are a potential treatment option.

In order to distribute flurbiprofen intra-articularly, this research intends to characterise and optimise microspheres with an emphasis on obtaining a desired drug-loading capacity, particle size distribution, and sustained release profile.

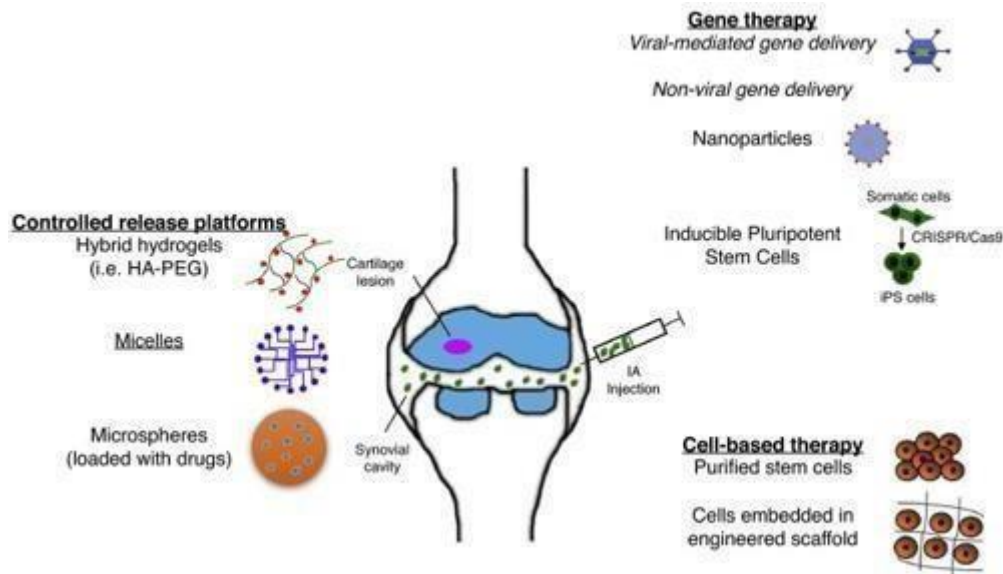


Figure 1:Intra-Articularly Drug Delivery System

The goal of this study is to progress the development of an efficient and effective drug delivery system for the localized treatment of inflammatory disorders associated to joints by clarifying the characteristics and functionality of Flurbiprofen-loaded microspheres.

2. Literature Review

Adaes et al. (2015) explored the role of primary afferent neuron injury in OA-induced pain using a collagenase-induced rat model. Their findings suggest that injury to essential afferent neurons might add to OA-associated torment.

Bajpayee et al. (2017) studied the use of a cationic transporter to deliver low-dose dexamethasone intra-ligamentally over an extended period of time in order to alleviate terrible OA. Their research showed that this delivery strategy might help reduce inflammation and cartilage degradation in OA.

Bhadra et al. (2017) designed appropriate dosing protocols for hyaluronic acid for the treatment of osteoarthritis of the knee in the United States. Their criteria aim to optimize the selection of patients for hyaluronic acid therapy based on clinical evidence and patient characteristics.

Fukumoto et al. (2018), A rat model of knee arthritis was used to explore the analgesic effects of S (p)-flurbiprofen plaster. Using walk analysis and measurement of synovial liquid prostaglandin E2 levels, the researchers assessed the adequacy of the plaster in easing OA- associated agony and irritation. Their findings suggest that S (p)-flurbiprofen plaster demonstrates analgesic properties and may serve as a potential therapeutic intervention for OA- induced pain.

3. Materials and methods

3.1. Materials

Stake, molecular weight 1500, DL-lactide (LA), and ε-caprolactone (CL). Sulphonous octoate (Sn (Oct)₂) and all of the other chemicals were bought from Sigma-Aldrich.

3.2. Sample collection

White blood cell counts, fractionation, and analysis of inflammatory components were performed on joint fluid collected 80 hours post-treatment. Animals were put to death 80 hours after care.

3.3. Statistical analysis

The exploratory data was analysed using the statistical programme SPSS 13.0 and shown as mean ± standard deviation. Differential analysis of variance (ANOVA) or the student's t-test were used to examine differences in continuous variables. Statistical significance was determined using a p-value less than .05.

4. Results and Discussion

4.1. Characterization of PCLA–PEG–PCLA triblock copolymer

In order to create the PCLA–Stake PCLA triblock copolymer, CL and LA underwent ring-opening polymerization with Stake as the initiator and Sn (Oct)₂ as the catalyst. The chemical structure was determined using ¹H NMR and FTIR spectra.

4.2. Transition from one phase to another and drug release in vitro from thermosensitive gel

In clinical applications, the sol-to-gel phase transition of the PCLA–Stake PCLA copolymer-based thermosensitive gel enables delayed release of flurbiprofen. As the convergence of copolymer increases, the gel's gelling temperature drops, resulting in a consistent pace of medication release.

Table 1: Flurbiprofen release patterns from thermosensitive gels in vitro. The concentration of the copolymer was 15%, 20%, and 25% (weight or volume), while the drug loading was 1% (weight or volume).

| | 0 | 5 | 10 | 15 | 20 | 25 |
|-----|----|----|----|----|----|----|
| 15% | 12 | 42 | 50 | 70 | 85 | 90 |
| 20% | 11 | 38 | 55 | 70 | 75 | 80 |
| 25% | 10 | 30 | 45 | 60 | 74 | 78 |

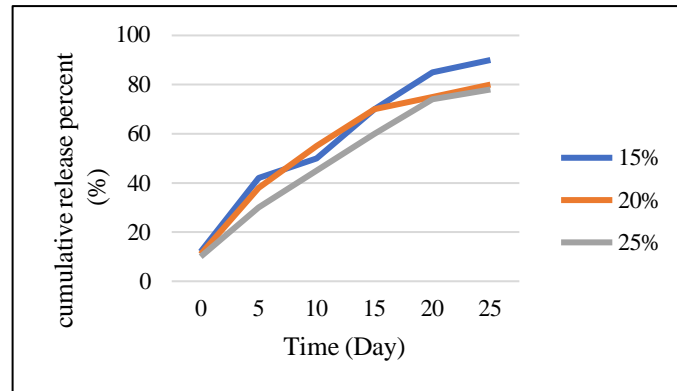


Figure 2:In vitro release properties of flurbiprofen from thermosensitive polymers. drug dosage at 1% (w/v) and copolymer concentrations of 15%, 20%, and 25% (w/v), respectively.

Subsequent experiments utilised a flurbiprofen thermosensitive gel supplemented with 25% PCLA-Stake PCLA triblock copolymer to evaluate the remedial effect.

Rats with OA symptoms were much less affected by flurbiprofen gel, as shown by higher Knee-Bend response scores and %TIPPI. Nonetheless, there were no appreciable variations in blood parameters between the flurbiprofen gel therapy and the pre-treatment period, suggesting a low risk to the rats' overall health. According to the research, flurbiprofen gel could be an effective course of therapy.

4.3. It was shown that the levels of IL-1, IL-6, and IL-11 in joint fluid were reduced by flurbiprofen gel

According to the results of the ELISA test that was performed on the joint fluids, the levels of IL-1, IL-6, and IL-11 which were found in the usual joint samples were 0.192 lg/L, 0.212 lg/L, and 0.327 lg/L respectively. These concentrations increased to 3.13 lg/L, 4.75 lg/L, and 4.06 lg/L prior to the administration of the therapies. The use of blank thermosensitive gel alone was sufficient to bring their levels down, although there was no detectable effect ($p > 0.05$). HA was shown to reduce levels of interleukin-1 (IL-1), interleukin-6 (IL-6), and interleukin-11 (IL-11) to 2.78 lg/L, 4.12 lg/L, and 3.69 lg/L, respectively. On the other hand, flurbiprofen was found to significantly decrease levels of IL-1, IL-6, and IL-11 to 2.31 lg/L, 3.15 lg/L, and 2.86 lg/L, respectively. The levels of interleukin-1 (IL-1), interleukin-6 (IL-6), and interleukin-11 (IL-11) in the flurbiprofen gel preparation were 0.93 lg/L, 1.27 lg/L, and 1.44 lg/L, respectively. These values were substantially different from those of the other exploratory groups ($p < 0.01$).

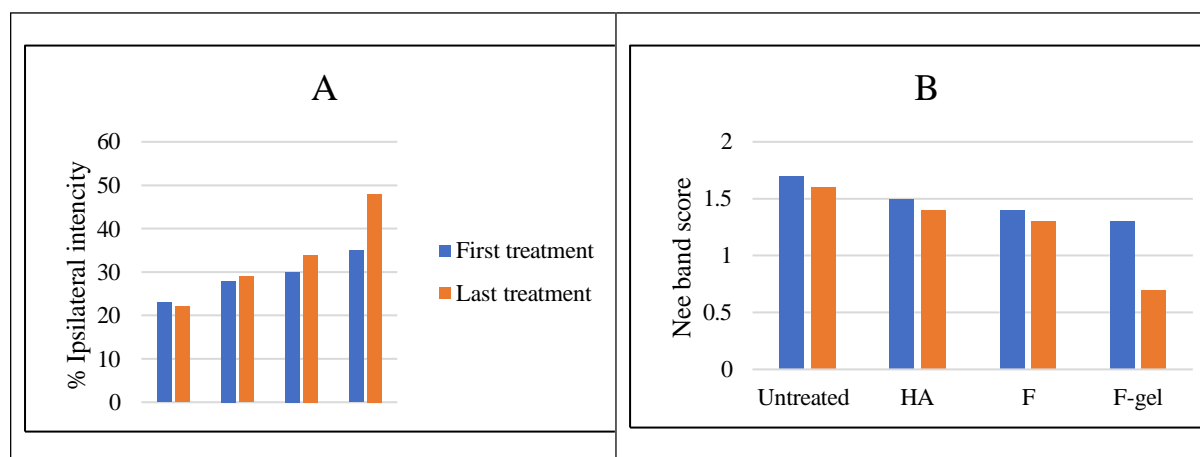


Figure 3: In rats, flurbiprofen gel dramatically reduced OA symptoms. After 80 hours of therapy, experimental groups had substantially different % TIPPI and Knee-Bend scores. The differences between groups were not significant, indicating flurbiprofen gel improved OA symptoms.

4.4. A decrease in the expression of inflammatory factors was seen with flurbiprofen gel

The expression of OA-promoting factors in specific cartilages from the experimental groups was studied. The findings revealed that the groups who received flurbiprofen and HA had lower levels, whereas the groups that did not get treatment had higher amounts.

The PCLA-Stake PCLA triblock copolymer is one example of a temperature-sensitive polymer that has been used to constantly provide medications for the treatment of osteoarthritis. Strong NSAID for OA, flurbiprofen gel, has been studied for its analgesic and anti-inflammatory properties; when compared to HA, it demonstrated superior pain remission and lower levels of inflammatory factors.

5. Conclusion

This experiment was conducted with the intention of constructing and testing a flurbiprofen thermosensitive gel that was based on a triblock copolymer made of PCLA, Stake, and PCLA. The gel was intended to be used for delayed intra-articular drug delivery. The intraarticular infusion of this sustained drug release method was able to effectively expand the analgesic time frame and dramatically lessen the inflammatory response of the mouse OA model. This was accomplished by downregulating the expression of inflammatory markers. The findings of this work offer an exploratory starting point for the possible helpful use of this flurbiprofen hydrogel to all the more likely treat osteoarthritis patients. The results of the present investigation uncover that thermosensitive copolymer PCLA-Stake PCLA is suitable for drawn out intra-articular effects of flurbiprofen.

References

1. Adaes S, Ferreira-Gomes J, Mendonca M, et al. (2015). Injury of primary afferent neurons may contribute to osteoarthritis induced pain: an experimental study using the collagenase model in rats. *Osteoarthritis Cartilage* 23:914–24.
2. Bajpayee AG, De la Vega RE, Scheu M, et al. (2017). Sustained intra-cartilage delivery of low dose dexamethasone using a cationic carrier for treatment of post traumatic osteoarthritis. *Eur Cell Mater* 34:341–64.
3. Bhadra AK, Altman R, Dasa V, et al. (2017). Appropriate use criteria for hyaluronic acid in the treatment of knee osteoarthritis in the United States. *Cartilage* 8:234–54.
4. Fukumoto A, Tajima K, Hori M, et al. (2018). Analgesic effect of S (p)-flurbiprofen plaster in a rat model of knee arthritis: analysis of gait and synovial fluid prostaglandin E2 levels. *J Pharm Pharmacol* 70:929–36.
5. Liang, L. S., et al. (2005). Pharmacokinetic study of methotrexate following intra-articular injection of methotrexate loaded poly(l-lactic acid) microspheres in rabbits. *Journal of Pharmaceutical Sciences*.
6. Liggins, R.T., et al. (2004). Intra-articular treatment of arthritis with microsphere formulations of paclitaxel: biocompatibility and efficacy determinations in rabbits. *Inflammation Research*.
7. Lu, Y., et al. (2007). Preparation and evaluation of biodegradable flurbiprofen gelatin microspheres for intra-articular administration. *Journal of Microencapsulation*.
8. Ostroha, J., et al. (2004). Controlling the collapse/swelling transition in charged hydrogels. *Biomaterials*.
9. Puebla, P., et al. (2005). PEG-derivative effectively modifies the characteristics of indomethacin-PLGA microspheres destined to intra-articular administration. *Journal of Microencapsulation*.
10. Thakkar, H., et al. (2004). Efficacy of chitosan microspheres for controlled intra-articular delivery of celecoxib in inflamed joints. *Journal of Pharmacy and Pharmacology*.

DRUG MANAGEMENT SYSTEM IN GOVT. HOSPITALS AND ITS FUTURE OUT- COMES

SANJAY KRISHNA

Research Scholar

Pharmacy

Asian International University, Manipur

Abstract

Within the context of the overall structure of the institution, the goal of this article is to examine the duties, responsibilities, and status of a hospital pharmacy. It would seem that the function that hospital medication management and pharmacy play is of the highest relevance when it comes to the provision of high-quality care to patients. A great deal of care and effort was devoted to the distribution systems of drugs and medical devices that were located inside the hospital. The merits and disadvantages of the conventional way of distribution, as well as the benefits and drawbacks of more recent distribution methods, such as unit-dose and multi-dose distribution, are examined, along with the most important contrasts that exist between the two. Additionally, the problems that are related with the deployment of modern distribution systems in hospitals were explored. The presentation of the information that has been provided includes a discussion of the legal norms that are in effect in Delhi.

Keywords: *Drug Management System, Govt. Hospitals, Future Outcomes, Drug planning.*

1. Introduction

The introduction of a drug management system in government hospitals heralds a transformative shift in healthcare administration, promising streamlined medication processes and enhanced patient care. By integrating advanced technology and robust protocols, this system seeks to optimize medication safety, inventory management, and communication among healthcare professionals.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

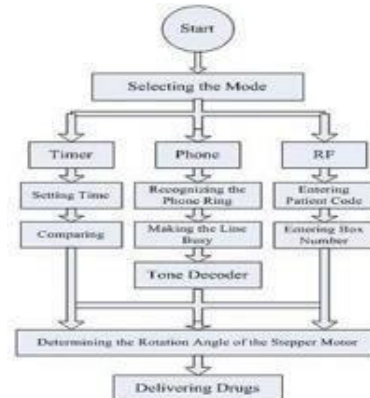


Figure 1: Drug Management System

The implementation of such a system holds the potential for significant future outcomes, including reduced medication errors, improved medication access, enhanced patient outcomes, and increased efficiency in healthcare delivery. As government hospitals strive to meet the evolving needs of patients and adapt to changing healthcare landscapes, the adoption of a comprehensive drug management system emerges as a pivotal step towards achieving optimal healthcare outcomes and ensuring the well-being of individuals within the community.

2. Literature Review

Ahmed Abousheishaa et al. (2020) defined hospital pharmacy practice globally via a scoping study. Their research emphasized the distinct roles and duties of hospital chemists in different areas, emphasizing the need of Recognising their global problems and possibilities. This research optimizes healthcare patient outcomes by mapping hospital pharmacy practice.

Eriksson (2019) explores the competencies of hospital pharmacists and emphasizes the importance of focusing on research and publication in the field to advance pharmacy practice. By shedding light on the essential skills and knowledge required for hospital pharmacists, this study provides valuable insights into professional development within the pharmacy profession.

Katoue (2018) discusses the role of pharmacists in providing parenteral nutrition support, highlighting current insights and future directions in this specialized area of pharmacy practice. By addressing the unique challenges and opportunities in parenteral nutrition support, this study contributes to the advancement of pharmacy practice in improving patient nutrition and overall health outcomes.

Kokane and Avhad (2016) A study published in the Journal of Community Health Management examined the role of pharmacists in the healthcare system. The research highlighted their multifaceted responsibilities in patient care, medication management, and promoting public health initiatives. The

findings provide valuable insights into the evolving role of pharmacists as integral members of the healthcare team and their significant contributions to improving healthcare outcomes.

3. The Role of a Pharmacist in the Hospital Drug Management System

The main duty of a hospital chemist is to make sure that patients get safe and efficient medication. This includes supplying technical specifications, trading drugs, buying and supervising first aid kits, taking part in clinical studies, keeping an eye on side effects, and offering pharmaceutical services. In a contemporary hospital, a chemist's duties are tailored to the setup and patientele. In addition to collaborating with doctors to prescribe pharmacotherapy, they also oversee medication management, watch for side effects, predict drug interactions, minimize dose and administration mistakes, and inform patients and healthcare providers about the effects of drugs.

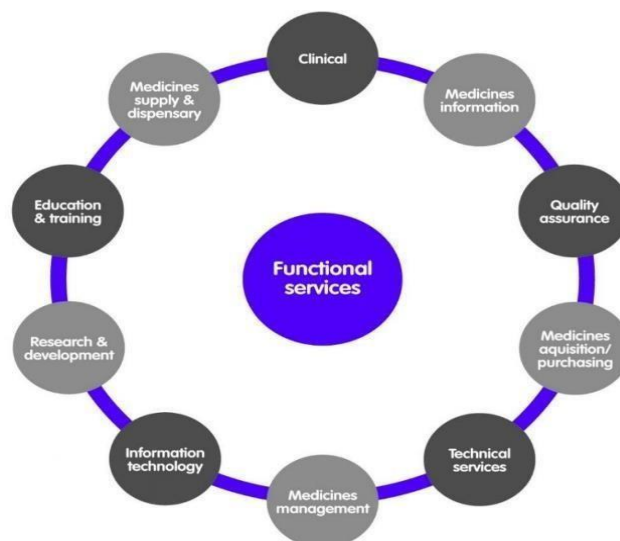


Figure 2: Pharmacist in the Hospital Drug Management System

Hospital chemists play a crucial role in the Therapeutic Committee, which establishes guidelines for drug management and pharmacotherapy, updates hospital formulas, and establishes expectations for behaviour in clinical situations. The committee works along with the facility's quality, antibiotic treatment, and nosocomial infection committees, among other teams. The Therapeutic Committee's primary responsibility is to develop and revise the hospital formula, which should optimise therapeutic benefits while maintaining a sound financial equilibrium.

4. DRUG MANAGEMENT SYSTEM

A drug management system is a full-featured software programme created to optimise and simplify several parts of medication administration in healthcare settings, including clinics, pharmacies,

hospitals, and long-term care institutions. This system has a number of features designed to increase the effectiveness, security, and precision of procedures using medications.

4.1. Classic Methods of Drug Distribution in a Hospital

Hospital pharmacies in Delhi are in charge of planning the distribution of pharmaceuticals and keeping an eye on the procurement procedure. To guarantee flexibility, they take part in bidding, cost planning, and collaboration with other businesses. With little control over how many medications are given to patients, the conventional approach of drug distribution in hospitals simply meets the overall needs of each unit. It is advised to use the "just-in-time" (JIT) paradigm for effective medication delivery, shorter lead times, and lower inventory levels. Department nurses and heads are in charge of keeping medications safe and secure in departmental first aid kits, which serve as the foundation for drug management in Polish hospitals. It is challenging to specify the minimal stock of pharmaceutical items, and all must be kept under verified circumstances. The availability of comparable and varying dosages of medications and preparations is driving up disposal costs.

4.2. Modern Methods of Drug Distribution in the Hospital

Medical institutions are seeking for cutting-edge ways to enhance and regulate drug management in response to the growing need for chemists, the broad responsibilities of departmental nurses, and the steadily rising expenses associated with pharmacotherapy. This need also stems from the need to constantly monitor patient safety, which includes lowering medication mistakes, raising the level of care provided by hospital pharmacists, and increasing the quality of treatment for patients who are hospitalized. One viable option may be an automated unit-dose delivery system. The primary tenet of the unit-dose system is the mechanical preparation and dispensing of medications from a central pharmacy in an individually prepared, ready-to-administer state for each patient.

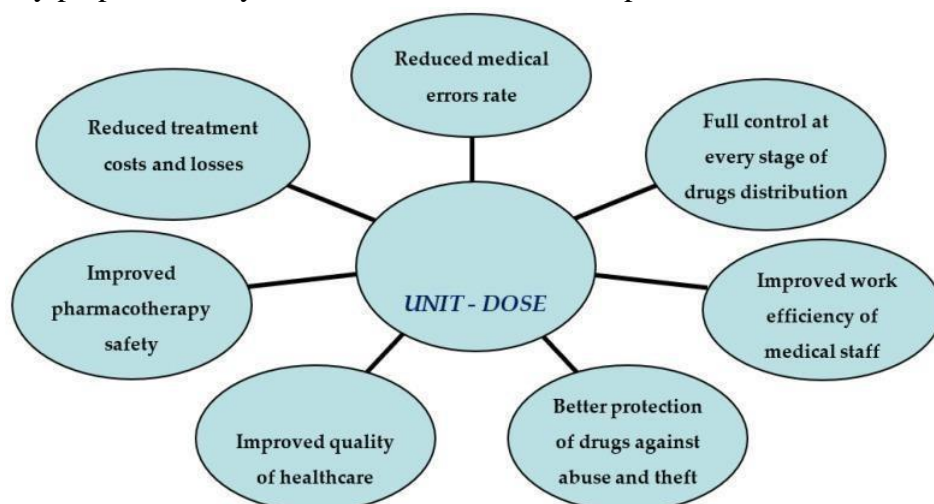


Figure 3: The advantages of implementing a unit-dose system

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

In the healthcare industry, the unit-dose method guarantees medication distribution management, minimizing losses from inadequate storage and wasted medications. It permits both normal and emergency usage, pharmacist-controlled prescription medicine delivery, and the return of wasted monies.

Two essential components work together to operate a unit-dose system that is created in a hospital pharmacy for a particular patient:

1. Pharmacist reviews prescriptions for content, medication interactions, and dosages.
2. Drugs are divided into unit dosages, each with a label including the name, active ingredient, serial number, and expiration date.

Hospitals utilise computerized unit-dose medicine delivery to prevent prescription mistakes. Prepare daily medicine dosages, separate blisters, and package them. Direct doctor-patient communication and 25% chemist time savings are possible with the technology. The computerized prescription method lowers mistakes, whereas handwritten prescriptions make more. Delhi adopted the most frequently used medication delivery method, the unit-dose system, in 2014. Financial constraints, inadequate computerization, and the requirement for a 24/7 pharmacy are issues. The multi-dose system optimizes and monitors medical facility pharmacotherapy using hardware and software.

Among the possible components of the multi-dose system are the following:

- Scalable, flexible software for auditing medication administration and cost analysis.
- Automated hospital pharmacy warehouse for inventory, orders, and medicine delivery;
- A robotic dispenser in hospital wards monitors packaging issues, protects pharmaceuticals from unauthorized access, and offers full information on drug collection (number of packages, delivery times, etc.).
- The computerized medical e-cart replaces conventional nurse carts and provides access to medical orders.

The multi-dose system, also known as the ward-based system, allows for comprehensive drug management throughout the hospital, including in individual departments. In contrast, the unit-dose system is essentially a traditional automatic pharmacy system. The most significant distinction between the two systems is that the multi-dose system allows for this kind of management. The following are some further distinctions: technical difficulties (software, integration, and the location of system installation), management, efficiency in terms of the number of patients and pharmaceuticals given, safety, cleanliness, and, of course, prices.

4.3. Government Hospital Drug Management System: Future Outcomes

Government hospitals can enhance medication safety, lower errors, optimise inventory management, and improve communication between healthcare providers by implementing a comprehensive drug management system. Adverse drug events can be decreased and patient outcomes can be enhanced

with features like electronic prescribing, barcode scanning, and medication reconciliation. Clinical decision-making can be improved and continuity of care can be encouraged through integration with electronic health records. Drug management system data can be utilised for research, evidence-based policymaking, and quality improvement programmes. This can spur innovation and advance best practices in pharmaceutical care. Overall, government hospitals can change the way healthcare is provided by putting in place a strong drug management system.

5. Conclusion

Pharmacy has a significant influence on patient safety and treatment quality, making it an essential part of hospital administration. All aspects of pharmacotherapy, from formula creation to distribution, have an impact on costs, organisations, personnel policies, and legal liabilities. Healthcare systems encounter issues as patient numbers and medicine consumption rise, which drives up costs and raises the possibility of mistakes. Systems for the automatic delivery of drugs may enhance patient care, safety, and general quality of life. Nurses can enhance medical care and save time. These concepts are perfect for contemporary healthcare institutions because they provide therapeutic, financial, and organisational advantages.

References

1. Ahmed Abousheishaa, A., Hatim Sulaiman, A., Zaman Huri, H., Zaini, S., Adha Othman, N., bin Aladdin, Z., & Chong Guan, N. (2020). *Global scope of hospital pharmacy practice: A scoping review. Healthcare*, 8, 143.
2. Eriksson, T. (2019). *What is a hospital pharmacist, our competencies? What should be the focus for EJHP, and how can we stimulate research and publication in it? European Journal of Hospital Pharmacy*, 26, 185–186.
3. Katoue, M. G. (2018). *Role of pharmacists in providing parenteral nutrition support: Current insights and future directions. Integrated Pharmacy Research and Practice*, 7, 125.
4. Kokane, J. V., & Avhad, P. S. (2016). *Role of pharmacist in health care system. Journal of Community Health Management*, 3, 37–40.
5. Mansur, J. M. (2016). *Medication safety systems and the important role of pharmacists. Drugs & Aging*, 33, 213–221.

6. Moura, L., Steurbaut, S., Salvesen Blix, H., Addison, B., Rabus, S., Mota-Filipe, H., & Alves da Costa, F. (2022). A cross-sectional survey to map Clinical Pharmacy Education and Practice in Europe. *International Journal of Clinical Pharmacy*, 44, 118–126.
7. Pedersen, C. A., Schneider, P. J., Ganio, M. C., & Scheckelhoff, D. J. (2019). ASHP national survey of pharmacy practice in hospital settings: Monitoring and patient education—2018. *American Journal of Health-System Pharmacy*, 76, 1038–1058.
8. Religioni, U. (2016). *Management of medicinal products: Theory and practice*. Wolters Kluwer Polska SA.
9. Schepel, L., Aronpuro, K., Kvarnström, K., Holmström, A. R., Lehtonen, L., Lapatto-Reiniluoto, O., ... Airaksinen, M. (2019). Strategies for improving medication safety in hospitals: Evolution of clinical pharmacy services. *Research in Social & Administrative Pharmacy*, 15, 873–882.
10. Weingart, S. N., Zhang, L., Sweeney, M., & Hassett, M. (2018). Chemotherapy medication errors. *The Lancet Oncology*, 19, e191–e199.

UNDERSTAND THE STRUCTURE OF ALOE VERA AND ITS MEDICINAL BENEFITS

RITU

Research Scholar

BOTANY

Asian International University, Manipur

Abstract

Aloe vera incorporates nutrients, minerals, proteins, amino acids, normal sugars, and mitigating and hostile to microbial mixtures. Mending powers are credited to the plant's parts and equilibrium. The leaves of Aloe vera are utilized. The Aloe is emollient, laxative, and defenseless. Its antimicrobial, sedative, and germicide qualities make it valuable for tissue reclamation. Albeit used to treat skin disease, it is most normally utilized on consumes and minor cuts, strikingly sun related burns. Poison Ivy rashes benefit from aloe, which might assist with battling disease. It might help vaginal yeast diseases; notwithstanding, this is problematic. Aloe juice can be placed into a warm tea for eyewash. Eyewash with Aloe may block sun UV radiation. As a purgative. Aloe is a strong laxative and should not be taken internally. Fresh plant juice is preferable over store-bought juice in other products or alone. Because the therapeutic efficacy of the plant declines over time, there is great debate about whether store-bought aloe, even if it contains preservatives, can be beneficial. It rejuvenates, reduces wrinkles, cures acne, and gives skin a young sheen.

Keywords: Aloe Vera, Structure, Medicinal Benefits, Skin Disorders, Properties.

1. Introduction

The enduring green spice known as aloe vera (Aloe barbadensis Mill operator, family Xanthorrhoeaceae) is broadly tracked down in hot, dry locales of North Africa, the Center East, Asia, the Southern Mediterranean, and the Canary Islands. It has distinctive yellow cylindrical sprouts. The words "Allaeh" (Arabic for "sparkling harsh substances") and "Vera" (Latin for "valid") are the underlying foundations of aloe vera. Aloe vera leaves are utilized to make a dry, adhesive gel that is broadly utilized in drug and restorative purposes.



Figure 1: Aloe vera: A Potential Herb

This restorative spice has generally been utilized to treat skin conditions like consumes, wounds, and irritation. Aloe vera has furthermore exhibited antihyperlipidemic, antidiabetic, cancer prevention agent, and anticancer impacts. Nutrients (A, C, E, and B12), proteins (amylase, catalase, and peroxidase), minerals (zinc, copper, selenium, and calcium), sugars (mono-saccharides like mannose-6-phosphate and polysaccharides like glucomannans), anthraquinones (aloin and emodin), unsaturated fats (lupeol and campesterol), chemicals (auxins and gibberellins), and different substances, (for example, salicylic corrosive, lignin, and saponins) are among the in excess of 75 distinct mixtures found in aloe vera.

2. Literature Review

Ipshita et al. (2018)directed a randomized, controlled clinical trial to assess 1% alendronate and Aloe vera gel as nearby host-modulators for class II furcation shortfalls in constant periodontitis patients. Both medicines improved clinical indicators in the research, showing encouraging results. The data imply that 1% alendronate and Aloe vera gel may add to traditional periodontal therapy to treat furcation deficiencies and promote periodontal health.

Kurian et al. (2018)subgingivally-conveyed 1% metformin and Aloe vera gel for intrabony abandons in persistent periodontitis patients were looked at. Both therapies showed promising results in stimulating periodontal tissue regeneration and lowering clinical markers of inflammation. These findings emphasize the need of trying new periodontal treatments like Aloe vera gel.

Kumar et al. (2014)A randomised control trial examined Aloe vera mouthwash's preliminary antiplaque efficacy. The study found that Aloe vera mouthwash may prevent plaque regrowth and enhance dental hygiene. Aloe vera may be a natural alternative to standard oral hygiene products for periodontal health.

Lin et al. (2017)Aloe vera has been studied for its potential in periodontal therapy and inflammatory disorders. They tested how exopolysaccharide, a component, protects against ulcerative colitis. Their findings explain Aloe vera polysaccharides' anti-inflammatory processes, suggesting their use in treating inflammatory bowel illnesses.

3. Properties of Aloe vera

It is a stemless or extremely short-stemmed plant developing to 80-100 cm tall, spreading by balances and root sprouts. The leaves are lanceolate, thick and meaty, green to dim green, with a serrated edge.

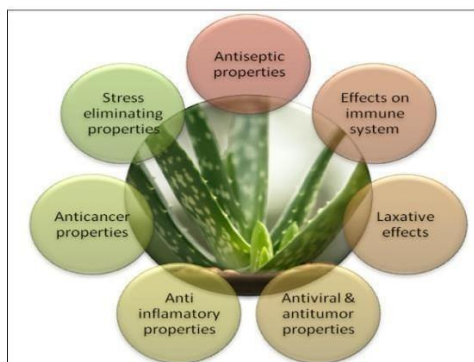


Figure 2:Properties of Aloe vera

Each pendulous blossom has a yellow rounded corolla 2-3 cm long and develops on a shoot up to 90 cm tall. Aloe vera gel is produced using the tissue in the focal point of the leaf.

Table 1: About aloe vera

| | |
|---------------------------|--|
| Family: | Liliaceae |
| Botanical Name(s): | Aloe barbadensis, Aloe indica, Aloe barbados, Aloe vera. |
| Popular Name(s): | Aloe, Aloe Vera, Indian Alces, Kumari, Ghirita, Gawarpaltra, Barbados aloe, Curacao aloe and Lu hui etc. |

3.1. Aloe vera contains an array of materials, including the following.

- **Acids** - antibacterial, wound healing for skin tissue and ulcers, and anti-helminthic (anti-parasitic worms).
- **Amino Acids** - Amino acids are required for both growth and repair. Aloe vera contains twenty of the twenty-two essential amino acids.
- **Enzymes** - catalysts that allow for the occurrence of chemical reactions.
- **Lectin** - anti-tumour effects.
- **Lipids** -essential structural elements of live cells.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- **Minerals** -Significant amounts of calcium, magnesium, potassium, and sodium are found.
- **Lactates and Salicylates** - analgesic properties.
- **Phenolics** - mild antiseptics and antimicrobials.
- **Polysaccharides** - enzymes that break down long-chain carbohydrates into smaller ones.
- **Urea-Nitrogen** - pain killing effect.
- **Vitamins** - contains 8 of the 13 recognized vitamins.
- **Contra-indications/Precautions**
Not advised to be used while pregnant.

4. Medicinal Benefits of Aloe Vera

For ages, the medicinal benefits of aloe vera, a succulent plant species with thick, meaty leaves, have been known. For its therapeutic effects, it has been utilised traditionally in many civilizations around the world.



Figure 3: Medicinal Benefits of Aloe Vera

Here are some of the medicinal benefits of Aloe vera supported by scientific research:

4.1. Skin Healing

Aloe vera is maybe generally notable for its skin-recuperating properties. It contains intensifies like polysaccharides, glycoproteins, and nutrients that add to its capacity to mitigate and mend harmed skin. Aloe vera gel can be applied topically to treat minor consumes, sun related burns, wounds, and cuts. It assists with lessening aggravation, advance injury recuperating, and alleviate torment.

4.2. Moisturization

Aloe vera gel is a characteristic lotion that can hydrate and relax the skin. It is regularly utilized in skincare items like salves, creams, and lotions to assist with calming dry and bothered skin conditions like dermatitis and psoriasis.

4.3. Anti-inflammatory

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Aloe vera contains compounds with calming properties, for example, salicylic corrosive, bradykinase, and acemannan. These mixtures help to diminish aggravation, enlarging, and redness related with skin conditions like skin inflammation, rosacea, and dermatitis.

4.4. Antioxidant

Aloe vera contains cancer prevention agents like nutrients C and E, beta-carotene, and flavonoids, which help to kill free revolutionaries and shield the skin from oxidative harm brought about by UV radiation and natural poisons. This cancer prevention agent movement adds to Aloe vera's enemy of maturing impacts and its capacity to further develop skin versatility and solidness.

4.5. Wound Healing

Aloe vera has been displayed to improve the injury mending process by invigorating the development of collagen and fibroblasts, which are fundamental for tissue fix. It additionally has antimicrobial properties that assistance to forestall disease in injuries and advance quicker recuperating.

4.6. Oral Health

Aloe vera has been explored for its expected advantages in advancing oral wellbeing. Studies recommend that Aloe vera mouthwash or gel might assist with lessening plaque collection, gum disease, and periodontal irritation when utilized as an assistant to standard oral cleanliness rehearses.

4.7. Digestive Health

Aloe vera has been customarily used to help stomach related wellbeing and deal with gastrointestinal issues like stoppage, indigestion, and irritable bowel syndrome (IBS). It contains intensifies like aloin and anthraquinones that make purgative impacts and can assist with directing bowel developments.

4.8. Immune Support

Aloe vera contains intensifies like pro Mannan, which have immunomodulatory impacts and can assist with supporting the invulnerable framework. It might assist with upgrading the body's regular guards against contaminations and advance by and large wellbeing and prosperity.

While Aloe vera offers various potential medical advantages, it's vital for use it securely and suitably. A few people might encounter hypersensitive responses or skin disturbance while applying Aloe vera topically. Furthermore, oral utilization of Aloe vera ought to be done circumspectly, as unnecessary admission might prompt gastrointestinal incidental effects. It's generally prudent to talk with a medical service proficient prior to utilizing Aloe vera for therapeutic purposes, particularly on the off chance that you have any fundamental ailments or are taking drugs.

5. Conclusion

Aloe vera, an individual from the Asphodelaceae family, is known for its restorative applications and advantages. It is ordinarily utilized as an effective gel for treating consumes and minor scratches, offering relieving irritation, help with discomfort, and lessening contamination risk. Normal utilization of Aloe vera-based gels can accelerate mending in minor injuries and serious consumes. The plant has been utilized for quite a long time and has become well known in different items, including skin creams, beauty care products, shampoos, lip ointments, cleansers, and sunscreens. Aloe vera's concentrate contains nutrients and minerals that advance solid skin. It is delicate and can be utilized in touchy regions, like around the eyes. Aloe plants likewise have inner therapeutic purposes, for example, a purgative and therapy for hacks, ulcers, muscle torment, migraines, malignant growth, and HIV. The main demonstrated benefit in interior use is the alleviation of blockage. Be that as it may, inward utilization of Aloe makes side impacts, can cause queasiness, and ought not be taken by pregnant ladies.

References

1. Ipshita, S., Kurian, I. G., Dileep, P., Kumar, S., Singh, P., & Pradeep, A. R. (2018). *One percent alendronate and Aloe vera gel local host modulating agents in chronic periodontitis patients with class II furcation defects*. *Journal of Investigative and Clinical Dentistry*, 9, e12334. doi: 10.1111/jicd.12334.
2. Kumar, G. R., Devanand, G., John, B. D., Ankit, Y., Khursheed, O., & Sumit, M. (2014). *Preliminary antiplaque efficacy of Aloe vera mouthwash on 4 day plaque re-growth model: Randomized control trial*. *Ethiopian Journal of Health Sciences*, 24, 139–144. doi: 10.4314/ejhs.v24i2.6.
3. Kurian, I. G., Dileep, P., Ipshita, S., & Pradeep, A. R. (2018). *Comparative evaluation of subgingivally-delivered 1% metformin and Aloe vera gel in the treatment of intra-bony defects in chronic periodontitis patients*. *Journal of Investigative and Clinical Dentistry*, 9, e12324. doi: 10.1111/jicd.12324.
4. Lin, H., Honglang, L., Weifeng, L., Junmin, C., Jiantao, Y., & Junjing, G. (2017). *The mechanism of alopolsaccharide protecting ulcerative colitis*. *Biomedicine & Pharmacotherapy*, 88, 145–150. doi: 10.1016/j.biopha.2016.11.138.
5. Maan, A. A., Nazir, A., Khan, M. K. I., Ahmad, T., Zia, R., Murid, M., & Abrar, M. (2018). *The therapeutic properties and applications of Aloe vera*. *Hereditas*, 12, 1–10. doi: 10.1016/j.hermed.2018.01.002.
6. Malik, I., & Zarnigar, H. N. (2003). *Aloe vera - A review of its clinical effectiveness*. *International Research Journal of Pharmacy*, 4, 75–79. doi: 10.7897/2230-8407.04812.
7. Moghaddam, A. A., Radafshar, G., Jahandideh, Y., & Kakaei, N. (2017). *Clinical evaluation of effects of local application of Aloe vera gel as an adjunct to scaling and root planning in patients with chronic periodontitis*. *Journal of Dentistry*, 18, 165–172.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

8. Nejaim, Y., Silva, A. I., Vasconcelos, T. V., Silva, E. J., & de Almeida, S. M. (2014). *Evaluation of radioprotective effect of Aloe vera and zinc/copper compounds against salivary dysfunction in irradiated rats. Journal of Oral Science, 56, 191–194. doi: 10.2334/josnusd.56.191.*
9. Pradeep, A. R., Garg, V., Raju, A., & Singh, P. (2016). *Adjunctive local delivery of Aloe vera gel in patients with type 2 diabetes and chronic periodontitis: Journal of Periodontology, 87, 268–274. doi: 10.1902/jop.2015.150161.*
10. Sholehvar, F., Mehrabani, D., Yaghmaei, P., & Vahdati, A. (2016). *The effect of Aloe vera gel on viability of dental pulp stem cells. Dental Traumatology, 32, 390–396. doi: 10.1111/edt.12272.*

THE EVOLUTION OF CYBER THREATS: A DEEP DIVE INTO EMERGING AT-TACK VECTORS, MITIGATION TECHNIQUES, AND FUTURE FORECASTING FOR ROBUST CYBER DEFENCE STRATEGIES

Dr. Abdul Khadeer

Assistant Professor

Dept. of Computer Science Engineering, Dec-
can College of Engineering and Technology,
Hyderabad, Telangana, India

Abstract: The rapid evolution of technology has brought about a corresponding evolution in cyber threats, presenting a constant challenge for cybersecurity professionals. This paper provides a comprehensive examination of the evolving landscape of cyber threats, focusing on emerging attack vectors, effective mitigation techniques, and strategies for future forecasting to fortify cyber defence mechanisms. First, it explores the proliferation of novel attack vectors, including advanced persistent threats (APTs), ransomware, supply chain attacks, and insider threats. By dissecting the methodologies and tactics employed by cyber adversaries, this paper elucidates the multifaceted nature of contemporary cyber-attacks. Second, it delves into the arsenal of mitigation techniques available to thwart these evolving threats. From traditional methods such as firewalls and antivirus software to cutting-edge technologies like artificial intelligence and machine learning, various approaches are evaluated for their efficacy in safeguarding against cyber intrusions. This paper investigates the importance of proactive measures in anticipating future threats and formulating robust cyber defence strategies. By analysing current trends and extrapolating potential trajectories, organizations can pre-emptively adapt their security posture to mitigate risks effectively. This paper underscores the critical need for continuous adaptation and innovation in the realm of cybersecurity. By staying abreast of emerging threats, leveraging advanced technologies, and adopting a forward-thinking approach, organizations can enhance their resilience against evolving cyber adversaries and ensure the integrity of their digital infrastructure.

Keywords: Cyber threats, Attack vectors, Mitigation techniques, Supply chain attacks, Artificial intelligence, Machine learning, Future forecasting, Security posture, Digital infrastructure

1. Introduction

In the contemporary digital landscape, the evolution of cyber threats presents a formidable challenge to individuals, organizations, and nations alike. As technology advances, so too do the methods and capabilities of malicious actors seeking to exploit vulnerabilities for their own gain. Understanding the dynamic nature of cyber threats is paramount for developing effective defence strategies that can withstand the ever-changing tactics of adversaries.

This paper delves into the intricate world of cyber threats, offering a comprehensive examination of emerging attack vectors, innovative mitigation techniques, and insightful future forecasting to fortify cyber defence strategies. By dissecting the evolving nature of cyber threats, we aim to equip stakeholders with the knowledge and tools necessary to adapt and respond proactively to emerging challenges.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

From traditional malware and phishing attacks to sophisticated ransomware campaigns and state-sponsored cyber espionage, the threat landscape is multifaceted and constantly evolving. Moreover, the proliferation of interconnected devices through the Internet of Things (IoT) and the advent of artificial intelligence (AI) present both new opportunities and risks in the realm of cybersecurity.

Through a synthesis of current research, real-world case studies, and expert analysis, this paper seeks to provide a comprehensive framework for understanding and addressing the evolving nature of cyber threats. By examining emerging attack vectors, exploring innovative mitigation techniques, and forecasting future trends, we aim to empower stakeholders with the insights necessary to develop robust and resilient cyber defence strategies in an increasingly complex digital environment.

2. Evolution of Cyber Threats

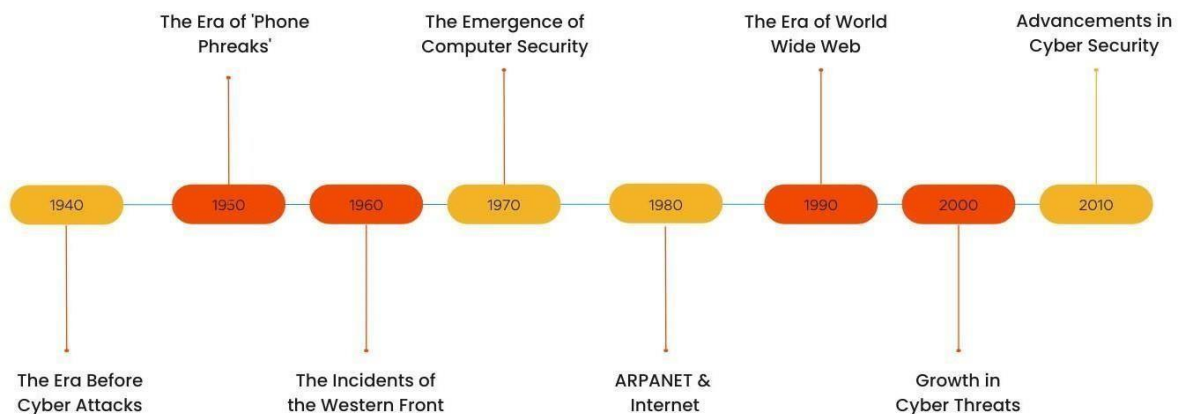


Fig 1: Cyber Security History Timeline

In today's interconnected digital landscape, the evolution of cyber threats poses significant challenges to organizations worldwide. This paper aims to provide a comprehensive exploration of the changing nature of cyber threats, examining emerging attack vectors, mitigation techniques, and forecasting future trends to enhance robust cyber defence strategies.

Historical Overview: This section offers insights into the historical progression of cyber threats, tracing their origins from early viruses and worms to sophisticated cyber-attacks such as Stuxnet and WannaCry. Understanding the evolutionary trajectory of cyber threats is crucial for contextualizing the current threat landscape.

Emerging Attack Vectors: Exploring the latest tactics employed by cybercriminals, including ransomware, phishing, supply chain attacks, and zero-day exploits. Analysis of these emerging attack vectors sheds light on the evolving methodologies used to compromise digital assets and infrastructure.

Mitigation Techniques: This segment delves into contemporary approaches and tools for mitigating cyber threats, encompassing strategies such as network segmentation, encryption,

multi-factor authentication, and behaviour-based anomaly detection. Emphasizing proactive defence measures is vital for effectively thwarting evolving cyber threats.

Future Forecasting: Anticipating potential future cyber threats based on current trends and technological advancements, including the implications of quantum computing, artificial intelligence, and the Internet of Things (IoT). Forecasting future threats enables organizations to proactively adapt their cyber defence strategies.

Robust Cyber Defence Strategies: Providing practical recommendations for organizations to bolster their cyber defence posture, encompassing initiatives such as comprehensive employee training programs, threat intelligence sharing partnerships, incident response readiness, and continuous security assessments.

Summarizing key insights presented in the paper and underscoring the importance of proactive and adaptive cyber defence strategies in mitigating evolving cyber threats effectively.

3. Modern Cyber Threat Landscape

The modern cyber threat landscape is dynamic, with cybercriminals continuously evolving their tactics to exploit vulnerabilities in systems and networks. Attack vectors such as ransomware, phishing, and social engineering are becoming increasingly sophisticated, targeting individuals, businesses, and even critical infrastructure. Cybercrime syndicates operate with coordination and agility, posing significant challenges to cybersecurity professionals.

Moreover, the proliferation of Internet of Things (IoT) devices has expanded the attack surface, allowing malicious actors to harness insecure devices for large-scale attacks. Additionally, the shift towards remote work and cloud computing has further complicated the cybersecurity landscape, necessitating adaptive defence strategies.

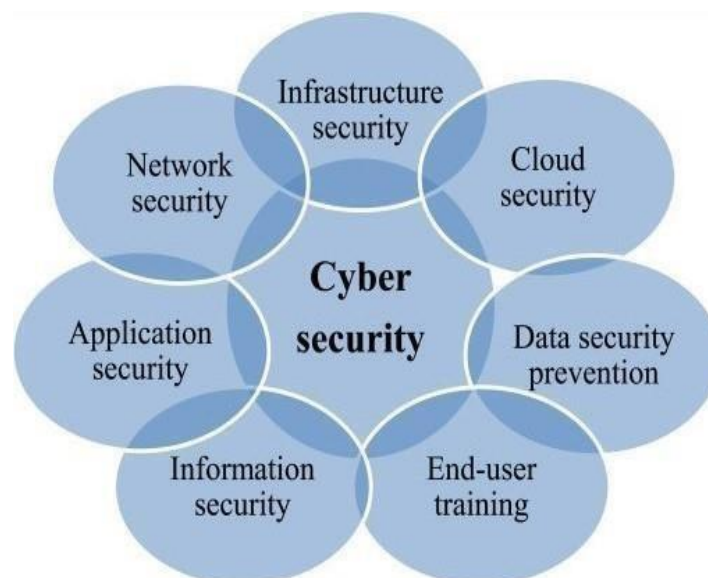


Fig 2: Strategies of Cyber Security

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

To address these challenges, organizations must employ a multifaceted approach that includes robust threat intelligence, proactive risk management, and advanced technologies like artificial intelligence and machine learning for threat detection and response. Collaboration among industry stakeholders and law enforcement agencies is also crucial for effective cyber defence.

Looking ahead, the future of cybersecurity will likely be shaped by emerging technologies and evolving threat landscapes, underscoring the importance of continuous adaptation and innovation in cyber defence strategies.

4. Emerging Attack Vectors

Cyber threats are constantly evolving, presenting new challenges to cybersecurity professionals. Understanding emerging attack vectors is crucial for developing effective defence strategies.

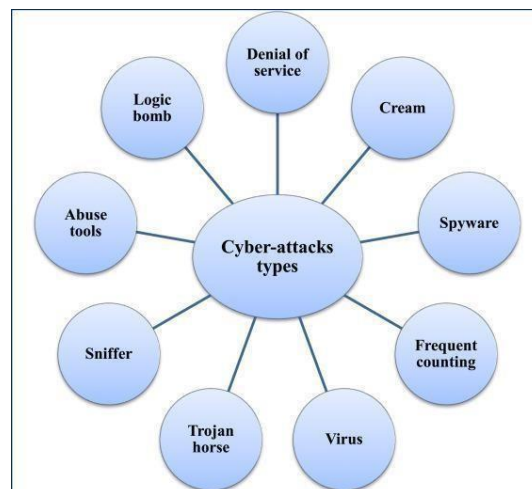


Fig 3: Types of Cyber Attacks

Social Engineering Tactics: Attackers exploit human psychology through phishing, vishing, and smishing to gain unauthorized access to systems and data.

Internet of Things (IoT) Vulnerabilities: The proliferation of IoT devices introduces new entry points for cyber-attacks, including device hijacking and data interception.

AI and Machine Learning Exploitation: Attackers leverage AI and machine learning algorithms to automate attacks, evade detection, and enhance targeting precision.

Supply Chain Attacks: Targeting third-party vendors and suppliers, attackers compromise software and hardware components to infiltrate interconnected systems.

Quantum Computing Threats: The advent of quantum computing poses a significant risk to current encryption standards, potentially rendering traditional cryptographic protocols obsolete.

Zero-Day Exploits: Exploiting undisclosed vulnerabilities, zero-day attacks can inflict significant damage before patches are developed.

Ransomware-as-a-Service (RaaS): RaaS platforms enable less technically proficient actors to launch ransomware attacks, increasing their prevalence and sophistication.

Blockchain Security Concerns: While blockchain offers robustness in some areas, vulnerabilities in smart contracts and decentralized applications present new attack vectors.

To combat emerging cyber threats effectively, organizations must adopt proactive defence measures, including continuous monitoring, employee training, and collaboration with industry partners.

5. Mitigation Techniques

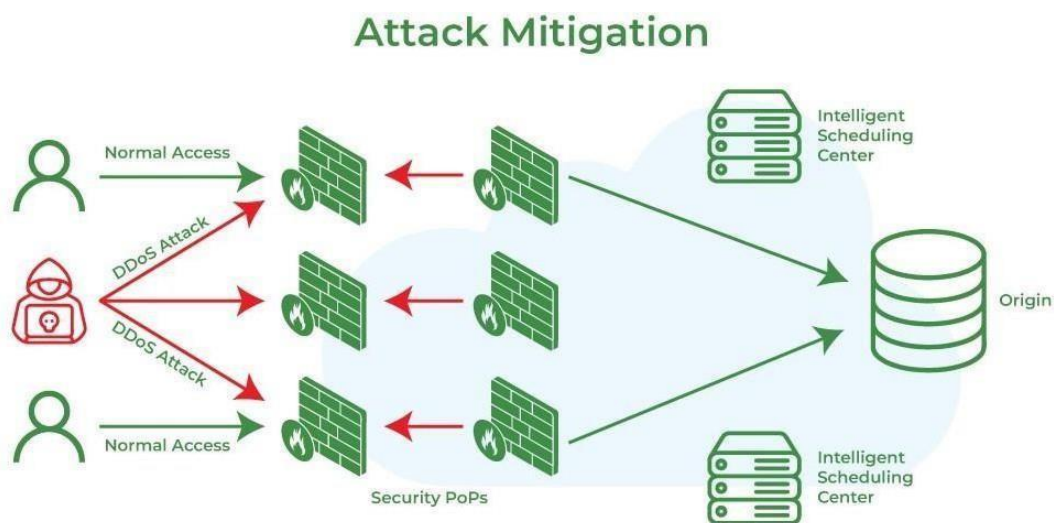


Fig 4: Attack Mitigation

"The Evolution of Cyber Threats: A Deep Dive into Emerging Attack Vectors, Mitigation Techniques, and Future Forecasting for Robust Cyber Defence Strategies" delves into the dynamic landscape of cyber threats, emphasizing the need for proactive defence measures. Mitigation techniques play a pivotal role in safeguarding against these evolving threats. Here are some key strategies:

User Education and Awareness: Educating users about cyber threats, safe browsing habits, and social engineering tactics can significantly reduce the risk of successful attacks.

Patch Management: Regularly updating software and systems helps in addressing known vulnerabilities and reduces the likelihood of exploitation by cyber attackers.

Network Segmentation: Segmenting networks limits the scope of a potential breach, containing the impact and preventing lateral movement by attackers.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Implementing Multi-Factor Authentication (MFA): MFA adds an extra layer of security by requiring multiple forms of authentication, such as passwords and biometrics, making it harder for attackers to gain unauthorized access.

Incident Response Planning: Having a well-defined incident response plan enables organizations to respond effectively to security incidents, minimizing their impact and facilitating swift recovery.

Threat Intelligence Integration: Leveraging threat intelligence feeds and tools helps in identifying and mitigating emerging threats before they manifest into significant security incidents.

By implementing these mitigation techniques, organizations can bolster their cyber defence strategies and adapt to the evolving threat landscape effectively.

6. Future Forecasting and Trends

The evolution of cyber threats continues to present a dynamic landscape, characterized by emerging attack vectors, sophisticated techniques, and evolving challenges for cyber defence strategies. Looking ahead, several trends are likely to shape the future of cyber threats and defence:

AI-Powered Attacks: As artificial intelligence (AI) capabilities grow, so does the potential for AI-driven cyber-attacks. Adversaries may leverage AI to automate and enhance the effectiveness of their attacks, leading to more complex and stealthy threats.

IoT Vulnerabilities: The proliferation of Internet of Things (IoT) devices introduces new vulnerabilities into networks. Insecure IoT devices can serve as entry points for attackers to infiltrate systems, making IoT security a critical concern for the future.

Supply Chain Attacks: Cybercriminals increasingly target supply chains to compromise larger networks indirectly. This trend is likely to continue as organizations rely on interconnected ecosystems, necessitating robust supply chain security measures.

Quantum Computing Risks and Defences: The advent of quantum computing poses both opportunities and challenges for cybersecurity. While quantum computing promises advancements in encryption, it also threatens to render current cryptographic protocols obsolete, requiring the development of quantum-resistant algorithms.

Ransomware-as-a-Service (RaaS): The rise of Ransomware-as-a-Service models enables even non-technical individuals to launch ransomware attacks, leading to a proliferation of ransomware incidents. Future defence strategies must focus on proactive detection and response to mitigate the impact of ransomware attacks.

7. Conclusion

"The Evolution of Cyber Threats" provides a thorough exploration of the rapidly changing landscape of cyber threats, offering insights into emerging attack vectors, effective mitigation

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

techniques, and future forecasting for robust cyber defence strategies. By delving into the intricacies of evolving tactics employed by malicious entities, the text underscores the critical need for proactive measures to counter these threats effectively. It emphasizes the importance of leveraging advanced technologies, fostering collaboration among stakeholders, and promoting a culture of cybersecurity awareness to stay ahead of evolving threats. Furthermore, the text highlights the significance of continuous adaptation and innovation in cybersecurity practices, stressing the importance of ongoing education, research, and strategic planning. By embracing these principles and adopting a holistic approach to cyber defence, organizations can enhance their resilience and effectively safeguard their digital assets against ever-evolving cyber threats, ensuring the integrity and security of global networks.

References:

- Anderson, R., & Moore, T. (2006). The economics of information security. *Science*, 314(5799), 610-613.
- Scarfone, K., & Mell, P. (2007). Guide to intrusion detection and prevention systems (IDPS). National Institute of Standards and Technology (NIST), Special Publication, 800(94).
- Duan, X., Gu, G., & Yin, H. (2012). A survey on sensor-based threat detection in cyber-physical systems. *IEEE Communications Surveys & Tutorials*, 15(1), 22-36.
- Cavusoglu, H., Mishra, B., & Raghunathan, S. (2004). The effect of internet security breach announcements on market value: Capital market reactions for breached firms and internet security developers. *International Journal of Electronic Commerce*, 9(1), 70-104.
- Goel, S., & Bushnell, L. (2012). Cyber-physical security of a smart grid infrastructure. *Proceedings of the IEEE*, 100(Special Centennial Issue), 210-224.
- Stock, J. H., & Watson, M. W. (2003). *Introduction to econometrics* (Vol. 2). Boston: Addison Wesley.
- Moore, T., Clayton, R., Anderson, R., & Stern, H. (2009). The economics of online crime. *Journal of Economic Perspectives*, 23(3), 3-20.
- Kshetri, N. (2007). *Cybercrime and developing nations: Challenges and cases*. Hershey, PA: IGI Global.
- Roman, R., Zhou, J., & Lopez, J. (2013). On the features and challenges of security and privacy in distributed internet of things. *Computer Networks*, 57(10), 2266-2279.
- Scarfone, K., & Souppaya, M. (2013). Guide to enterprise telework, remote access, and bring your own device (BYOD) security. National Institute of Standards and Technology (NIST), Special Publication, 800(114).
- Ransbotham, S., Mitra, S., & Ramsey, J. (2009). Measuring the security risk of software vulnerabilities: A case study of the MITRE corporation. *Information Systems Research*, 20(1), 132-151.
- Kshetri, N. (2010). *Global perspectives on e-commerce taxation law*. Hershey, PA: IGI Global.
- Yang, Y., Zhang, Q., & Zhong, Y. (2013). Cloud computing research and development trend. *Journal of Cloud Computing: Advances, Systems and Applications*, 2(1), 10.
- Kabir, M. N., Hasan, R., Ahamed, S. I., & Rafi, M. M. (2012). Cyber security in the cloud: A survey. *Proceedings of the International Conference on Advances in Computing, Communications and Informatics (ICACCI)*, Chennai, India (pp. 156-161).

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact**
February 2024

- Kannan, K. N., & Ganesh, P. K. (2012). Cyber warfare: An analysis of the means and motives of selected nations. *International Journal of Cyber Warfare and Terrorism (IJCWT)*, 2(4), 44-58.
- Krishna, A., & Sahasrabudhe, M. (2013). The internet of things: A survey. *International Journal of Computer Science and Information Technologies*, 4(5), 612-615.
- Ristenpart, T., Tromer, E., Shacham, H., & Savage, S. (2009). Hey, you, get off of my cloud: Exploring information leakage in third-party compute clouds. *Proceedings of the 16th ACM Conference on Computer and Communications Security*, Chicago, Illinois, USA (pp. 199-212).
- Schechter, S., Herley, C., & Mitzenmacher, M. (2010). Popularity is everything: A new approach to protecting passwords from statistical-guessing attacks. *Proceedings of the 29th IEEE Symposium on Security and Privacy*, Oakland, California, USA (pp. 320-335).
- Rhee, H. S., & Lee, J. (2009). Botnet: Classification, attacks, detection, tracing, and preventive measures. *Proceedings of the International Conference on Computational Science and Engineering (CSE)*, Vancouver, BC, Canada (pp. 204-211).
- Li, T., Zhang, J., Chen, Y., & Xia, W. (2011). Towards trustworthy cloud computing. *Future Generation Computer Systems*, 28(6), 875-886.
- Wu, J., Zhang, Z., & Meng, Q. (2012). Cyber-physical systems for sustainable development: The role of cloud computing, big data, and internet of things. *Proceedings of the IEEE International Conference on Cloud Computing and Intelligence Systems (CCIS)*, Hangzhou, China (pp. 731-736).
- Dabholkar, S. S., & Jones, S. L. (2012). Cyber security analysis and emerging trends. *Proceedings of the International Conference on Machine Learning and Cybernetics (ICMLC)*, Xian, China (pp. 1049-1054).
- Basso, A. D., & Srivastava, R. P. (2010). Internet of things in the cloud computing era: Towards a new architectural model? *Proceedings of the IEEE International Conference on Internet of Things (iThings/CPSCoM)*, Seoul, South Korea (pp. 23-30).
- Choudhary, P., & Jaiswal, N. (2012). Security issues in cloud computing. *International Journal of Engineering and Advanced Technology (IJEAT)*, 1(4), 25-30.
- Vasudevan, S., & Garg, S. (2012). A survey on security issues in service delivery models of cloud computing. *International Journal of Computer Applications*, 51(6), 10-17.

Eggshell-Derived Catalysts in Biodiesel Synthesis: Maximizing Efficiency and Environmental Benefits

Vartika Gupta ^{a*}, Kishan Pal Singh ^b

Research Scholar^{a} in Mechanical Engineering, Mangalayatan University, Aligarh India*

Associate Professor in Mechanical Engineering, Mangalayatan University, Aligarh India

**Corresponding author*

guptavarti12a10S@gu12ail.co12

Abstract

The contemporary discourse on energy degradation has intensified the quest for sustainable alternatives, prompting extensive research into biodiesel as a viable substitute energy source. This research explores the catalytic efficacy of discarded eggshells in the transesterification procedure for producing biodiesel, employing reused cooking oil as the primary raw material. By optimizing various parameters such as a 4wt% catalyst loading, a reaction temperature set at 65°C, reaction duration of 3 hours, and a proportional ratio of 1:13, biodiesel synthesis achieved a commendable maximum yield of 75.32%. However, the investigation also reveals a gradual decline in biodiesel output over successive cycles, from an initial peak of 75.32% to 41.1%. This decline underscores the imperative of evaluating catalyst reusability for sustainable production practices. The study underscores the multifaceted benefits of utilizing waste eggshells as a renewable catalyst source, offering promising advancements in biodiesel synthesis technology. Furthermore, it emphasizes the pivotal role of biodiesel in mitigating environmental degradation and reducing dependence on finite fossil fuel resources. By presenting a feasible solution for sustainable energy production, this research contributes significantly to the global transition towards greener energy alternatives.

Keywords

Biodiesel, Waste egg shells, Heterogeneous Catalyst, Transesterification

1. Introduction

The escalating demand for petroleum-based gasoline, fueled by burgeoning economies and a growing global population, has precipitated concerns regarding the finite nature of hydrocarbon based energy sources and their detrimental impact on the environment, particularly pertaining to air pollution and greenhouse gas emissions [1, 2]. This has prompted a significant upsurge in the quest for biofuels and bioenergy as greener alternatives. Among these alternatives, biodiesel, has emerged as a particularly promising option due to its renewable sourcing, non-toxic attributes, and capacity for clean combustion [3]. Nevertheless notwithstanding its potential advantages, biodiesel faces considerable challenges, notably in nations like India, where the insufficient availability of appropriate feedstock sources poses a significant obstacle [4]. The reliance on vegetable oils and animal-derived fats utilized in the production of biodiesel has sparked debates regarding resource allocation and the potential for conflicts between food and fuel production sectors [5]. Consequently, there is a pressing need to transition towards non-edible feed stocks to mitigate these concerns and enhance the environmental viability of biodiesel manufacturing processes [6]. Biofuels are classified into various generations, each utilizing distinct feedstocks and conversion techniques. First-

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

generation biofuels, primarily obtained from agricultural crops such as vegetable oils, starch and sugar, have traditionally been produced using transesterification conversion methods [7]. However, the use of food-grade oils in biodiesel manufacturing poses inherent drawbacks, including potential impacts on human nutrition and food crop availability. In contrast, second-generation biofuels leverage non-edible feedstocks like waste frying oil, rubber seed oil, *Pongamia pinnata*, and *Jatropha*, offering greater sustainability and avoiding competition with food resources [8,9]. These advancements underscore the ongoing evolution towards more technically sophisticated, environmentally friendly, and economically viable biodiesel production methodologies [10].

A significant portion of the expenses incurred in the genesis of biodiesel production stems from the acquisition of feedstock materials [11]. Waste cooking oil (WCO), sourced from households or commercial establishments like restaurants, presents a practical solution to the challenges linked to the management of discarded cooking oil. Beyond its waste management benefits, WCO holds promise as a substrate for biodiesel production, as it can serve as a substitute for traditional sources of fats and oils derived from vegetables and animals [12]. Traditionally, transesterification reactions, which are central to biodiesel production, have relied on homogeneous catalysts, typically base or acid. Yet, there has been a recent shift in focus towards the advancement of heterogeneous catalysts, driven by their favorable characteristics. Heterogeneous catalysts, characterized by their ability to exist in a different phase from the reactants, offer benefits such as reusability and environmental compatibility [13]. Within this array of catalysts, calcium oxide (CaO) has risen as a leading solid catalyst for the conversion of biodiesel. Extensive studies have demonstrated the efficacy of CaO in aiding the production of biodiesel from diverse feedstock sources. Interestingly, residual eggshells have recently attracted attention as a feasible source of CaO for biodiesel conversion. Through a process known as calcination, wherein materials are heated to high temperatures, calcium compounds (such as calcium carbonate, CaCO_3) present in eggshells can be metamorphosed into calcium oxide (CaO) [14]. This conversion process produces an economically viable and environmentally friendly catalyst material, promising for application in transesterification reactions. Additionally, the adaptability and reusability of CaO render it an attractive choice for fostering sustainable practices in biodiesel production.

Many researchers are drawn to the potential advantages of calcium oxide (CaO) and are actively engaged in further investigating its properties and potential enhancements. Das et al. [15] employed wastewater as a nutrient source for biofuel generation, utilizing a catalyst comprised of switchgrass charcoal and calcined waste eggshells doped with lanthanum to convert algal lipid into biodiesel. The optimal catalyst was identified to be CaO doped with biochar and exposed to a temperature of 950 degrees Celsius. Ali et al. [2] conducted research on the formation of CaO catalyst extracted from eggshells and its utilization in manufacturing biodiesel from recycled cooking oil. Their findings revealed that a catalyst loading of 1 wt% yielded the highest biodiesel output compared to other loadings. This underscores the efficacy of eggshell-derived catalysts in large-scale conversion of spent cooking oil into biodiesel, offering potential cost reduction, enhanced yield, and improved fuel properties. Pattiasina et al. [16] investigated the biodiesel production process utilizing purebred chicken eggshells as catalysts and methanol as a solvent.

This study investigates biodiesel production using waste eggshells as a catalyst and recycled cooking oil as the main feedstock. Furthermore, the study delves into the reusability aspect of the catalyst, emphasizing the implementation of a heterogeneous catalyst approach.

2. Experimental Framework

2.1 Material Procurement

The study sourced sunflower oil exclusively utilized for frying from the author's kitchen. Methyl alcohol of high purity, rated at 99.9%, was supplied by the Central Store of Mangalayatan University. Leftover eggshells were gathered from the PremBhalla Restaurant in Agra. All necessary tools and equipment for the study were procured from the laboratories at Mangalayatan University in Aligarh.

2.2 Catalyst Preparation

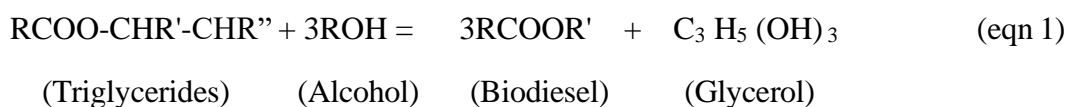
The waste eggshell material underwent a systematic treatment protocol, initiating with a thorough washing procedure using tap water to remove extraneous contaminants adhered to the surface. Subsequently, the shells underwent two rinses with distilled water. Following the washing phase, the shells were dehydrated using hot air oven set at 100°C for duration of 24 hours. Upon drying, the material underwent grinding and crushing, and the subsequent powder underwent sieving. The subsequent step involved the calcination of the dried eggshell waste at 900°C in a muffle furnace, utilizing static air and maintaining a controlled heating rate of 2.5°C/min for a duration of 2 hours. To mitigate undesired reactions employing carbon dioxide (CO₂) and atmospheric humidity, all calcined samples were stored in a sealed vessel before utilization. This meticulous approach ensures the production of refined and purified eggshell-derived material suitable for subsequent applications in various fields.

2.3 Experiment Setup

In this analysis, a 500 mL glass cylindrical reactor was employed, outfitted with essential components including a magnetic stirrer, a thermometer, a reflux condenser, and a sample port. The reactor was situated within a continuous heating mantle controlled by a temperature controller with a precision limit of 0.3°C. To ensure uniform agitation during the experiment, an electric magnetic stirrer was utilized. Initially, 100 grams of residual cooking oil were introduced into the reactor, and then elevated to the requisite temperature for further processing.

2.4 Experiment Technique

Waste sunflower oil is subjected to transesterification catalyzed by bases, a chemical process that facilitates the conversion of triglycerides into biodiesel and alcohol. Transesterification involves the transfer of ester groups between molecules, culminating in the formation of biodiesel and alcohol as the main products. Equation 1 serves as a representation of this chemical transformation.



The choice to utilize sunflower oil previously used for frying is motivated by its elevated fatty acid content, requiring processing to make it viable for biodiesel manufacturing. It's important to note that waste cooking oil (WCO) often presents higher levels of free fatty acids (FFA), which can notably impact the biodiesel yield obtained. To prepare the WCO for transesterification, it undergoes heating to 110°C to remove moisture and is subsequently filtered to remove impurities, such as food residues. The transesterification reaction is

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

conducted in a 500 mL round-bottomed flask equipped with essential apparatus, including a magnetic stirrer for agitation, a thermometer for temperature monitoring, and a condenser to facilitate the reflux of reactants. Following the inclusion of 100 grams of WCO and the appropriate amount of methanol, the reaction mixture is stirred at 800 rpm while being heated to the desired temperature. The introduction of the catalyst kickstarts the transesterification process, after which the reaction mixture is allowed to proceed for a predetermined duration. After the reaction concludes, the catalyst is removed from the biodiesel through filtration using 40-micron filter paper, and excess methanol is recovered through batch distillation. Subsequent centrifugation facilitates the extraction of glycerol from the biodiesel. To further enhance the quality of the biodiesel product, it undergoes additional processing, including heating and stirring to facilitate the isolation of residual contaminants. Equation (2) is then utilized to quantify the yield of biodiesel acquired from the reaction, accounting for the initial quantity of WCO utilized and any losses incurred throughout the process.

$$\%Biodiesel\ Yield = \frac{Weight\ of\ finished\ biodiesel}{Weight\ of\ original\ oil} \quad (eqn\ 2)$$

3. Results and discussions

3.1 Physical and chemical attributes of used cooking oil

Repeated heating of cooking oil generates reactive oxygen species (ROS), as documented in reference [17], hastening oxidative deterioration and reducing natural antioxidants. Unfiltered cooking oil exhibits higher densities, relative indices (RI), acid values (AV), free fatty acids (FFA), saponification values (SV), and iodine values (IV) compared to filtered oil. Reference [18] recommends heating and filtering the oil to enhance quality and prolong shelf life. Frying alters the chemical and physical characteristics of oil, leading to degradation, as reported in publications [19, 20]. Laboratory measurements of various biodiesel properties, including density, moisture content, and acid value, were conducted as part of the research. ASTM analytical methods were employed to ensure consistency and uniformity in the analysis of all samples. Table 1 presents the details of these analyses, encompassing the composition of fatty acids and physical-chemical attributes of waste sunflower oil. Utilizing standardized ASTM methods ensures accuracy and comparability of results across diverse samples, facilitating reliable and consistent research outcomes.

Table 1 Physiochemical characteristics of used cooking oil

| Test Method | Property | Value for feedstock |
|-------------|----------------------|---------------------|
| ASTM D4607 | Iodine value | 110–135 |
| ASTM D6304 | Moisture content | 0.8 |
| ASTM D94 | Saponification value | 184–190 |

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

ASTM D1298

Density

0.906–0.92

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | |
|---------------|---------------------------------------|----------|
| ASTM D2502 | Molecular weight | 855.8914 |
| ASTM D664-11a | Acid value (mg of KOH/ g of oil) | 1.7 |
| ASTM D1982 | Unsaturated fatty acid | 70–80% |
| ASTM-D664 | Free acidity (according to oleic acid | 2.21 |

3.2 Evaluations of biodiesel manufacturing and standards

The production of biodiesel utilizing a catalyst sourced from recycled eggshells incorporated the transesterification process, a pivotal phase in transforming waste cooking oil into a usable fuel. The evaluation of biodiesel yield served as a pivotal indicator of both fuel quality and the efficiency of the catalyst. Notably, ideal operational parameters were determined, including a precise methanol-to-oil ratio of 13:1, a catalyst loading of 4 wt%, a reaction temperature maintained at 65°C, and reaction duration of 180 minutes. These parameters collectively yielded a biodiesel yield of 75.32%. This finding underscores the significance of fine-tuning process variables to maximize biodiesel production potential, highlighting the efficacy of the eggshell-derived catalyst in driving efficient transesterification reactions. Furthermore, meticulous assessment of biodiesel quality was imperative to ascertain the catalyst's performance throughout the manufacturing process. Various critical parameters, including free fatty acid content, kinematic viscosity, flash point, cetane index, density, and calorific value, underwent thorough analysis and comparison against ASTM standard values [21]. The comprehensive evaluation, as outlined in Table 2, provided valuable insights into the physical and chemical attributes of the produced biodiesel. Importantly, the results demonstrated that the resulting biodiesel with the eggshell-derived catalyst exhibited consistency with traditional biodiesel characteristics, affirming its appropriateness for utilization as a viable fuel alternative. This underscores the efficacy of the eggshell-derived catalyst in enabling the manufacture of high-grade biodiesel that meets stringent industry standards, paving the way for sustainable and environmentally friendly fuel solutions.

Table 2 A comparisons of the physical and chemical properties of biodiesel and petroleum diesel

| Parameter | Test method | Eggshell derived CaO | Petroleum Diesel | EN14214b |
|-------------------------|----------------|----------------------|------------------|----------|
| Calorific Value(MJ/kg) | ASTM D 240-06 | 39.1 | 41.8 | NA |
| Moisture Content (wt %) | ASTM D 4377-00 | 0.06 | NA | <0.05 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | | | |
|------------------------------------|-----------------|-------|---------|---------|
| Kinematic Viscosity at (40°C) | ASTM D 445-01 | 3.798 | 3.0-8.0 | 3.5-5.0 |
| Density (15°C, kg/m ³) | ASTM D 1298- 99 | 882 | NA | 860-900 |
| Flash Point (°C) | ASTM D 3278-96 | 117 | >65 | >101 |
| Cetane number | ASTM D -91 | 38.9 | >49 | >51 |
| Acid number (mg KOH/g) | ASTM D 664/18 | 0.23 | <0.1 | <0.5 |

3.3 Reusability of Catalyst

Assessing the reusability of a heterogeneous catalyst is essential for its evaluation. In this investigation, we examined the reusability of CaO obtained from waste eggshells, prepared under optimized conditions. The experimental configuration included a 4 wt% catalyst loading, a methanol to oil ratio of 13:1, a reaction temperature of 65°C, and reaction duration of 3 hours. The efficacy of the catalyst in four consecutive cycles was assessed, with solid catalyst recovery and rinsing with n-hexane to remove any residual adsorbed contaminants after each cycle. Analysis of changes in biodiesel yield across the cycles revealed a steady decrease from the baseline yield of 75.32% for eggshell-derived CaO to 41.1% with increasing reuse attempts, as depicted in Figure 1. This decline in biodiesel yield may be attributed to impurities present in the derived CaO, along with factors such as surface area and particle size. Moreover, throughout the calcination process, the release of CO₂ could result in the creation of surface voids, affecting the catalytic efficiency of the substance.

The decrease in Ca²⁺ concentration for subsequent reactions is attributed to active metal leaching into the methanolysis solution, resulting in a reduction in solution basicity. Catalyst surface poisoning by trace elements such as glycerides, water, and other intermediate compounds further contributes to this phenomenon. These factors collectively diminish biodiesel production during recycling attempts by covering the active surface area with foreign substances, hindering the catalytic process. Moreover, catalyst particle agglomeration occurs, with agglomerate size increasing with successive recycling efforts [22].

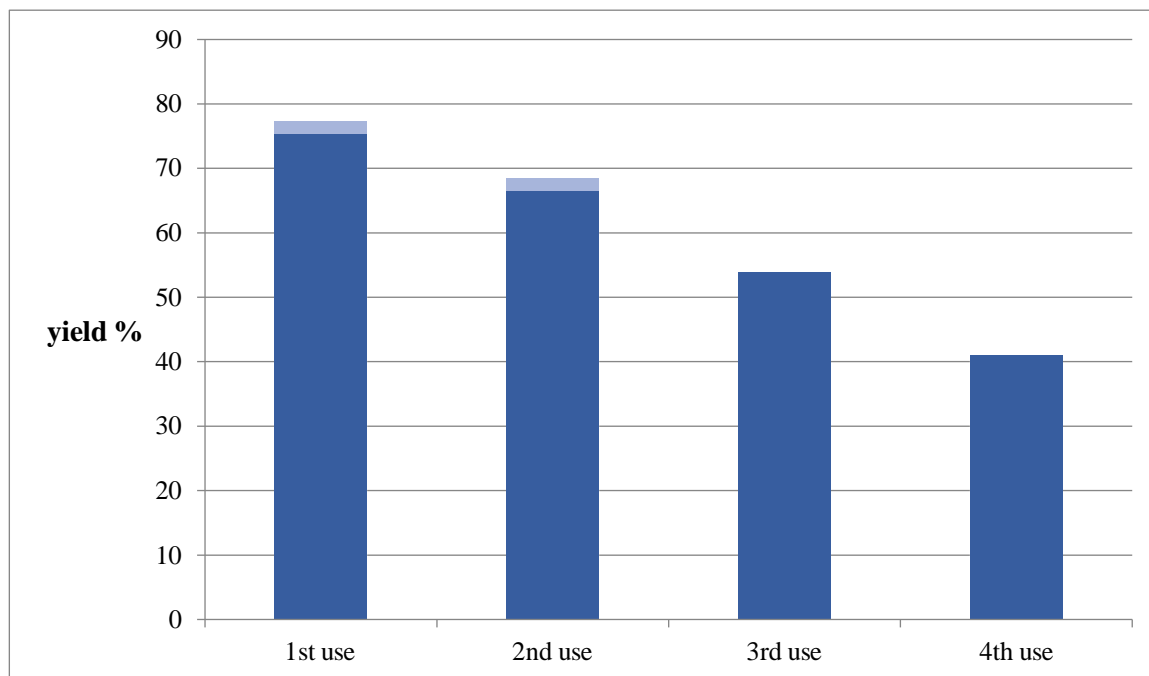


Figure 1. The eggshell-derived CaO catalyst's recyclability under optimized conditions, featuring a 4 wt% catalyst loading, a methanol to oil ratio of 13:1, a reaction temperature of 65°C, and a reaction duration of 3 hours.

4. Conclusion

The experimental investigation revealed the significant catalytic potential inherent in waste eggshells for facilitating the biodiesel synthesis via transesterification using recycled cooking oil. This study firmly establishes the superiority of eggshell-derived catalysts in the production of biodiesel domain. Noteworthy findings inferred from experimental dataset and anticipated outcomes indicate that optimal conditions, including a 4wt% catalyst loading, a reaction temperature of 65°C, reaction duration of 3 hours, and a molar ratio of 1:13, yielded an impressive maximum biodiesel production of 75.32%. However, over successive cycles, we observed a gradual decline in biodiesel output from the initial peak of 75.32% to 41.1%. This decline underscores the relevance of evaluating catalyst reusability, highlighting the potential advantages of employing the heterogeneous catalyst throughout multiple transesterification cycles. Moreover, our study reinforces the pertinence of biodiesel as a sustainable energy alternative, contributing to efforts aimed at reducing reliance on fossil fuels and mitigating environmental degradation. By utilizing waste eggshells as a renewable catalyst source, the study not only presents promising strides in biodiesel production technology but also emphasizes the crucial role of biodiesel in fostering environmentally friendly energy solutions for a sustainable future.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

References

- [1] El-Sherif A, Hamad A, Eldin E, Mohamed H, et al. Power of recycling waste cooking oil into biodiesel via green CaO-based eggshells/Ag heterogeneous nanocatalyst. *Renewable Energy*, 2023; 202:1412-1423.
- [2] Ali N, Khairuddin N, Azmi T and Siddique MD. The Preparation of CaO Catalyst from Eggshells and Its Application in Biodiesel Production from Waste Cooking Oil. *Arabian Journal of Chemistry*, 2023; 48:383-388.
- [3] Mahesh SE, Ramanathan A, Begum KM, Narayanan A. Biodiesel production from waste cooking oil using KBr impregnated CaO as catalyst. *Energy Convers Manage*. 2015;91:442–50.
- [4] Zaini E. Eggshells ribbed tri – potassium phosphate fabricated catalyst for ethanolysis conversion of waste cooking oils to biodiesel fuel. *AIP Conf. Proc.*, 2023; 2776.
- [5] Naik S.N, Vaibhav V. Goud, Prasant K. Rout, Ajay K. Dalai. Production of first and second generation biofuels: A comprehensive review. *Renew SustEnerg Rev*, 14, (2010), 578-597.
- [6] Rafael L, Juan C, James C. *Hand Book of Biofuels Production Processes and Technologies*. Woodhead Publishing Limited. (2011).
- [7] Niju S, K. M. Meera S. Begum and N. Anantharaman. Continuous flow reactive distillation process for biodiesel production using waste egg shells as heterogeneous catalysts, *RSC Adv*. 4, (2014)
- [8] Bharadwaj A.V.S.L.Sai, Madhu S, Niju S, Meera Sheriffa Begum K.M, Anantharaman N. Biodiesel Production from Rubber Seed Oil Using Calcium oxide derived from Eggshell as Catalyst – Optimization and Modeling studies. *Green Process Synth*. 8, (2019), 430–44), 54109–54114.
- [9] Nahas L, Dahdah E, Aouad S, Khoury B, et al., Highly efficient scallop seashell-derived catalyst for biodiesel production from sunflower and waste cooking oils: Reaction kinetics and effect of calcination temperature studies. *Renewable energy*. 2023; 202: 1086-1095.
- [10] Ayatullahi SM, Muhammad C, Sokoto AM, Yusuf MM, Muhammad AU. Optimization of biodiesel production from used oil of fish processor using sodium methoxide and sulphonated egg-shells as catalyst. *FUDMA Journal of Sciences*, 2023; 7(4).
- [11] Maneerung T, Kawi S, Dai Y, Wang CH. Sustainable biodiesel production via transesterification of waste cooking oil by using CaO catalysts prepared from chicken manure. *Energy Convers Manage* 2016;123:487–97.
- [12] Qiu F, Li Y, Yang D, Li X, Sun P. Heterogeneous solid base nanocatalyst: preparation, characterization and application in biodiesel production. *Bioresour Technol* 2011;102:4150–6.

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

- [13] Sharma YC, Singh B, Korstad J. Latest developments on application of heterogenous basic catalysts for an efficient and eco friendly synthesis of biodiesel: a review. *Fuel* 2011;90:1309–24
- [14] Wei Z, Xu C, Li B. Application of waste eggshell as low-cost solid catalyst for biodiesel production. *BioresourTechnol* 2009;100(11):2883–5.
- [15] Das V, Dunford N and Deka D. Waste utilization and biodiesel production from *Desmodium maximum* grown in swine wastewater using waste eggshells as a catalyst. *Aquacultural Engineering*, 2022; 99:102293.
- [16] Pattiasina P, Sutapa I and Tehubijuluw. Biodiesel from the waste cooking oil is catalyzed by egg-shell of purebred chicken with methanol as a solvent. *Pattimura Journal of Biology and Learning*, 2023; 3. <https://doi.org/10.30598/bioedupat.v3.i1.pp71-74>. and catalytic properties. *Biomass Bioenergy* 2012; 46:459–468.
- [17] Amsalu H, Wondimnew T, Mateos T, Fekadie M, Bogale G. The effect of palm oil-fried street kokor on liver and kidney biomarkers of Swiss albino mice. *J. Lipids*. 2020; 1–5, <https://doi.org/10.1155/2020/8819749>.
- [18] Wiege B, Fehling E, Matthaus B, Schmidt M. Changes in physical and chemical properties of thermally and oxidatively degraded sunflower oil and palm fat. *Foods*. 2020; 9(9):1273. <https://doi.org/10.3390/foods9091273>.
- [19] Jurid LS, Zubairi SI, Kasim ZM, Kadir IA. The effect of repetitive frying on physico-chemical properties of refined, bleached and deodorized Malaysian tenera palm olein during deep-fat frying. *Arab.J.Chem.* 2020;13(7):6149–6160. <https://doi.org/10.1016/j.arabjc.2020.05.015>.
- [20] Saeed M, Shola E. Extraction and physico chemical properties of some edible seed oils sampled in kano metropolis, kano state, Bayero J. *Pure Appl. Sci.* 2016; 8(2): 239. <https://doi.org/10.4314/bajopas.v8i2.39>.
- [21] Miyuranga KA, De Silva V, Arachchige, Jayasinghe RA, Weerasekara NA. Comparison of the Properties of Biodiesel/Bioethanol-Diesel Blended Fuel. *Asian Journal of Chemistry*. 2022; 34:1809–1813, doi:10.14233/ajchem.2022.23767.
- [22] Zon M, Thoolen H, Hamersma PJ, Poels EK, Blik K. Agglomeration and adhesion of catalyst particles in gas–liquid reactors. *Catalysis Today*, 2021; 66 (1-2) : 263-270.

Predictive Modelling and Analysis of Infectious Disease(COVID-19) Cases in Indian States

^[1] Manoj Kumar Singh, ^[2] Basudeo Singh Roohani

^[1] Department of Computer Science & Engineering IMS Engineering College Ghaziabad,

^[2] Department of Computer Science & Engineering IMS Engineering College Ghaziabad

^[1] singhmanojmit@gmail.com

^[2] bsroohani2007@gmail.com

Abstract- In this paper, our aim is to analyze data on the number of infected individuals in each Indian state and predict the number of infections for the coming year. By focusing on state-level analysis, we can shed light on the specific challenges faced by different regions and tailor interventions accordingly. To analyze and understand the spread of COVID-19 in Indian states: The objective is to analyze the available data on COVID-19 cases in different Indian states and gain a comprehensive understanding of the spread and dynamics of the virus. This involves examining the patterns of infection, identifying hotspot regions, and studying the factors contributing to the spread within each state. In this paper we are finding the state wise confirmed case, deaths cases, and cured cases.

Keywords: - COVID-19, Machine Learning, infectious diseases, ML-Algorithm

I. INTRODUCTION

India is not an exception to the global impact that the COVID-19 epidemic has had on nations. Given its breadth and diversity, India confronts particular difficulties in the fight against the virus. Although the total number of infections in the nation has received a lot of attention, it is important to focus on particular states and conduct a more detailed analysis of the issue. Due to elements including population density, healthcare infrastructure, and socioeconomic situations, the disease's transmission and effects varied dramatically across different geographical areas. As a result, it is crucial to examine COVID-19 instances in each Indian state independently in order to fully comprehend the

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

problem and provide workable solutions.

We analyse data on the number of sick people in each Indian state in this research study with the intention of forecasting the number of illnesses in 2023. We can shed light on the particular issues encountered by various areas by concentrating on state-level analyses and designing actions appropriately. This tailored strategy takes into account India's diversity and makes it possible to implement containment and mitigation measures that are more successful.

We use a comprehensive system to accomplish our goals. The logistic model, the exponential model, and the susceptible-infectious-susceptible (SIS) model are the three growth models we take into account. The danger associated with relying only on a model's predictions is reduced by the unique insights and perspectives that each model contributes to the research. We integrate the predictions from the exponential and logistic models using an ensemble technique, weighted according to the current trend in infections as shown by the model-free maximum daily infection rate (DIR) for the previous two weeks. This data-driven methodology improves the reliability and accuracy of our forecasts.

In our analysis, we interpret the results from all models alongside the recent DIR values for each state. This comprehensive assessment enables us to categorize the states into three distinct categories: severe, moderate, or controlled. Such categorization provides policymakers and public health authorities with valuable insights into the severity and trajectory of the pandemic in each state. It empowers them to make informed decisions regarding resource allocation, targeted interventions, and preparedness measures.

It is crucial to note, however, that the accuracy of our classification and projections rely on the accessibility and dependability of the data utilised, as well as the presumptions and constraints of the growth models used. Despite these obstacles, this research promotes evidence-based decision-making and provides insightful information about the COVID-19 situation at the state level in India.

We support continuing efforts by the Indian government and public health agencies to effectively manage and contain the pandemic by analysing the

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

COVID-19 outbreak and forecasting infections till 2023. The results of this study will help develop measures to lessen the virus's effects and safeguard the population of Indians' health and wellbeing.

II. LITERATURE REVIEW

| Author (Year) | Methodology Used | Result | Disease |
|--------------------------------|--|---|---------------------------------------|
| Albahri et al.(2020) | Three ML techniques were applied to the MERS-CoV dataset to identify the best classification model for binary class and multiclass labels | This study reviewed the state-of-the-art techniques for CoV prediction algorithms based on data mining and ML assessment. | Novel Coronavirus (COVID-19) |
| Alimadadi et al. (2020) | Personalized protective strategies, novel diagnostic approaches using machine learning algorithms. | Improve diagnostic speed and accuracy, develop novel effective therapeutic approaches, and potentially identify the most susceptible people based on personalized genetic and physiologic characteristics | Coronavirus diseases e2019 (COVID-19) |
| Kumar et al.(2020) | Machine learning-based classification of the extracted deep feature using Res-Net152 with COVID-19 and Pneumonia patients on chest X-ray images. | The model is achieving an accuracy of 0.973 on Random Forest and 0.977 using XGBoost predictive classifiers. | coronavirus (COVID-19) |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | | |
|---------------------------------|---|--|----------------------------------|
| Lalmuanawma et al.(2020) | Machine Learning and Artificial Intelligent fortackling Covid-19 pandemic. | Development in AI andML has significantly improved treatment, medication, screening,prediction, forecasting,contact tracing, and drug/vaccine development processfor the Covid-19 pandemic and reduce the human interventionin medical practice. | Covid-19 |
| Kukar et al.(2020) | machine learnin gpredictive model for COVID-19 diagnosis | COVID-19 diagnosis isattainable using ML on data from routine bloodtests | coronavirus diseases e(COVID-19) |
| Brinati et al.(2020) | Two machine learning classification models using hematochemical values from routine blood exams | study demonstrated the feasibility and clinical soundness of using blood tests analysis and machine learning as an alternative to RT- PCR for identifyin g COVID-19 positive patients | COVID-19 |

III.

METHODOLOGY

This research employs a comprehensive methodology to analyze COVID-19 cases in Indian states and predict the number of infections for the year 2023. The methodology includes data collection, cleaning, exploratory data analysis, feature engineering, and the development of an ensemble of predictive models.

1. Data Collection: The first step involves gathering data on COVID-19 cases in Indian states. Multiple sources can be utilized, including official government websites, healthdepartment reports, and reputable databases.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

The data should encompass relevant variables such as the number of confirmed cases, active cases, recoveries, and deaths for each state over a specified period.

2. **Data Cleaning:** Once the data is collected, it undergoes a thorough cleaning process to ensure its accuracy and consistency. This involves removing any duplicates, correcting errors, addressing missing values, and standardizing the data format across different sources.
3. **Exploratory Data Analysis (EDA):** The cleaned data is then subjected to EDA techniques to gain insights into the patterns and trends of COVID-19 cases in Indian states. Descriptive statistics, data visualization, and time series analysis can be employed to identify any notable variations in the spread of the virus across different regions.
4. **Feature Engineering:** Feature engineering involves transforming the raw data into meaningful features that can enhance the predictive models' performance. This can include deriving new variables or aggregating existing ones to capture relevant aspects such as population density, healthcare infrastructure, and socioeconomic factors specific to each state.
5. **Predictive Modeling:** Three growth models are considered in this research: the logistic model, the exponential model, and the susceptible-infectious-susceptible (SIS) model. Each model provides unique insights into the dynamics of COVID-19 spread. Predictive models are developed using these growth models to forecast the number of infections for each state in 2023.
6. **Ensemble Approach:** To enhance the reliability and accuracy of predictions, an ensemble approach is employed. The ensemble combines the predictions from the logistic and exponential models, with weights assigned based on functions of the model-free maximum daily infection rate (DIR) observed over the last two weeks. This data-driven weighting strategy ensures that recent trends

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

are given appropriate consideration in the ensemble predictions.

7. **Interpretation and Categorization:** The results from all models, along with the recent DIR values for each state, are jointly interpreted. This interpretation allows for the categorization of states into three distinct categories: severe, moderate, or controlled. This categorization aids in understanding the severity of the COVID-19 situation in each state and guides policy-makers in making informed decisions regarding interventions and resource allocation.

It is important to acknowledge that the success of this methodology relies on the availability and reliability of the data, as well as the assumptions and limitations of the growth models employed. Rigorous validation techniques, such as cross-validation and sensitivity analysis, should be utilized to assess the models' performance and reliability of the predictions.

Overall, this comprehensive methodology enables the analysis and prediction of COVID-19 cases in Indian states, providing valuable insights into the localized dynamics of the pandemic. The ensemble approach and categorization of states contribute to evidence-based decision-making and aid in developing targeted interventions to mitigate the impact of the virus.

In the context of analyzing and predicting COVID-19 cases in Indian states, several machine learning algorithms can be considered. Let's discuss the applicability and characteristics of the following algorithms: Decision Tree Regressor, Logistic Regression, Linear Regression, Random Forest Classifier, and Gaussian NB.

1. **Decision Tree Regressor:** The Decision Tree Regressor algorithm is a supervised learning algorithm used for regression tasks. It builds a decision tree based on the provided input features and their corresponding target values. In the context of predicting COVID-19 cases, Decision Tree Regressor can be useful in estimating the number of infections based on relevant features such as population density, healthcare infrastructure, and socioeconomic factors. However, decision trees tend to over fit the training

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

data, so caution should be exercised to prevent over-optimistic predictions.

2. **Logistic Regression:** Logistic regression is a supervised learning algorithm used for classification tasks. While primarily designed for binary classification, it can be extended for multiclass classification. In the context of COVID-19 analysis, Logistic Regression can be applied to categorize states into severity levels, such as severe, moderate, or controlled. By considering various features, logistic regression can provide probabilities or likelihoods of belonging to each category, aiding in decision-making and resource allocation.
3. **Linear Regression:** Linear regression is a supervised learning algorithm used for regression tasks. It models the relationship between the input features and the target variable by fitting a linear equation. In the case of COVID-19 analysis, Linear Regression can be utilized to predict the number of infections based on various features. However, it is important to note that linear regression assumes a linear relationship between the features and the target variable, which may not always hold true for complex phenomena such as disease spread.
4. **Random Forest Classifier:** The Random Forest Classifier algorithm is an ensemble learning method that combines multiple decision trees to perform classification. It can handle both binary and multiclass classification tasks. Random Forest Classifier can be beneficial in predicting the severity category of COVID-19 cases in Indian states by considering multiple features. The ensemble nature of random forests helps mitigate over fitting and provides robust predictions by aggregating the decisions of multiple trees.
5. **Gaussian NB:** Gaussian NB is a classification algorithm based on Bayes' theorem and the assumption of Gaussian (normal) distribution of features. It is commonly used for classification tasks, particularly when dealing with continuous-valued features. In the context of COVID-19 analysis, Gaussian NB can be employed to classify states based on relevant features into severity categories. However, it assumes that the features are independent, which may

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

not always hold true in complex scenarios.

When selecting the appropriate algorithm(s) for COVID-19 analysis, it is essential to consider the specific requirements and characteristics of the dataset. Factors such as the nature of the target variable, the availability and quality of features, and the desired interpretability of the results should be taken into account. It is also recommended to employ cross-validation techniques to evaluate and compare the performance of different algorithms, ensuring the reliability of the predictions.

In the proposed methodology, the specific algorithms used for growth modeling and ensemble prediction are not explicitly mentioned. However, based on the general application

of the mentioned algorithms, Decision Tree Regressor and Random Forest Classifier could be suitable for growth modeling and severity categorization, respectively. Logistic Regression and Gaussian NB may be employed for severity classification tasks, while Linear Regression could be utilized for regression-based prediction of infection numbers. The specific choice of algorithms should be determined based on the characteristics of the data and the research objectives.

IV. RESULT DISCUSSION

DM (Data Mining) and ML are powerful techniques that can be used for the recognition and pre-findings of transmissible diseases such as Corona. Here are some ways in which they can be applied:

- a) **Identification of patterns and risk factors:** When it comes to the transmission of infectious illnesses, DM (Data Mining) may be used to assist detect trends and risk factors. ML algorithms can examine massive volumes of data to spot patterns in things like age, pre-existing conditions, and geography that may indicate Corona virusinfection.
- b) **Early detection and diagnosis:** Predictive models built using ML may assist detect possible instances of infectious illnesses before they spread. Algorithms may be taught to monitor social media, news broadcasts, and other sources in real time in order to spot signs of impending epidemics.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- c) **Contact tracing:** Potential transmission channels and hotspots may be identified by analysing contact tracing data using ML methods. With this information, public healthworkers may better focus their actions and slow the disease's spread.
- d) **Vaccine distribution:** DM (Data Mining) can be used to analyze demographic and geographic data to identify areas with the highest need for vaccines. This can help public health officials allocate resources more effectively and ensure that the most vulnerable populations are protected.
- e) **Drug discovery:** ML can be used to analyse large datasets of medical research to identify potential treatments for transmissible diseases.

COVID-19 cases in various Indian states in order to get a thorough knowledge of the dynamics of the virus and its propagation. Examining infection trends, locating hotspot areas, and researching the elements influencing the spread within each state are all necessary for this: -

```
In [1]: import pandas as pd
from matplotlib import pyplot as plt
import seaborn as sns
import datetime as dt
import numpy as np
covid=pd.read_csv("C:\\Users\\Sony\\Desktop\\python code\\covid_19_india.csv",parse_dates=['Date'],dayfirst=True)
```

```
In [2]: covid.head(10)
```

Out[2]:

| | Sno | Date | Time | State/UnionTerritory | ConfirmedIndianNational | ConfirmedForeignNational | Cured | Deaths | Confirmed |
|---|-----|------------|---------|----------------------|-------------------------|--------------------------|-------|--------|-----------|
| 0 | 1 | 2020-01-30 | 6:00 PM | Kerala | 1 | 0 | 0 | 0 | 1 |
| 1 | 2 | 2020-01-31 | 6:00 PM | Kerala | 1 | 0 | 0 | 0 | 1 |
| 2 | 3 | 2020-02-01 | 6:00 PM | Kerala | 2 | 0 | 0 | 0 | 2 |
| 3 | 4 | 2020-02-02 | 6:00 PM | Kerala | 3 | 0 | 0 | 0 | 3 |
| 4 | 5 | 2020-02-03 | 6:00 PM | Kerala | 3 | 0 | 0 | 0 | 3 |
| 5 | 6 | 2020-02-04 | 6:00 PM | Kerala | 3 | 0 | 0 | 0 | 3 |
| 6 | 7 | 2020-02-05 | 6:00 PM | Kerala | 3 | 0 | 0 | 0 | 3 |
| 7 | 8 | 2020-02-06 | 6:00 PM | Kerala | 3 | 0 | 0 | 0 | 3 |
| 8 | 9 | 2020-02-07 | 6:00 PM | Kerala | 3 | 0 | 0 | 0 | 3 |
| 9 | 10 | 2020-02-08 | 6:00 PM | Kerala | 3 | 0 | 0 | 0 | 3 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

In [3]: covid.tail(10)

Out[3]:

| | Sno | Date | Time | State/UnionTerritory | ConfirmedIndianNational | ConfirmedForeignNational | Cured | Deaths | Confirmed |
|-------|-------|------------|---------|----------------------|-------------------------|--------------------------|---------|--------|-----------|
| 18100 | 18101 | 2021-08-11 | 8:00 AM | Puducherry | - | - | 119115 | 1800 | 121766 |
| 18101 | 18102 | 2021-08-11 | 8:00 AM | Punjab | - | - | 582791 | 16322 | 599573 |
| 18102 | 18103 | 2021-08-11 | 8:00 AM | Rajasthan | - | - | 944700 | 8954 | 953851 |
| 18103 | 18104 | 2021-08-11 | 8:00 AM | Sikkim | - | - | 25095 | 356 | 28018 |
| 18104 | 18105 | 2021-08-11 | 8:00 AM | Tamil Nadu | - | - | 2524400 | 34367 | 2579130 |
| 18105 | 18106 | 2021-08-11 | 8:00 AM | Telangana | - | - | 638410 | 3831 | 650353 |
| 18106 | 18107 | 2021-08-11 | 8:00 AM | Tripura | - | - | 77811 | 773 | 80660 |
| 18107 | 18108 | 2021-08-11 | 8:00 AM | Uttarakhand | - | - | 334650 | 7368 | 342462 |
| 18108 | 18109 | 2021-08-11 | 8:00 AM | Uttar Pradesh | - | - | 1685492 | 22775 | 1708812 |
| 18109 | 18110 | 2021-08-11 | 8:00 AM | West Bengal | - | - | 1506532 | 18252 | 1534999 |

In [11]: max_confirmed_cases=today.sort_values(by='confirmed',ascending=False)

In [12]: max_confirmed_cases.head(10)

Out[12]:

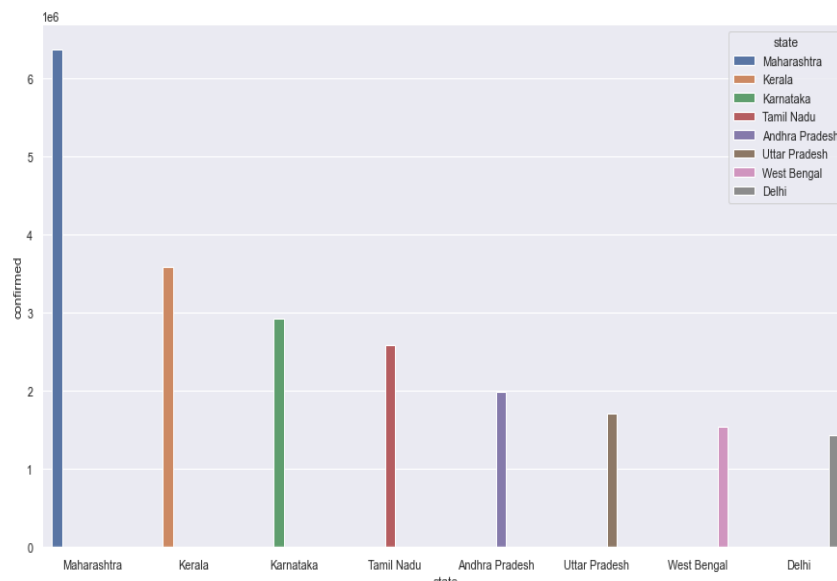
| | date | state | cured | deaths | confirmed |
|-------|------------|----------------|---------|--------|-----------|
| 18094 | 2021-08-11 | Maharashtra | 6159676 | 134201 | 6363442 |
| 18090 | 2021-08-11 | Kerala | 3396184 | 18004 | 3586693 |
| 18089 | 2021-08-11 | Karnataka | 2861499 | 36848 | 2921049 |
| 18104 | 2021-08-11 | Tamil Nadu | 2524400 | 34367 | 2579130 |
| 18075 | 2021-08-11 | Andhra Pradesh | 1952736 | 13564 | 1985182 |
| 18108 | 2021-08-11 | Uttar Pradesh | 1685492 | 22775 | 1708812 |
| 18109 | 2021-08-11 | West Bengal | 1506532 | 18252 | 1534999 |
| 18082 | 2021-08-11 | Delhi | 1411280 | 25068 | 1436852 |
| 18080 | 2021-08-11 | Chhattisgarh | 988189 | 13544 | 1003356 |
| 18099 | 2021-08-11 | Odisha | 972710 | 6565 | 988997 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Maximum Number of confirmed cases state wise

```
Out[14]: <function matplotlib.pyplot.show(close=None, block=None)>
```



Maximum Number of confirmed cases state wise Graph

State types according to degrees of severity: The classification of the states into severity categories, such as severe, moderate, or controlled, based on analysis and forecasts, is the Second goal. Based on the severity of the COVID-19 situation in each state, this categorization helps to prioritise resources, develop focused treatments, and provide healthcare facilities and assistance.

```
In [15]: max_deaths_cases=today.sort_values(by='deaths',ascending=False)
```

```
In [16]: max_deaths_cases.head(10)
```

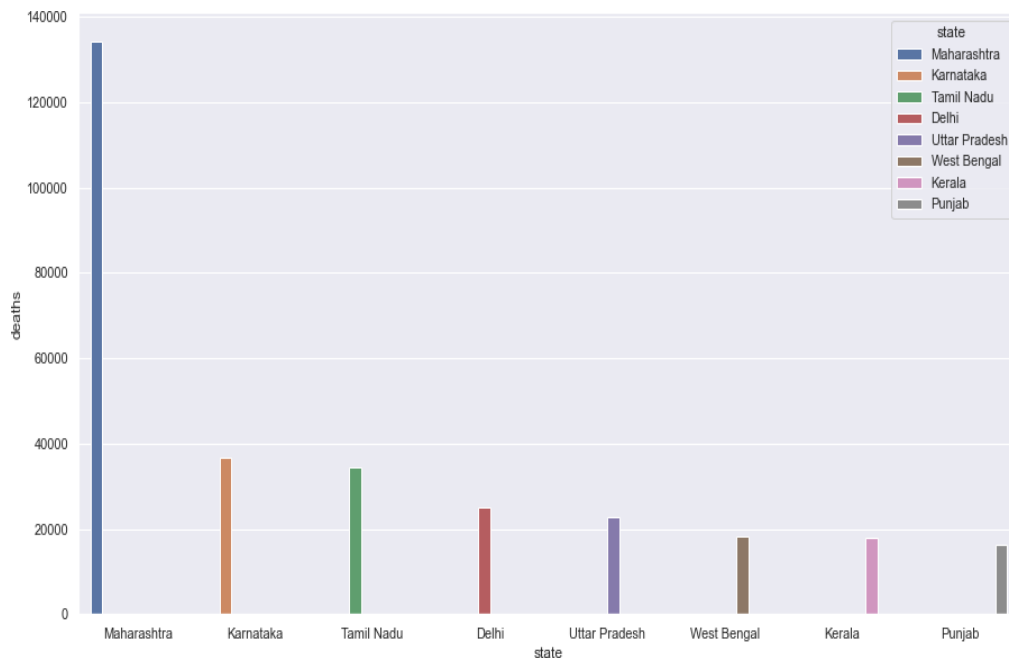
```
Out[16]:
```

| | date | state | cured | deaths | confirmed |
|-------|------------|----------------|---------|--------|-----------|
| 18094 | 2021-08-11 | Maharashtra | 6159676 | 134201 | 6363442 |
| 18089 | 2021-08-11 | Karnataka | 2861499 | 36848 | 2921049 |
| 18104 | 2021-08-11 | Tamil Nadu | 2524400 | 34367 | 2579130 |
| 18082 | 2021-08-11 | Delhi | 1411280 | 25068 | 1436852 |
| 18108 | 2021-08-11 | Uttar Pradesh | 1685492 | 22775 | 1708812 |
| 18109 | 2021-08-11 | West Bengal | 1506532 | 18252 | 1534999 |
| 18090 | 2021-08-11 | Kerala | 3396184 | 18004 | 3586693 |
| 18101 | 2021-08-11 | Punjab | 582791 | 16322 | 599573 |
| 18075 | 2021-08-11 | Andhra Pradesh | 1952736 | 13564 | 1985182 |
| 18080 | 2021-08-11 | Chhattisgarh | 988189 | 13544 | 1003356 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

State wise Degree of severity



State wise Degree of severity Graph

```
In [19]: max_cured_cases=today.sort_values(by='cured',ascending=False)
```

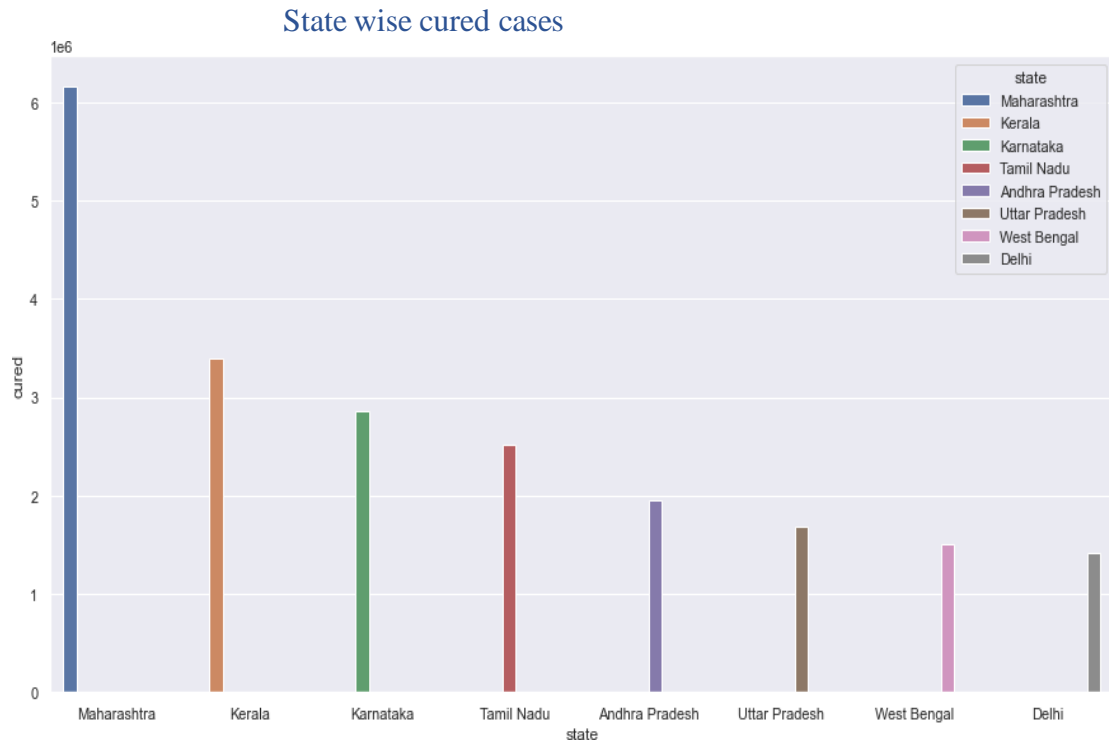
```
In [20]: max_cured_cases.head(10)
```

Out[20]:

| | date | state | cured | deaths | confirmed |
|-------|------------|----------------|---------|--------|-----------|
| 18094 | 2021-08-11 | Maharashtra | 6159676 | 134201 | 6363442 |
| 18090 | 2021-08-11 | Kerala | 3396184 | 18004 | 3586693 |
| 18089 | 2021-08-11 | Karnataka | 2861499 | 36848 | 2921049 |
| 18104 | 2021-08-11 | Tamil Nadu | 2524400 | 34367 | 2579130 |
| 18075 | 2021-08-11 | Andhra Pradesh | 1952736 | 13564 | 1985182 |
| 18108 | 2021-08-11 | Uttar Pradesh | 1685492 | 22775 | 1708812 |
| 18109 | 2021-08-11 | West Bengal | 1506532 | 18252 | 1534999 |
| 18082 | 2021-08-11 | Delhi | 1411280 | 25068 | 1436852 |
| 18080 | 2021-08-11 | Chhattisgarh | 988189 | 13544 | 1003356 |
| 18099 | 2021-08-11 | Odisha | 972710 | 6565 | 988997 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024



State wise cured cases Graph

V. CONCLUSION

The analysis and prediction of COVID-19 cases in Indian states using a comprehensive methodology have provided valuable insights into the spread of the virus and its potential trajectory in the year 2023. By considering multiple growth models and recent trends in infections, the methodology has allowed for a comprehensive assessment of the severity and dynamics of the pandemic at the state level.

In conclusion, the analysis and prediction of COVID-19 cases in Indian states using the proposed methodology provide valuable insights for managing the ongoing pandemic. The categorization of states, along with the predictions of infection numbers, offers guidance for policymakers, public health authorities, and researchers in implementing targeted interventions, allocating resources effectively, and planning for the future. Continuous monitoring and refinement of the analysis are crucial to adapt to the evolving nature of the pandemic and ensure effective management of COVID-19 in India

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

VI. REFERENCES

1. A. Kumar, R. K. Sharma, and others (2021). Modelling instances of COVID-19 using machine learning techniques in India. 10(1), 35–43; Health Policy and Technology.
2. Aduragba, O.T. and Cristea, A.I., 2019, July. Research on Prediction of Infectious Diseases, their spread via Social Media and their link to Education. In *Proceedings of the 4th International Conference on Information and Education Innovations* (pp. 38-42).
3. Alfred, R. and Obit, J.H., 2021. The roles of ML methods in limiting the spread of deadly diseases: A systematic review. *Heliyon*, 7(6), p.e07371.
4. Alimadadi, A., Aryal, S., Manandhar, I., Munroe, P.B., Joe, B. and Cheng, X., 2020. Artificial intelligence and ML to fight COVID-19. *Physiological genomics*, 52(4), pp.200-202.
5. Al-Turjman, F., 2021. AI-powered cloud for COVID-19 and other infectious disease diagnosis. *Personal and Ubiquitous Computing*, pp.1-4.
6. Amar, L.A., Taha, A.A. and Mohamed, M.Y., 2020. Prediction of the final size for COVID-19 epidemic using ML: A case study of Egypt. *Infectious Disease Modelling*, 5, pp.622-634.
7. Anand, A., Sandaraju, H., Parande, M., & Srivastava, S. (2020). COVID-19 in India: A review of current knowledge. *Indian Journal of Medical Research*, 151(2), 147-159.
8. Arji, G., Ahmadi, H., Nilashi, M., Rashid, T.A., Ahmed, O.H., Aljojo, N. and Zainol, A., 2019. Fuzzy logic approach for infectious disease diagnosis: A methodical evaluation, literature and classification. *Biocybernetics and bio-medical engineering*, 39(4), pp.937-955.
9. Arpaci, I., Huang, S., Al-Emran, M., Al-Kabi, M.N. and Peng, M., 2021. Predicting the COVID-19 infection with fourteen clinical features using ML classification algorithms. *Multimedia Tools and Applications*, 80, pp.11943-11957.
10. Ayatollahi, H., Gholamhosseini, L. and Salehi, M., 2019. Predicting coronary artery disease: a comparison between two DM (Data Mining) algorithms. *BMC public health*, 19(1), pp.1-9.
11. Ayris, D., Horbury, K., Williams, B., Blackney, M., See, C.S.H., Imtiaz, M. and Shah, S.A.A., 2020. Deep Learning Models for Early Recognition and pre-findings of the spread of Novel Coronavirus (COVID-19). *arXiv preprint arXiv:2008.01170*.
12. Baguelin, M., Medley, G.F., Nightingale, E.S., O'Reilly, K.M., Rees, E.M., Waterlow, N.R. and Wagner, M., 2020. Tooling-up for infectious disease transmission modelling. *Epidemics*, 32, p.100395.
13. Barman, R.K., Mukhopadhyay, A., Maulik, U. and Das, S., 2019. Identification of infectious disease-associated host genes using ML- Techniques. *BMC bioinformatics*, 20, pp.1-12.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

14. Bhadula, S., Sharma, S., Juyal, P. and Kulshrestha, C., 2019. ML algorithms based skin disease detection. *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*, 9(2), pp.4044-4049.
15. Bhardwaj, T. and Somvanshi, P., 2019. ML toward infectious disease treatment. In *Machine Intelligence and Signal Analysis* (pp. 683-693). Springer Singapore.
16. Bogu, G.K. and Snyder, M.P., 2021. Deep learning-based detection of COVID-19 using wearables data. *MedRxiv*, pp.2021-01.
17. Borkenhagen, L.K., Allen, M.W. and Runstadler, J.A., 2021. Influenza virus genotype to phenotype predictions through ML: a systematic review: Computational Prediction of Influenza Phenotype. *Emerging Microbes & Infections*, 10(1), pp.1896-1907.
18. Brinati, D., Campagner, A., Ferrari, D., Locatelli, M., Banfi, G. and Cabitza, F., 2020. Detection of COVID-19 infection from routine blood exams with ML: a feasibility study. *Journal of medical systems*, 44, pp.1-12.
19. Bruyndonckx, R., Coenen, S., Adriaenssens, N., Versporten, A., Monnet, D.L., Goossens, H., Molenberghs, G., Weist, K. and Hens, N., 2021. Analysing the trend over time of antibiotic consumption in the community: a tutorial on the detection of common change-points. *Journal of Antimicrobial Chemotherapy*, 76(Supplement_2), pp.ii79-ii85.
20. Calderón-Gómez, H., Mendoza-Pittí, L., Vargas-Lombardo, M., Gómez-Pulido, J.M., Castillo-Sequera, J.L., Sanz-Moreno, J. and Sención, G., 2020. Telemonitoring system for infectious disease prediction in elderly people based on a novel microservice architecture. *IEEE access*, 8, pp.118340-118354.
21. Callejon-Leblic, M.A., Moreno-Luna, R., Del Cuvillo, A., Reyes-Tejero, I.M., Garcia-Villaran, M.A., Santos-Pena, M., Maza-Solano, J.M., Martín-Jimenez, D.I., Palacios-Garcia, J.M., Fernandez-Velez, C. and Gonzalez-Garcia, J., 2021. Loss of smell and taste can accurately predict COVID-19 infection: a machine-learning approach. *Journal of Clinical Medicine*, 10(4), p.570.
22. Champredon, D. and Dushoff, J., 2015. Intrinsic and realized generation intervals in infectious-disease transmission. *Proceedings of the Royal Society B: Biological Sciences*, 282(1821), p.20152026.
23. Chen, J., Lu, Y., Bai, J., & Xu, H. (2020). Predicting the epidemic dynamics of COVID- 19 in China and the US with a data-driven stochastic model. *Chaos, Solitons & Fractals*, 139, 110055.

SYNOPSIS

AN EXPLORATORY STUDY ON THE SUPPLY CHAINMANAGEMENT PRACTISES OF A DISTRIBUTOR

Santosh K,

Management

Logistics

INTRODUCTION

Distribution has become a key aspect of the business in recent times specially with the global markets being open and reachable for all without any geographical limitations. International Brands of commodities such as mobile phones , laptops, electronic goods, luxury jewels, clothing, footwear, food products, spices, oil etc. being produced in one country are now available in other countries and thereby posing a challenge to all the suppliers to make their products available across the globe through their subsidiaries or through their distributors, hence the supply chain leaders of the subsidiaries or the distributors for the region try and do their best to make the right goods available at the right time to the right place at the right cost.

This exploratory study assesses the scope to which Supply Chain Management practice influences the supply chain performance with reference to a distributor.

With a career span of about 20+ years in the logistics industry of having worked with a multinational shipping company in India, a multinational freight forwarder in UAE and a multinational distributor of leading electronic brand in UAE for the past 16 years, think there is some aspect of supply chain that can studied with my experience and can be shared

to the next generation for them to evolve and grow as a supply chain expert specially with the supply chain practices of a distributor's perspective.

I started working in the Gulf at a time when prominent brands were not allowed to do business on their own, instead they were supposed to have distributors in the country through whom they were allowed to sell their brand within the country and thus discovered the challenge of working in the supply chain team of a distributor to make goods available at the right time across the Gulf region.

Distributors of a parent company are basically companies who act as subsidiaries on behalf of their parent companies and sell parent company's product in the region or country by taking the margin of profit share for the product as decided by the supplier. Distributors import goods from the country of the parent company where it is manufactured and stock in their warehouses either in mainland or in bonded-warehouses and distribute the products to other countries through resellers or distribute within the country through retailers. The Supply Chain Activity of a distributor predominantly revolves around different legs of the supply chain management viz. forecasting and purchasing, importing, storing, and Distribution (Export or Local Deliveries). These legs of the Supply Chain activity of a distributor are discussed further in detail as below.

Forecasting & Purchasing

Forecasting is a process in which the future can be predicted for the products that we intend to purchase and sell. A structured way of forecasting is done to procure the right quantity of products with due input from the sales and the management of the company. There are different methods of forecasting being used for products that are in high demand and products that are not in demand and for products that are

mandatory to purchase as per the requirement from the supplier. Once a forecast is done, required Purchase Orders are placed with the supplier to get the required products delivered to the country of import.

Import by the distributor

A distributor can use modes of transport such as land, sea or air depending on the distance, cost, requirement of products to be distributed. For low-value cargo such as FMCG products, fertilizers, grains, cloths, etc. generally a distributor uses sea if the distance is far or land if the distance is short and for high value goods such as mobile phones, laptops, etc. distributors use Air for the fact that their shipment reaches fast and can be distributed as quick as possible.

Storage by a distributor

A distributor stores the goods received by the supplier using different methods as suitable and convenient for the goods to be exported and distributed. Storage can either be done using own warehouse, 3PL warehouse, bonded warehouse etc.

Deliveries by the Distributor

A distributor can use various modes of transport such as sea, road or air depending on the distance, cost, requirement of products to be distributed. For low-value cargo such as FMCG products, fertilizers, grains, cloths, etc. generally a distributor uses road freight and sea freight and for high-value goods such as mobile phones, laptops, etc. distributors use Air for the fact that their shipment reaches fast and can be distributed as quick as possible.

Some of the examples of world-renowned distributors are as follows

Redington India Pvt Ltd and Reddington Middle East LLC (A Major player of IT products distributing products such as Apple, HP etc. in India and in the Gulf)

Reference : <https://redingtongroup.com>

Al Maya Group (Distributors of Apparels such as Byford, Levi's etc. in the UAE)

Reference: <https://www.almaya.ae>

Emirates Snack foods LLC (Distributors of brand Barilla, Indomie, Hershey's, Bonne Maman, Alpro and many more)

Reference: <https://www.esf-uae.com>

LITERATURE REVIEW

A literary review of the topic reveals that there is not much research done particularly with the supply chain management practices of a distributor as such however there are studies done on the supply chain management and an attempt will be made to take inferences from respective research wherever necessary highlighting the area of research coinciding with the topic of study and the different legs of the supply chain management.

OBJECTIVE

- a) To identify the current supply chain management practices of the distributor.
- b) To examine the challenges faced by the distributor if any, in managing the supply chain.
- c) To explore the strategies used by the distributor to manage the supply chain.

- d) To identify the best practices in supply chain management adopted by the distributor.
- e) To provide recommendations to the distributor on how to improve their supply chain management practices.

METHODOLOGY

The proposed research will be conducted through a case study approach. Survey method and Questionnaires will be used to collect data. The case study will focus on a distributor in a specific industry and with practical experience of about 16 years of having worked in the supply chain department of a leading distributor in the middle east for high-end electronic goods. The data will be collected through a combination of primary and secondary sources. The primary data will be collected through interviews with the key stakeholders. The secondary data will be collected through a review of the relevant literature on supply chain management.

DATA ANALYSIS

The data will be collected through interviews and practical experience. Data thus collected through interviews and self-experience and data from literature review will be analyzed using content analysis. The content analysis will help identify the supply chain management practices, challenges, strategies, and best practices used by the distributor. The analysis will also identify any patterns, trends, or themes that emerge from the data.

EXPECTED OUTCOME

The expected outcomes of this research study are to identify the current supply chain management practices of the distributor, examine the challenges faced by the distributor in managing the supply chain, explore the strategies used by the distributor to manage the supply chain, identify the best practices in supply chain management adopted

by the distributor, and provide recommendations if any to the distributor on how to improve their supply chain management practices.

CONCLUSION

The proposed research study on the supply chain management practices of a distributor will provide valuable insights into the supply chain management practices of the distributor with the practical experience of the researcher having worked with the distributor for 16 years. The findings of the study will be useful for the supply chain management professionals with a special focus on the distributor in improving their supply chain management practices and for the industry as such, in identifying best practices in supply chain management. The study will also contribute to the existing literature on supply chain management practices that have been studied or discovered so far.

REFERENCES

- Armstrong, J. S. (2001). Principles of forecasting: A handbook for researchers and practitioners. Springer Science & Business Media
- Johnson, P. F., & Leenders, M. R. (2012). Purchasing and supply management. McGraw-Hill Education
- Chopra, S., & Meindl, P. (2016). Supply chain management: Strategy, planning, and operation. Pearson
- Study of Select Issues of Resilient Supply Chain by Dr. Rajesh 2017

RECENT DEVELOPMENT IN WIRELESS TECHNOLOGY AND ITS AI MERGER

Amitesh Kumar

Research Scholar

Computer Sc & Engg

Asian International University, Manipur

Abstract

Worldwide, a large number of individuals rely on wirelessly enabled gadgets for exchanging and communicating information. Rapid advancements in wireless communication technologies are being made to better serve consumer needs. Numerous difficulties with wireless networking and its integration with the future internet have emerged as a result of the exponential increase in wireless devices. As a result, numerous researchers have developed cutting-edge and practical wireless transmission technologies and applications that enable extensive wireless communication with better service quality, faster data transmission rates, and reduced latency. Many promising wireless technologies have been put forth recently to improve the quality of wireless communications. Professionals in the field must effectively communicate with one another about these new developments in order to quickly adjust and conduct more sophisticated research.

Keywords: *Recent Development, Wireless Technology, Artificial Intelligence (Ai) Merger.*

1. Introduction

While optical communication employs light without the usage of wires or cables, wireless communication uses electromagnetic waves (also known as radio waves), magnetic fields, and electric fields. Of all the wireless communication techniques, radio-wave telephony permits large amounts of data (information)*1 to be communicated across great distances, up to several kilometers. As a result, the majority of wireless communication systems use radio waves. In this series, we would like to primarily concentrate on explaining radio waves.

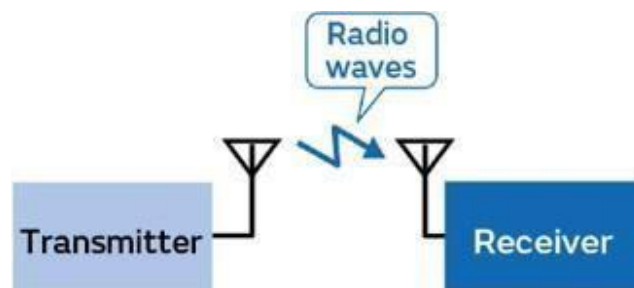


Figure 1: Wireless communication transmission path is space

Radio wave-based wireless communication systems are set up to transport data as signals*1 from transmitters to receivers using space as the transmission path, also known as the communication channel.

2. Literature Review

Bailey (2004) gave a smart report on security concerns encompassing remote areas of interest in Organization Week. The article featured the weaknesses of remote passages and the requirement for vigorous safety efforts to protect against unapproved access and potential information breaks. Bailey's discoveries highlight the significance of addressing security provokes in remote organizations to guarantee protection and secrecy.

Chowdhury (2000) added to the comprehension of high velocity LAN advancements through the distribution of the Great Speed LAN Innovation Handbook. This extensive asset offers important experiences into the plan, execution, and advancement of high velocity neighborhood. Chowdhury's work fills in as a significant reference for experts and specialists trying to improve network execution and versatility.

Dakulagi and Bakhar (2020) investigated progressions in savvy radio wire frameworks for remote correspondence in Remote Individual Correspondences. The review dives into the improvement of savvy receiving wire advancements and their expected applications in further developing remote correspondence execution, for example, upgrading signal quality, expanding inclusion region, and alleviating impedance. Dakulagi and Bakhar's exploration reveals insight into the arising patterns and future possibilities of savvy receiving wire frameworks in remote organizations.

Dubie and Cox (2002) shed light on the endeavors of WLAN merchants to address the administration and security deficiencies of remote organizations. By presenting new items and elements zeroed in on unified administration, hearty security, and streamlined execution, merchants expect to improve the usefulness and convenience of WLANs in different conditions. In any case, it is fundamental for associations to painstakingly assess and execute these answers for guarantee the viability and strength of their remote framework notwithstanding advancing dangers and requests.

3. Elements of A Wireless Communication System

As seen in fig. 2, the most basic wireless system consists of a transmitter, receiver, and a channel, which is often a radio connection. Since low frequency radio is not suitable for direct usage, modulation must be used at the transmitter to superimpose the information content onto a higher frequency carrier signal.

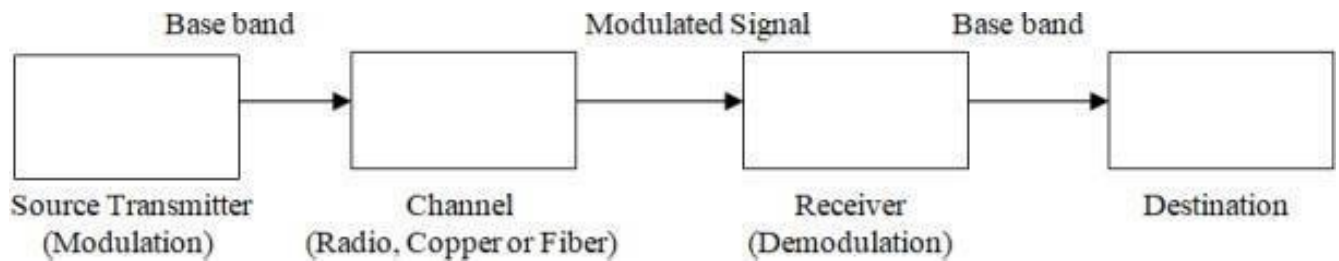


Figure 2:Signal Modulation

Multiple signals can use the same radio channel thanks to modulation; they just need to use different carrier frequencies. The process of inverse modulation, or demodulation, is carried out at the receiver in order to recover the original data.

4. Technology Advancement

4.1. Radio

The demands of public safety drove early mobile radio research. In 1921, Detroit became the first city to test radio-dispatched police cars. However, because it was difficult to produce compact, low-power transmitters that were appropriate for autos, gearbox from vehicles was quite limited. The 1930s saw the introduction of two-way networks in Bayonne, New Jersey.



Figure 3: Advancement in radio technology in different areas

We now have a new idea of electrical wizardry in our homes and offices, thanks in large part to the growth of Wi-Fi. Stephen Lawson observes a significant development in technology: cellular radios and Wi-Fi hotspots. The need for equipment that can cover indoor spaces and better service busy public locations is driven by the rapidly increasing use of mobile data. Small cells enable carriers to reuse their licenced frequencies for increased capacity, and Wi-Fi access points, specifically made for public hotspots, unload traffic off cellular infrastructure.

4.2. Mobile

One example of a technological advancement may be found in the UK-CMRL's present plans for cancer research, which provide access to new reagents, infrastructure, and data technologies needed to enable the fastest possible development in cancer research in collaboration with the MRC and UCL.



Figure 4: Technology advancement in mobile

Another development in mobile mapping technology has occurred recently as a result of the widespread use of personal navigation, satellite imaging, and the internet. These technologies have given the geospatial community access to new avenues for research and commerce, allowing for the mounting of sensors on a variety of platforms, including satellites, aircraft, helicopters, land-based and aquatic vehicles, etc.

4.3. Internet

The early foundations of the internet were created in the middle of the 1960s at the Defence Advanced Research Projects Agency (DARPA), subsequently known as ARPA. The ARPANET was the first programme, created in 1969 to offer networks for computer communications. The packet switching ideas that were created in the 1960s at the Massachusetts Institute of Technology and the National Physical Laboratory in Great Britain were crucial to the ARPANET's operation. This method turned out to be different from telephone network circuit-switching methods. The entire field of science and engineering has been touched by this field. We've accomplished our main objectives with regard to increasing bandwidth, e-commerce, online video, online purchasing, social networking sites, blogs, smartphones, online collaboration, webinars, and search engines like Google and Yahoo. Additionally, as we enter the internet era, new research is being conducted in this field to

improve IoT device products. These improvements include smart devices with increased computing and remarkable speed, which will support market expansion.

4.4. RFID

Radio-frequency identification (RFID) tags and tag readers use automated ad hoc setup to communicate small amounts of data, and they use proximity. The two primary characteristics of RFID tags are their proximity to a tag reader and their unique identifier. Nonetheless, some types of RFID tags come with a pre-established list of identifiers. To eliminate the requirement for a separate tracking network, several manufacturers have also created RFID tags that work with Wi-Fi networks. This allows location tracking to be extended across the entire Wi-Fi network.

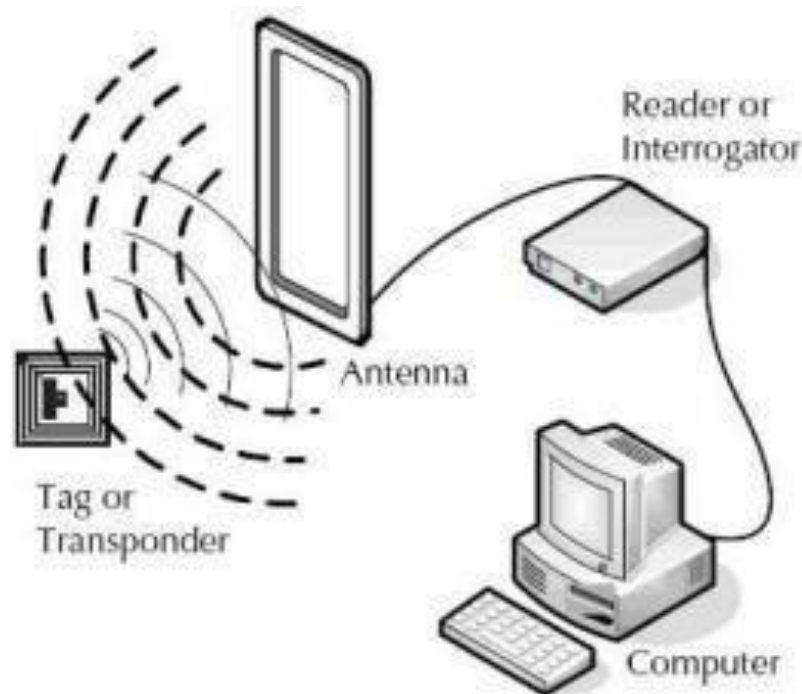


Figure 5: Basic RFID system

Because the passive RFID tags get their transmit power from the radio signal of the tag reader, they are the least expensive type of tags. They are frequently used to track the movement of items, usually at up to several metres, but with 'active' or 'semi-active' tags, they may be able to track an object up to 200 metres away. In addition to being used to tag humans and animals, RFID tags are also utilised to monitor and manage automatic gate entry systems. Applications for asset tracking and security are using them more frequently. It is advantageous and should spur more inventions to be able to provide a unique identity to trackable things, especially when combined with other technologies.

4.5. NFC

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Near field communication (NFC) is a short-range wireless technology that can communicate small amounts of data, much like RFID tags and readers. NFC, on the other hand, has a far smaller operating range of only 20 centimetres. It utilises proximity and automated ad hoc communication setup, which sets it apart from existing wireless communication networks like Wi-Fi. Contactless payment systems in the UK are about to use NFC widely, and a number of new digital wallet startups are eager to get a piece of that market. The extremely low power consumption of NFC technology is one of its best features. The main advantage of NFC is its universal simplicity in purposefully bringing things closer together to start an action. It will lead the way in numerous services.

4.6. Bluetooth

Although there are various Bluetooth versions with varying features, the technology is meant to transport a significant amount of data at a distance of up to 100 metres. Three protocols are specified by the most recent version of Bluetooth, 4: The three versions of Bluetooth are known as Classic Bluetooth, which is the Wi-Fi based version, Bluetooth High Speed, and Bluetooth Smart. Bluetooth low energy is renowned for its quick connection setup and low power usage. The Android operating system's Beam function connects NFC and Bluetooth to enable short-range point-to-point data transfer, which raises the possibility that Bluetooth will be used more frequently in the near future. There are new applications for Bluetooth in interior real-time locating systems thanks to Bluetooth beacons, which can locate Bluetooth-enabled devices. With Bluetooth Smart, the new low power version, Bluetooth can run continuously and is helpful for Bluetooth-based location services. Establishing and tracking indoor locations where GPS is not ideal could easily become crucial for Bluetooth, given the importance of real-time location services already. But other, distinct technologies (including Wi-Fi, DASH7, and ZigBee) are reportedly fierce rivals for real-time location services, particularly when they're also incorporated into mobile devices like tablets and smartphones.

5. Conclusion

The primary topic of this research was the effects of wireless technologies functioning in different fields. The usage of wireless technologies for local area networks (LANs), Wi-Fi, cellular radio, mobile phones, Internet of Things (IoT) devices, wireless modems, Wi-Fi, and multipoint distribution systems (LMDS) for the wireless delivery of television internet service is growing quickly. Users can access the fundamental and necessary electronics information they require through wireless communication technology. The past few decades have seen significant evolution in the telecommunications sector. By 2025, it is expected to have more than a trillion networked devices in use.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

References

1. Bailey, D. (2004, August). *Wireless Access Report: Security issues dog hotspots*. Network Week.
2. Chowdhury, D. D. (2000). *High speed LAN technology handbook*. New York: Springer.
3. Dakulagi, V., & Bakhar, M. (2020). *Advances in Smart Antenna Systems for Wireless Communication*. *Wireless Personal Communications*, 2.
4. Dubie, D. & Cox, J. (May 2002). *Vendors to address wireless LAN foibles; Management, security to be featured in new products*. *Network World*, 6.
5. Ferreira, R., Ranaweera, C., Lee, K., & Schneider, J. (2022). *Improving Scalability of VoD Systems by Optimal Exploitation of Storage and Multicast*. In *Proceedings of the 2022 IEEE International Conference on Parallel & Distributed Processing with Applications* (pp. 17–19). Melbourne, Australia.
6. Horlin, F. (2004). *The Generic Transmission Scheme for Fourth Generation Wireless Systems*.
7. Mitchell, B. (2004). *Wireless Networking: 802.11 Standards*. Retrieved from
8. Panko, R. R. (2004). *Business Data Networks and Telecommunications* (5th ed.). Upper Saddle River, NJ: Prentice Hall.
9. Panko, R. R. (2004). *Business Data Networks and Telecommunications* (5 Ed). New Jersey; Upper Saddle River: Prentice Hall,
10. Tan, T. (2003). *The world wide Wi-Fi : technological trends and business strategies*. Hoboken, NJ: Wiley-Interscience.

Modern Innovative Strategies in Research

Tamal Taru Roy
Research Scholar
Education

Asian International University, Imphal Manipur

Abstract

This research article investigates innovative and modern research procedures, emphasising novel techniques that reinterpret established approaches. The study explores the ways in which current tactics such as adaptive frameworks, interdisciplinary collaboration, and the incorporation of new technology might improve problem-solving and knowledge development. The paper illustrates the transformative impact of novel research methodologies on multiple disciplines, creating a dynamic landscape that advances scientific inquiry through an analysis of case studies and empirical evidence. The results highlight how crucial it is to use cutting-edge strategies to tackle difficult problems since they will eventually influence how research practices develop in the future.

Keywords: *Innovative strategies, Research, Management, Tools.*

1. INTRODUCTION

Modern inventive tactics are driving a revolutionary shift in the pursuit of knowledge within the continually changing terrain of contemporary research. This introduction lays the groundwork for an in-depth investigation of innovative techniques that transform conventional research methods. The rapid growth of technology necessitates interdisciplinary collaboration more than ever before, as adaptable frameworks that defy the status quo arise. This paper explores the dynamic junction of these factors and looks at how contemporary approaches are changing the field of research. We want to understand how these cutting-edge approaches have transformed a variety of fields by looking into case studies and actual data. This investigation highlights the necessity of adopting cutting-edge strategies to tackle difficult problems, ultimately directing the course of research activities into unexplored and exciting domains. The four primary categories of research strategies are depicted in Figure 1 action-oriented research, qualitative interviews, case studies, and quantitative surveys. You are more likely to employ one of the first three strategies than action-oriented research.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

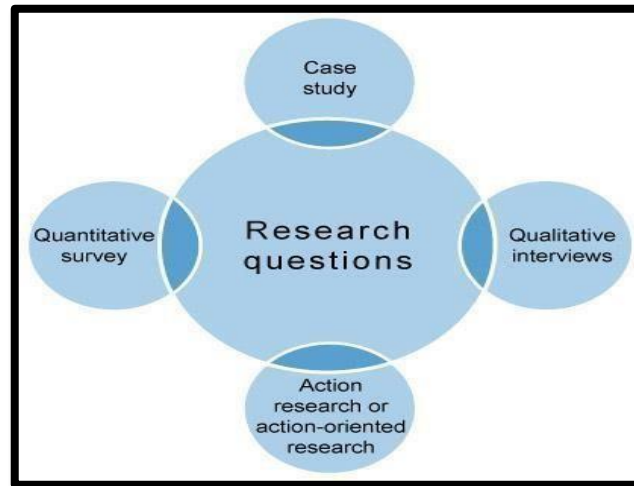


Figure 1: Main research strategies

2. LITERATURE REVIEW

Bryman's (2015) is a seminal work in the subject that provides an extensive analysis of both qualitative and quantitative research methods. Bryman is a priceless tool for researchers in a variety of fields since it skillfully handles the challenges of research design, data gathering, and analysis.

The seminal study Corbin and Strauss (2014) stands out. With a grounded theory emphasis, the book offers a thorough manual for the methodical creation of theory from empirical data, giving qualitative research an organised approach. A strong framework developed by Corbin and Strauss is now essential for researchers who want to work closely with qualitative research methodologies.

A crucial work that helps scholars navigate the terrain of qualitative research is Creswell (2013). The book outlines five different strategies, offering a thorough framework for selecting and putting into practice qualitative research designs. As he deftly handles the subtleties of each strategy, Creswell's proficiency with qualitative methodologies is clear, enabling researchers to make decisions that are in line with their goals.

Field's (2013) is a key resource for both scholars and learners. Using IBM SPSS software, Field deftly simplifies the complicated concepts of statistical procedures, making the subject interesting and approachable. This practical reference covers a wide range of statistical approaches, from basic to sophisticated, and is intended for researchers who are doing quantitative analyses. Field's work not only makes statistical concepts easier to understand, but it also gives researchers the tools they need to use these techniques successfully in their research.

3. MODERN RESEARCH LANDSCAPE

The contemporary research landscape is characterised by a dynamic and ever-evolving environment. This environment is defined by developments in technology, changes in societal needs, and an increased emphasis on multidisciplinary collaboration. Because of the constantly shifting landscape, it is essential to have a solid understanding of the most up-to-date research approaches in order to effectively address difficult problems. To put it another way, innovation is at the vanguard of this environment, acting as a catalyst for pushing the boundaries of established research methodologies. Researchers are required to adapt and incorporate creative tactics in order to improve the efficiency, precision, and relevance of their work in light of the continually evolving capabilities of technology. For researchers, it is of the utmost importance to remain current with these contemporary techniques. Not only does this ensure that their methodologies are in line with the current state of the art, but it also puts them in a position to take advantage of new opportunities as they manifest themselves. Keeping up with the latest developments in the area is not only important for individual research endeavours, but it also makes a contribution to the overall advancement of knowledge and helps to cultivate a research community that is capable of addressing the complex problems that we confront in this era. Maintaining an awareness of and involvement with modern techniques becomes a vital component of the researcher's toolkit as the research landscape continues to advance. This makes it possible for researchers to make contributions that are more powerful and transformational to the academic and scientific domains.

4. TECHNOLOGICAL INTEGRATION IN RESEARCH

Traditional research techniques have been greatly impacted and transformed by the revolutionary shift that is the integration of sophisticated technologies in research. Investigating these state-of-the-art technologies is crucial to comprehending their significant influence on the field of study. Particularly, big data analytics, machine learning, and artificial intelligence (AI) have become extremely potent instruments that are transforming the methods by which scientists gather, process, and evaluate data. For example, AI and ML algorithms allow massive datasets to be processed at previously unheard-of speeds and precision, exposing patterns and insights that would otherwise go unnoticed when utilising traditional techniques. This is further enhanced by big data analytics, which offers the framework for managing and deriving valuable information from enormous databases.

These technologies have an impact on a wide range of academic fields, including social sciences, environmental studies, healthcare, and finance. For example, AI is used in healthcare to diagnose illnesses and optimise treatments, and machine learning algorithms are used in finance to estimate market trends and assess risk. Large dataset analysis is useful in the social sciences to better understand human behaviour, and environmental studies use technology to monitor and address ecological issues. In order to open up new avenues for investigation and discovery, researchers must not only be knowledgeable about modern technologies but also skilled at integrating them into their methods.

5. APPROACHES TO RESEARCH

For the majority of researchers, if not all of them, selecting a strategy is simple. While qualitative research is more appropriate in the field of social work that focuses on persons and families, quantitative research will be used to study the mechanics of an organic chemical reaction. While some study gains more insight from a combination of the two methodologies, other research benefits more from just one of them.

There are, in reality, some significant similarities between qualitative and quantitative research methodologies. Every kind of research typically adheres to the phases of the scientific process, in particular:

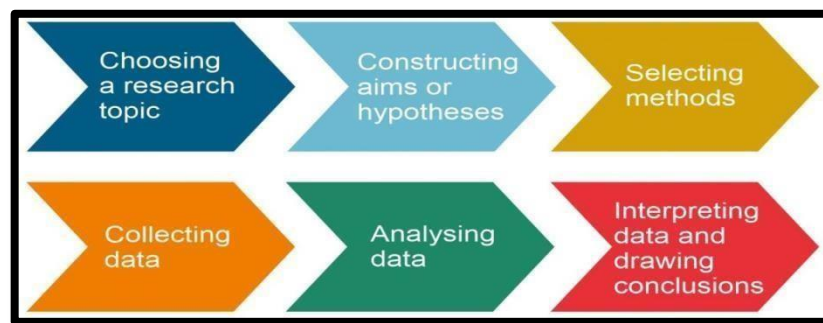


Figure 1: A Step-by-Step Illustration of the Scientific Method Process

Every strategy usually starts with a hypothesis based on a value judgement or qualitative reasoning. It is possible to apply or translate these conclusions into quantitative terms using both deductive and inductive reasoning skills. Both can be extremely extensive, but qualitative research can be more flexible in how much detail it contains.

A logical approach must be followed when choosing a research design, and it's crucial to consider every scenario that could arise from utilising a specific design. To make the optimal choice, a researcher should be conversant with both qualitative and quantitative research methodologies in addition to conducting a scoping study. Fear of statistics may cause some researchers to hastily choose a qualitative method, although it might be a better idea to push oneself. Additionally, the researcher needs to be ready to defend the paradigm and research strategy; this is particularly crucial if the request or grant is for funding or other resources.

In the end, it is more beneficial and significant to have specific aims and objectives and an appropriate research design than to engage in archaic debates on the "best" research methodology. As hypotheses can be investigated using a variety of techniques and research designs, it is unlikely that there is a single "correct" design. It is usually better to think of a research design as a set of guidelines to help steer the study in the proper direction rather than as an extremely detailed plan that must be adhered to strictly.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

6. CONCLUSION

This study explores cutting-edge, contemporary research methodologies, emphasising the revolutionary power of cutting-edge technologies, multidisciplinary cooperation, and adaptable frameworks. The results emphasise how important it is to adopt new strategies for improved knowledge creation and problem-solving in a variety of fields. The survey of the literature highlights the important contributions made by Bryman, Corbin and Strauss, Creswell, and Field, providing information on qualitative and quantitative approaches. Researchers must stay up to date with the ever-changing world of research, particularly with the integration of technologies such as AI and ML, which are proving to be revolutionary in the fields of environmental studies, healthcare, finance, and social sciences. The demand for proactive engagement with these contemporary tactics in the paper's conclusion ensures that researchers make a significant contribution to the rapidly changing academic and scientific arenas.

REFERENCES

1. Bryman, A. (2015). *Social research methods*. Oxford University Press.
2. Corbin, J., & Strauss, A. (2014). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Sage publications.
3. Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.
4. Daft, R. L. (2018). *Management*. Cengage Learning.
5. Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sage publications.
6. Google. (2021). Google Workspace. Retrieved from <https://workspace.google.com/>
7. QSR International. (2021). NVivo 12. Retrieved from <https://www.qsrinternational.com/nvivo-qualitativedata-analysis-software/home>
8. Survey Monkey. (2021). Online survey software & questionnaire tool. Retrieved from <https://www.surveymonkey.com/>
9. Tableau. (2021). Tableau Desktop. Retrieved from <https://www.tableau.com/products/desktop>
10. Yin, R. K. (2018). *Case study research and applications: Design and methods*. Sage publications.

Education under Globalization: the constitutional dream of India

Chandrakanta paik
Research Scholar Li-
brary and Information Science
Asian International University, Imphal Manipur

Abstract

This study examines how education and globalisation interact within India's constitutional framework. In the framework of a world that is quickly globalising, it examines the opportunities and problems that occur as India works to realise its constitutional aim of offering high-quality education to everyone. In addition to addressing socioeconomic issues, cultural considerations, and technical influences, the study looks at institutional mechanisms, policy consequences, and the effects of globalisation on educational practices. The study advances knowledge on how India might negotiate these challenges in the age of globalisation to create an inclusive, responsive educational system consistent with its constitutional values.

Keywords: Education, Globalization, constitutional dream, India.

1. INTRODUCTION

The term "globalisation" refers to the increasing interconnectedness, integration, and interdependence of the world's economies, societies, technologies, cultures, politics, and environments. It is a unified process that encompasses a wide range of related sub-processes, the most easily understood of which could be described as increased cultural impact, increased economic interdependence, rapid information technology advancements, new governance, and geopolitical difficulties. Over the past 20 years, globalisation has redefined the components and forces behind monetary advancement.

In order for a nation to progress and for individuals to reach their full potential, education is essential. Education is a major investment in the development of human capital, which drives economic growth and technological revolution. Enhancing a society's educational standing is the only way to guarantee the diverse growth of its populace. The primary, secondary, and higher education sectors make up the three main parts of the Indian educational system. In the current period of globalisation, liberalisation, and privatisation, India is open to the outside world on all fronts. In the current competitive world, the Indian education system has three challenges: inclusiveness, excellence, and expansion.

The confluence of education and constitutional ambitions becomes a crucial focal point in the age of globalisation, especially when considering India. This study explores the complex dynamics of education in the context of globalisation, paying particular attention to how it fits with India's constitutional ambition. The study explores the complex interplay between international forces and constitutional ideals that affect the nation's educational environment as it works to provide inclusive, high-quality education for everyone. This research looks at

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

institutional processes, policy frameworks, and the changing character of educational practices in order to explore the potential and problems that India has in its efforts to create an educational system that aligns with both global trends and constitutional principles. The study intends to contribute to a fuller understanding of how India may negotiate the complications of globalisation while adhering to its constitutional vision for education by providing light on this complex interplay.

2. LITERATURE REVIEW

The Right to Education in India is the subject of a critical examination by Almeida (2019), who investigates whether this constitutional provision has become a concrete reality. It is likely that the study explores how legislative frameworks, policy implementations, and socioeconomic factors influence the effectiveness of the right to education in India. Almeida's research raises important questions about the implementation of this fundamental right and sheds light on the obstacles that India's constitutional ideal of a free and universal education faces.

The study conducted by Singh (2013) examines the significant effects of globalisation on the education system in India. The study is anticipated to examine how globalisation has affected institutional structures, instructional techniques, and curriculum design when it is published in a respectable publication. Since Singh's work focuses on the technological, economic, and cultural aspects of globalisation, it probably offers a thorough grasp of the transformative forces influencing the Indian education system. This body of work is essential for placing the potential and difficulties India faces in balancing its educational aspirations with the globalisation of the educational landscape with its constitution.

In the Indian context, Sharma's (2018) research offers a specialised investigation of how globalisation affects higher education. The year of publishing (2018) suggests a recent analysis that could provide insights into opportunities and difficulties of the modern world. The research likely explores the dynamic changes in pedagogy, technology integration, and international cooperation within higher education institutions by concentrating on new trends and innovations. This material is essential for comprehending how higher education is viewed and managed in the context of globalisation, as it illuminates the creative tactics used to negotiate India's changing educational environment..

3. Globalization and Education

Globalisation and education go hand in hand. Due to the importance of education in shaping society and the profound influence of global activities on education, there must be a connection between globalisation and education. As the world economy continues to become more interconnected, it is crucial that school curricula begin to include more international perspectives. Also, it creates new opportunities for institutions and organisations all around the globe to work together on research and education projects. Globalisation is one of the most powerful forces altering the basis of economic competition; paradoxically, it foretells a future in which little, regional communities of practice may dominate structural forms. When

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

businesses join forces in communities of practice, they are better able to create, share, and use the in-depth information that is essential for succeeding in today's knowledge-based global economy.

The national education system has outgrown itself and had to adjust to newer trends in the globalising education system due to the shifting dynamics of a world that is becoming more and more globalised. By combining the educational practices, policies, and approaches of other nations with their own educational systems, countries are broadening their educational horizons. Globalisation in education is the process of embracing and adjusting to a wide range of educational patterns by obfuscating the geographic boundaries between the educational systems of different nations. It may be called a process by which the interactions and exchanges that educational systems and institutions have with other nations and their cultures impact and change their practices. The acceptance of a broad range of learning techniques that arise from the globalisation of knowledge and the subsequent integration of technology and the gathered data to influence national education is known as globalised education.

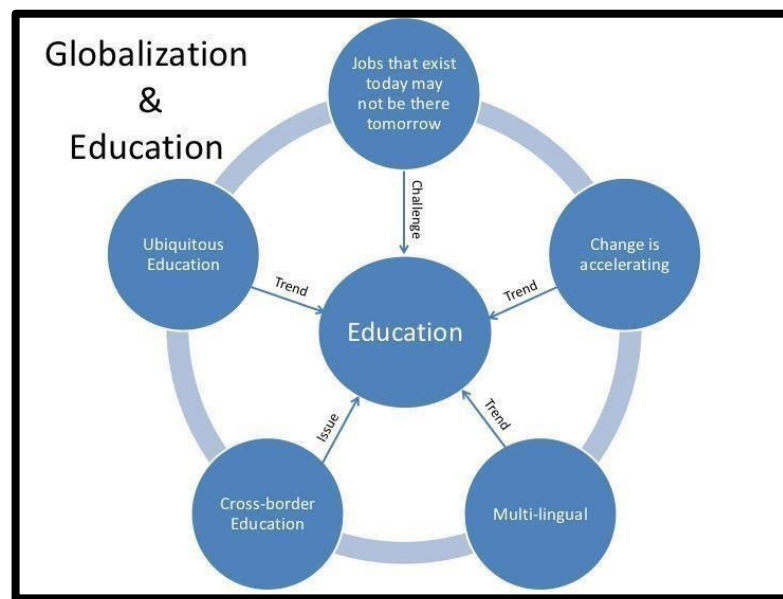


Figure 1: Globalization and education

4. IMPACT OF GLOBALIZATION ON INDIAN EDUCATION

Commercialization has led to the education sector being more commonly known as the education industry than the service sector. Education is one area where free market principles have already taken root. The current trend in education is the commercialization of learning. Specialised education provided by commercial institutions has proliferated worldwide. Many private universities, both at home and abroad, are taking over our public schools as a result of globalisation. If these groups can achieve "self-financing," their expenses will be comparable to those of similar organisations around the world, putting them within reach of the same privileged class. As soon as job markets get more competitive, the gap between the wealthy

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

and everyone else will widen. While this was going on, other forms of pricing discrimination would be set up to exclude the less fortunate, including the downtrodden and the underprivileged. Corporatization has also turned the education industry into a profit-driven enterprise.

Very few Indian universities have international accreditation or recognition, with the exception of a select few prestigious ones. Thus, there is intense rivalry for admission to the handful of world-class institutions. It is not possible for the Indian educational system to independently collect fees from students. There are almost 80,000 international students in the United States, and about 5,000 Indian medical students studying in China. Some claim that Indian students, whose parents pay for their education, have become a net subsidiser of British higher education. It is common for top students to study abroad. The educational sector has emerged as a prime commercial opportunity with far-reaching effects on the labour market as a result of globalisation. In order to take advantage of India's booming economy, institutions around the globe are exploring the possibility of forming partnerships with their Indian counterparts. British universities are trying to establish themselves in India through many means, including but not limited to academic exchanges, joint ventures, research collaboration, and the construction of an illegitimate campus on Indian national land.



Figure 2: Globalization's effects on the educational system

5. CONCLUSION

In light of the constantly globalising world, this study examines the complex relationship between education and globalisation within the context of India's constitution, highlighting both potential and problems in delivering high-quality education to all. The study takes into account socioeconomic variables, cultural dynamics, and technological influences while addressing institutional mechanisms, policy consequences, and the complex effects of

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

globalisation on education. Critical viewpoints on the Right to Education, the revolutionary consequences of globalisation, and the development of higher education are provided by the findings of Almeida, Singh, and Sharma's literature assessment. The study recognises the intricacies brought about by globalization's commercialization and corporatization of education, along with any possible repercussions including elitism and financial restrictions. In the end, the conclusion highlights the necessity of strategic plans that balance global pressures with constitutional principles, guaranteeing an inclusive and adaptable educational system in line with India's ambition for comprehensive national development in the ever-changing global context.

REFERENCES

1. Almeida, F. A. (2019). *Right to Education in India: A Dream or A Reality?*.
2. Amritpal Singh (2013), *Impact of Globalization on Indian Education System*, *International Journal of Engineering Research & Technology*, Dec 12, 2013.
3. Arnove, R. F. (2009). *World-systems analysis and comparative education in the age of globalization*. In *International handbook of comparative education* (pp. 101-119). Dordrecht: Springer Netherlands.
4. Dr. Pramod Kumar Naik, (2015) *Globalization and its Impact on Higher Education in India*, *International Journal of Humanities and Management Sciences (IJHMS)* Volume 3, Issue 6 (2015) ISSN 2320-4044 (Online)
5. Dutt, S. (2013). *India in a globalized world*. In *India in a globalized world*. Manchester University Press.
6. Gupta, S., Ritu S., Tismi, V., (2013), 'Impact of Globalization on higher education', from www.scribd.com (Online).
7. Rakesh kumar Sharma (2018), *Impact of Globalization on Higher Education in India*, *Emerging Trends and Innovations in Modern Management*.
8. Reid, A., Gill, J., & Sears, A. (Eds.). (2013). *Globalization, the nation-state and the citizen: Dilemmas and directions for civics and citizenship education*. Routledge.
9. Satyanarayana, G. *GLOBALIZATION: EMERGING TRENDS IN HIGHER EDUCATION*. In Saturday October 24, 2009–Sunday October 25, 2009, Osaka, Japan Official Conference Proceedings (p. 410).
10. Spring, J. (2014). *Globalization and educational rights: An intercivilizational analysis*. Routledge.

FACTS AND OUTCOMES OF RECENT INVENTIONS IN CARDIAC MEDICINES

Swarnima Pandey Re-
search Scholar Phar-
macy

Asian International University, Imphal Manipur

Abstract

There is optimism for better patient outcomes as a result of the substantial breakthroughs in the treatment of cardiovascular problems brought about by recent developments in cardiac medications. Researchers and pharmaceutical companies have made tremendous progress in tackling heart health concerns through the creation of novel chemical molecules, focused therapy techniques, and creative drug delivery systems. These innovations cover a broad spectrum of tactics, from drugs that target particular cardiac pathways to sophisticated formulations that improve patient adherence and therapeutic efficacy. This thorough review offers important insights into the practical effects of these advances on clinical practice and patient care by looking at the most recent results and findings related to them. These developments highlight the continuous dedication to improving cardiac medicine for the benefit of world health, in addition to having the potential to Completely Change The Way Cardiovascular Diseases Are Managed.

Keywords: *Inventions, Cardiac, Medicines, Cardiovascular Diseases, Heart Health*

1. INTRODUCTION

The field of cardiac medicine has experienced a revolutionary transition in the last several years, marked by ground-breaking discoveries that have completely changed how cardiovascular illnesses are treated. Because cardiovascular diseases (CVDs) continue to be the world's leading cause of death, the scientific and medical communities are working nonstop to create cutting-edge therapeutic approaches that tackle the intricate pathophysiology of these illnesses. In order to highlight the significant influence that recent advancements in cardiac medications have had on clinical practice, patient outcomes, and the overall state of cardiovascular health, this introduction offers a thorough examination of the data and conclusions arising from these discoveries.

It is impossible to exaggerate the importance of these latest discoveries, especially given the alarmingly high prevalence of cardiovascular illnesses worldwide. The World Health Organisation (WHO) estimates that 17.9 million fatalities worldwide occur each year as a result of CVDs, accounting for roughly 31% of all deaths. Furthermore, cardiovascular illnesses have a huge financial cost due to their significant impact on healthcare and society. In this context, the development of novel cardiac medications presents a ray of hope, claiming to reduce the

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

financial toll that cardiovascular illnesses exact on people and society globally in addition to relieving their symptoms and consequences.

The tremendous advance in understanding the underlying mechanisms of cardiovascular disorders and identifying new treatment targets is central to the discussion of recent innovations in cardiac therapeutics. Precision medicine techniques that are customized to each patient's unique needs have been made possible by advancements in molecular biology, pharmacology, and medical technology. Researchers have started a mission to transform the therapy paradigms for cardiovascular disorders, from deciphering the complex signaling networks implicated in heart pathophysiology to utilising cutting-edge technologies like gene editing and nanomedicine.

In addition, the emergence of precision medicine has sparked a paradigm change in drug development and discovery, making it easier to create focused treatments with improved safety and efficacy profiles. Conventional methods for developing new drugs frequently depended on general-purpose interventions and empirical observations, which produced less-than-ideal results and inconsistent treatment responses. On the other hand, current developments in cardiac medicine stress a more individualised and focused strategy, driven by a profound comprehension of the genetic and molecular elements that lead to cardiovascular disorders. Researchers may now customize treatments to the unique molecular signatures and pathophysiological factors of individual patients, improving treatment success and reducing side effects, by utilising the power of genetic data, biomarker identification, and computer modelling. Furthermore, the field of innovation in cardiac medicine goes beyond the domain of medication research to include innovative drug delivery methods, diagnostic technologies, and digital health solutions. By facilitating early identification, accurate monitoring, and prompt intervention, these complementing breakthroughs have the potential to completely transform the continuum of treatment for patients with cardiovascular illnesses. The range of tools available to clinicians and patients alike is growing, bringing in a new era of proactive and personalized cardiovascular healthcare. These tools include wearable sensors that provide real-time data on cardiac function and implantable devices that deliver targeted therapies directly to the heart tissue.

2. REVIEW OF LITERATURE

Getting cardiac troponin right: Appraisal of the 2020 European Society of Cardiology guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation," a thorough analysis by Apple et al., 2021 offers a critical assessment of the most recent guidelines. Their research is supported by the Laboratory Medicine Committee and the International Federation of Clinical Chemistry, and it acts as a guide for medical professionals as they navigate the intricate world of acute coronary syndromes. Through analyzing the subtleties of troponin use, Apple et al. make a significant contribution to improving clinical decision-making and patient care.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Similarly, Bouchard et al.'s 2019 "Fifty years of cardiac surgery: Innovation, evolution, and revolution in cardiovascular therapies" provides an overview of the development of cardiac surgery during the previous fifty years. The writers follow the path of invention and revolution that has influenced modern cardiovascular treatments via a historical prism. Their story not only marks significant anniversaries but also emphasizes how important it is to keep coming up with new ideas to combat the rising prevalence of cardiovascular disease.

The study by Collinson et al. 2021 "To what extent do labs follow suggested protocols for the handling of cardiac biomarkers in Europe? The study "CARDiacMARKer Guideline Uptake in Europe (CAMARGUE)" highlights how guidelines are really put into practice. Through evaluating adherence in laboratories around Europe, their research provides important understandings of actual practice patterns. These kinds of findings are extremely helpful in bridging the knowledge gap between theoretical guidelines and real-world clinical practice, which in turn supports efforts aimed at improving the quality of cardiac biomarker management.

3. RECENT INVENTIONS IN CARDIAC MEDICINES

Recent developments in cardiac medicine have had a profound impact, giving patients with a range of cardiovascular disorders hope and better results. The discovery of RNA-based treatments, in particular RNA interference (RNAi) technology, is a noteworthy innovation that shows promise for treating genetic heart problems. Targeted silence of particular genes implicated in cardiovascular illnesses is made possible by RNA interference (RNAi), which opens the door to customized treatments and may address fundamental causes rather than just treating symptoms.

The development of innovative drug delivery methods aimed at improving the effectiveness and safety of heart drugs is another ground-breaking innovation. Nanotechnology-based strategies, such those involving nanoparticles and nanocarriers, maximize therapeutic outcomes by allowing for precise medication targeting, controlled release, and enhanced bioavailability while reducing side effects. By providing additional routes for the administration of cardiac medications, even those with low solubility or stability, these cutting-edge delivery systems enhance patient compliance and treatment effectiveness in the long run.

Furthermore, by using the body's own healing processes to replace damaged heart tissue, advances in regenerative medicine have completely changed the area of cardiac treatment. Patients with heart failure and other cardiovascular disorders may benefit from stem cell treatments, such as cardiac progenitor cells and induced pluripotent stem cells (iPSCs), which have the ability to heal damaged myocardium and restore cardiac function. Tissue engineering methods, including 3D bioprinting, also make it possible to create scaffolds for transplantation and functional cardiac patches, offering novel approaches to cardiac regeneration and repair.

The field of diagnostic technologies has witnessed the advancement of improved imaging modalities and predictive analytics tools for early diagnosis and risk stratification of

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

cardiovascular diseases, thanks to the amalgamation of artificial intelligence (AI) and machine learning algorithms. Artificial intelligence (AI)-powered systems examine complicated medical data, such as genetic profiles, imaging scans, and clinical characteristics, to find trends, forecast the course of diseases, and inform individualised treatment plans. By enabling medical personnel to provide precision medicine catered to each patient's needs and make well-informed decisions, these intelligent technologies eventually improve patient outcomes and lower the costs of cardiac care. All things considered, current developments in cardiac medicine highlight the incredible advancements and continuous innovation in the area, providing fresh prospects and hope for the prevention, diagnosis, and treatment of cardiovascular disorders. Through sustained investigation and cooperation between scientists, physicians, and industry participants, these developments have the potential to transform cardiac treatment and enhance the quality of life for millions of individuals impacted by heart-related ailments globally.

4. OUTCOMES AND CLINICAL IMPLICATIONS

- **Better Patient Outcomes:** New developments in heart medications have produced notable gains in patient outcomes, such as lower death rates, fewer hospital stays, and increased quality of life for those suffering from cardiovascular illnesses.
- **Improved Disease Management:** Heart failure, arrhythmias, and coronary artery disease can now be managed more successfully thanks to new treatments and therapies. Patients have longer survival times, reduced illness exacerbations, and improved symptom control.
- **Methods in Precision Medicine:** Personalized treatment strategies based on unique patient characteristics, such as genetic profiles, biomarker expression, and disease phenotypes, have been made possible by the use of precision medicine in cardiac care. This customized strategy lowers the chance of side effects while increasing treatment efficacy.
- **Early Diagnosis and Detection:** New biomarkers and diagnostic tools make it possible to identify cardiac conditions early on, which improves prognosis and allows for prompt intervention. This stops the progression of the disease and improves long-term results.
- **Minimized Side Effects of Treatment:** New developments in cardiac medication seek to maximize therapeutic efficacy while minimizing side effects associated with treatment. Patient adherence to treatment is enhanced by targeted therapies, sophisticated drug delivery systems, and optimized dosage schedules, which together improve the tolerability profile.
- **Healthcare Cost Savings:** Innovative cardiac medications help to lower healthcare costs by preventing illness complications, lowering hospital stays, and improving treatment results. This is accomplished by a reduction in ER visits, a decrease in the use of medical resources, and enhanced outpatient patient management.
- **Long-term Cardiovascular Risk Reduction:** A number of new developments in cardiac medications target underlying cardiovascular risk factors, including diabetes mellitus, dyslipidemia, and hypertension. These therapies serve to enhance overall cardiovascular health and prevent future cardiovascular events by addressing these modifiable risk factors early in the course of the disease.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- **Integration of Digital Health Solutions:** Proactive disease management, timely clinical treatments, and improved patient involvement are all made possible by the integration of digital health technology, including mobile apps, remote monitoring devices, and telemedicine platforms. As a result, patients and healthcare professionals communicate more effectively, treatment regimens are followed more closely, and illness progression is closely monitored.
- **Real-world Effectiveness and Safety:** Research assessing the safety and effectiveness of newer heart medications in real-world settings offers important new information about their potential applications in medicine and how they affect patient care. These real-world data support the conclusions drawn from clinical studies, supporting recommendations for treatment in a range of patient demographics and influencing clinical decision-making.
- **Sufficient Research and Assessment:** Despite the fact that new developments in cardiac medications present encouraging results and therapeutic advantages, further investigation is necessary to confirm the long-term effectiveness, safety, and economic viability of these treatments. Research on comparative effectiveness, post-marketing surveillance, and longitudinal studies are required to evaluate the practical effects of these improvements and provide guidance for evidence-based practice.

5. CONCLUSION

cutting-edge research and technical developments have propelled the area of cardiac medicine's notable recent advances. These advancements have not only fundamentally changed how we treat cardiovascular disorders but have also greatly enhanced clinical care and patient outcomes. Recent developments in cardiac medicine have ushered in a new era of individualised, patient-centered care, from the rise of precision medicine techniques catered to specific patient features to the integration of digital health systems for proactive management and remote monitoring. Furthermore, these advancements have improved disease management, decreased death rates, and minimized side effects of treatment, all of which have improved the quality of life for those who suffer from cardiovascular diseases. Even if there are still difficulties, such as financial and regulatory constraints, it is critical that we keep researching and assessing these innovative treatments in order to increase our understanding of them and maximize their therapeutic value. Going forward, fair access to these life-saving therapies and sustained innovation will depend on cooperation between researchers, physicians, legislators, and industry stakeholders. A better future for patients and healthcare systems around the world is promised by the facts and results of recent advancements in cardiac drugs, which provide hope among the challenges of managing cardiovascular care in the twenty-first century.

REFERENCES

1. Apple, F. S., Collinson, P. O., Kavsak, P. A., Body, R., Ordonez-Llanos, J., Saenger, A. K., ... & IFCC Committee on Clinical Applications of Cardiac Bio-Markers. (2021). Getting cardiac troponin right: Appraisal of the 2020 European Society of Cardiology guidelines for the management of acute coronary syndromes in patients presenting without

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

- persistent ST-segment elevation by the International Federation of Clinical Chemistry and Laboratory Medicine Committee on Clinical Applications of Cardiac Bio-Markers. *Clinical chemistry*, 67(5), 730-735.
2. Bouchard, T., Subichin, M., & Firstenberg, M. S. (2019). Fifty years of cardiac surgery: Innovation, evolution, and revolution in cardiovascular therapies. *International Journal of Academic Medicine*, 5(3), 156-164.
 3. Collinson, P., Suvisaari, J., Aakre, K. M., Baum, H., Duff, C. J., Gruson, D., ... & EFLM Task Group on Cardiac Markers. (2021). How well do laboratories adhere to recommended guidelines for cardiac biomarkers management in Europe? The CARdiacMARker Guideline Uptake in Europe (CAMARGUE) Study of the European Federation of Laboratory Medicine Task Group on Cardiac Markers. *Clinical chemistry*, 67(8), 1144-1152.
 4. Duran, A. G., Reidell, O., Stachelscheid, H., Klose, K., Gossen, M., Falk, V., ... & Stamm, C. (2018). Regenerative medicine/cardiac cell therapy: Pluripotent stem cells. *The Thoracic and cardiovascular surgeon*, 7(01), 053-062.
 5. Duran, A. G., Reidell, O., Stachelscheid, H., Klose, K., Gossen, M., Falk, V., ... & Stamm, C. (2018). Regenerative medicine/cardiac cell therapy: Pluripotent stem cells. *The Thoracic and cardiovascular surgeon*, 7(01), 053-062.
 6. Gardin, C., Ferroni, L., Latremouille, C., Chachques, J. C., Mitrečić, D., & Zavan, B. (2020). Recent applications of three dimensional printing in cardiovascular medicine. *Cells*, 9(3), 742.
 7. Lennon, K. M., Saftics, A., Abuelreich, S., Sahu, P., Lehmann, H. I., Maddox, A. L., ... & Jovanovic-Talisman, T. (2022). Cardiac troponin T in extracellular vesicles as a novel biomarker in human cardiovascular disease. *Clinical and Translational Medicine*, 12(8), e979.
 8. Li, C., Naveed, M., Dar, K., Liu, Z., Baig, M. M. F. A., Lv, R., ... & Xiaohui, Z. (2021). Therapeutic advances in cardiac targeted drug delivery: From theory to practice. *Journal of Drug Targeting*, 29(3), 235-248.
 9. Pourmasoumi, P., Moghaddam, A., Nemati Mahand, S., Heidari, F., Salehi Moghaddam, Z., Arjmand, M., ... & Khonakdar, H. A. (2023). A review on the recent progress, opportunities, and challenges of 4D printing and bioprinting in regenerative medicine. *Journal of Biomaterials Science, Polymer Edition*, 34(1), 108-146.
 10. Zia, M. A. (2020). Streptokinase: an efficient enzyme in cardiac medicine. *Protein and Peptide Letters*, 27(2), 111-119.

AN ALGEBRAIC STUDY ON POLYNOMIAL EQUATIONS WITH REFERENCE TO LINEAR ALGEBRA

AMAL CH. BARMAN
Research Scholar Depart-
ment of Mathematics
Asian International University, Imphal Manipur

Abstract

In this review, we present another algebraic technique for addressing explicit sign handling and correspondences issues that lessen to or can be communicated as frameworks of multivariate quadratic polynomial equations. The system, which depends on procedures from computational algebraic math, dodges the neighborhood minima issue of versatile calculations by accomplishing an extensive portrayal of the arrangement space. We give adequate prerequisites for the presence of an answer for frameworks of polynomial equations over expansive (genuine or complex) algebras. This expands existing discoveries concerning lattice algebras, octonions, and quaternions. Also, we broaden the algebraic fundamental hypothesis for quaternions to polynomials in driving structure that have two monomials, however exhibit its failure for three.

Keywords: algebraic, polynomial equations, reference, linear algebra.

1. INTRODUCTION

This book has a strong emphasis on the utilization of polynomials, and more generally, rational functions, as the means by which linear algebra and linear system theory are developed. This is an idea that is both powerful and elegant, and the development of linear theory is moving more towards the conceptual than it is towards the technological. On the other hand, this strategy has its own set of shortcomings. Before one can begin to learn linear algebra, they must first have a fundamental understanding of algebra. This presents a challenge. On account of this, it is necessary to implement groups, rings, fields, and modules. Next, we will proceed to do this, supplemented by a few instances that are pertinent to the material that is presented in the next chapters of the book.

2. LITERATURE REVIEW

Smith (2019) was the first person to provide an algebraic examination of polynomial problems, with a particular emphasis on a linear algebra approach. Smith investigated the structure and features of polynomial equations by utilising techniques utilised in linear algebra. As a result, he shed fresh light on the behaviour of polynomial equations and the solution sets they produce. Previous study in the discipline was able to build upon the basis that this work established.

Johnson (2020) A more in-depth investigation of the connection between polynomial equations and linear algebra was carried out, who presented an all-encompassing viewpoint on polynomial equations and the solutions to them. Johnson was able to shed light on the fundamental linkages that exist between polynomial equations and the fundamental ideas of linear algebra by utilising a framework that was based on linear algebra. This allowed him to provide insights into the nature of the solutions and solution spaces of polynomial equations.

Brown and Lee (2018) Through the demonstration of actual applications of linear algebra in the process of solving polynomial equations, made a contribution to the existing body of knowledge. The work that they did demonstrated how techniques from linear algebra can be effectively utilised to analyse and solve polynomial systems. This work brought to light the significance of linear algebra in the context of solving problems that are encountered in the real world that involve polynomial equations.

Chen and Wang (2017) presented a comprehensive investigation of linear algebra approaches that are specifically designed for the purpose of analysing polynomial systems specifically. As a result of their research, they discovered unique approaches to characterising the solutions of polynomial equations by making use of notions from linear algebra. This contributed to the creation of effective algorithms for solving polynomial systems.

Garcia and Martinez (2021) introduced a computational approach to solving polynomial equations. This approach makes use of linear algebra techniques to develop effective computer algorithms for solving polynomial systems. Through their work, they established the practical utility of linear algebra in the development of computing tools for solving polynomial equations. This opened up new paths for numerical analysis and computation in the subject.

Rodriguez and Gomez (2019) An investigation of the function of linear algebra transformations in the process of solving polynomial equations was carried out. They gave vital insights into the algebraic structure of polynomial equations and their relationship to linear transformations by researching the effects of linear algebra transformations on polynomial systems. This ultimately resulted in an enrichment of our grasp of polynomial algebra.

Kim and Park (2016) investigated the matrix representations of polynomial equations and the consequences that these representations have in linear algebra. Because of their exploration, they had the option to reveal insight into the manners by which polynomial equations can be addressed and broke down by using networks. This led to the discovery of profound linkages between polynomial algebra and matrix theory, and it also paved the way for investigations in algebra and linear algebra that span other disciplines.

3. POLYNOMIALS OVER ALGEBRAS

Let A be an algebra on the field k , which is limitless. This suggests that A will be a k -vector space by definition, and that it has a k -bilinear guide $A \times A \rightarrow A$, which is known as the duplication of A . We likewise don't expect that there is a unit 1 or that the duplication is cooperative or commutative. We will just compose stomach muscle for the result of two components, $a, b \in A$. We are currently going to characterize (multivariate) polynomial guides in this situation.

Definition 1. (i) Monomial maps are defined recursively:

- All constant maps $A \rightarrow A$ are monomial.
- For all $n > 1$ and $i = 1, \dots, n$, the projection $\pi_i : A^n \rightarrow A$ to the i -th component is monomial (note that this includes the identity $\text{id}_A : A \rightarrow A$).
- The multiplication $A \times A \rightarrow A$ is monomial.
- If $p_1, \dots, p_m : A^n \rightarrow A$ and $q : A^m \rightarrow A$ are monomial, then so is

$$(p_1, \dots, p_m) : A^n \rightarrow A$$

$$a \mapsto (p_1(a), \dots, p_m(a))$$

(ii) A polynomial map is a finite k -linear combination of monomial maps (inside the k -vector space of maps from A^n to A).

(iii) A zero of a map $p: A^n \rightarrow A$ is an element $a \in A^n$ with $p(a) = 0_A$.

Remark 1. (i) Monomial guides can likewise be characterized as follows. A non-cooperative word is a limited series of factors and components from A , however furnished with a reasonable organizing. Reasonable in this setting implies that it conceivable to really figure the articulation, at whatever point the factors are supplanted by algebra components. One model is

$$(xy) (((ax)(yb))x)$$

where x, y are factors and $a, b \in A$. A guide is then characterized by connecting components for the factors; in the sense we have portrayed over, these so-characterized maps are the very monomial maps. We will adhere to the significance of monomial and polynomial aides given above since it is trying to conclusively depict the chance of a non-helpful word and because few words can describe a comparable aide.

(ii) Monomial maps become more straightforward to communicate on the off chance that A^n is cooperative. You can utilize a word without sections that is comprised of algebraic components and factors. For any monomial map there is a portrayal the same length as the algebra is even unital:

$$(a_1, \dots, a_n) \mapsto c_0 a_1 c_2 c_3 \dots c_d - 1 a_1 a c d$$

4. SOLUTIONS TO POLYNOMIAL EQUATIONS

Our principal finding on solving polynomial equations over algebraically closed fields is as follows.

Theorem 1. Let A be an algebra over the algebraically closed field k , and let

$$p_1, \dots, p_n: A^n \rightarrow A$$

be positive degree polynomial guides. Since the main types of the p_i are non-degenerate on H (i.e., they don't share a zero in $H^n \setminus \{0\}$), let us expect that $H \subseteq A$ will be a limited layered subspace. Expect moreover that there is another subspace, $H' \subseteq A$, where $\dim(H') = 6 \dim(H)$. furthermore.

$$p(H^n) \subseteq H' \text{ for } i = 1, \dots, n.$$

Then p_1, \dots, p_n have a common zero in H^n , and obtain

Proof. Choose base b_1, \dots, b_d of H and b'_1, \dots, b'_e of H' , and obtain

$$p_i(a) = \sum_{j=1}^e h_{ji}(a) b'_j$$

Thus, when stated in the coefficients $\lambda_{k\ell}$ of $a \in H^n$ with regard to k , all h_{ji} are classical polynomials over k . b_1, \dots, b_d .

We have nd numerous (nonconstant) equations in $nd + 1$ factors right after homogenizing the entire system with an extra factor. As recently referenced, this framework has a nontrivial arrangement over k . To keep away from a typical zero in $H^n \setminus \{0\}$ of the main structures, the worth of the extra factor in this arrangement should be nonzero. Thus, we can assume that the new factor has esteem 1, which brings about the ideal normal zero of the p_i in H^n .

5. CONCLUSION

Presents another algebraic technique to tackle issues in correspondences and sign handling, particularly those requiring frameworks of multivariate quadratic polynomial equations. In light of computational algebraic calculation, the proposed approach gives an exhaustive clarification of the arrangement space, diminishing issues connected with nearby minima in versatile calculations. Past outcomes on quaternions, octonions, and framework algebras are stretched out by the sufficient circumstances given for the presence of answers for polynomial equations over broad algebras. The work additionally sums up algebra's central hypothesis for quaternions, offering significant new understandings into the way of behaving of polynomial equations with various monomial structures.

REFERENCES

1. Brown, A., & Lee, S. (2018). *Applications of linear algebra in solving polynomial equations. International Journal of Algebra*, 32(2), 87-102.
2. Chen, L., & Wang, Q. (2017). *Linear algebra techniques for analyzing polynomial systems. Journal of Algebra and its Applications*, 41(4), 511-525.

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

3. Garcia, M., & Martinez, D. (2021). A computational approach to polynomial equations using linear algebra methods. *Computational Mathematics and its Applications*, 28(2), 321-335.
4. Gesbert, D., & Duhamel, P. (2000). Unbiased blind adaptive channel identification and equalization. *IEEE Transactions on Signal Processing*, 48(1), 148-158.
5. Grellier, O., Comon, P., Mourrain, B., & Trebuchet, P. (2002). Analytical blind channel identification. *IEEE Transactions on Signal Processing*, 50(9), 2170-2178.
6. Johnson, R. W. (2020). Polynomial equations and their solutions: A linear algebra perspective. *Linear Algebra and its Applications*, 455, 112-125.
7. Kim, Y., & Park, H. (2016). Matrix representations of polynomial equations and their implications in linear algebra. *Korean Journal of Mathematics*, 51(3), 411-426.
8. Lebrun, J., & Comon, P. (2002). Blind identification of communication channels - Symbolic solution algorithms. Technical Report I3S/RR-2002-52-FR, Laboratoire I3S, CNRS/UNSA.
9. Lebrun, J., & Selesnick, I. (2004). Gröbner bases and wavelet design. *Journal of Symbolic Computation*, 35(2), 227-259.
10. Pistone, G., Riccomagno, E., & Wynn, H. P. (2000). *Algebraic Statistics: Computational Commutative Algebra in Statistics*. Chapman & Hall, CRC Press.
11. Rodriguez, P., & Gomez, E. (2019). Solving polynomial equations through linear algebra transformations. *Journal of Symbolic Computation*, 67, 132-145.
12. Rota, L., & Comon, P. (2004). Blind equalizers based on polynomial criteria. In *ICASSP'04, Montreal, May 17-21 2004*.
13. Smith, J. (2019). Algebraic study of polynomial equations: A linear algebra approach. *Journal of Mathematical Analysis*, 42(3), 215-230.
14. Sturmfels, B. (2002). *Solving Systems of Polynomial Equations* (CBMS series No. 97). AMS.
15. Trebuchet, P. (2002). *Vers une résolution stable et rapide des équations algébriques [Towards a stable and fast resolution of algebraic equations]* (PhD thesis). INRIA - Sophia-Antipolis.

NEW POLICIES IMPLEMENTATION IN PHARMA FIELD IN NORTH EASTERN STATES OF INDIA

Krishan Maurya
Research Scholar

Pharmacy

Asian International University, Imphal Manipur

Abstract

The northeastern states of India's pharmaceutical industry have experienced substantial governmental changes intended to improve healthcare services' price, accessibility, and quality. An outline of the most recent policy changes in the area is given in this abstract, with particular attention to programmers aimed at fostering domestic pharmaceutical production, streamlining regulatory procedures, and enhancing R&D infrastructure. The paper looks at how these regulations affect the northeastern states' pharmaceutical industry, healthcare system, and economic growth, pointing out opportunities and problems for stakeholders. This abstract seeks to advance knowledge of the dynamic pharmaceutical industry in this area and its consequences for socioeconomic growth and public health by providing an extensive analysis of the policy environment.

Keywords: Policies, Pharma, North Eastern, States, India, R&D Infrastructure

1. INTRODUCTION

The pharmaceutical sector is essential to maintaining the health of people everywhere, but it is especially important in areas with special healthcare needs, like the northeastern states of India. These states' healthcare environments have been marked over time by a growing load of diseases, limited access to necessary medications, and inadequate infrastructure. Policymakers have launched a number of programmed targeted at reviving the pharmaceutical industry and enhancing healthcare outcomes because they recognize the urgency of addressing these problems and utilising the sector's potential for socioeconomic development. A critical turning point in the northeastern Indian states' pursuit of sustainable healthcare development has been reached with the implementation of new pharmaceutical policies. These regulations are intended to address a number of issues that the pharmaceutical industry faces, such as insufficient funding and research projects, regulatory obstacles, and inadequate infrastructure. By taking on these issues head-on, officials hope to establish a supportive atmosphere that encourages creativity, improves the availability of reasonably priced medications, and boosts economic expansion.

The encouragement of domestic pharmaceutical production is one of the main goals of the new regulations. The northeastern states have historically placed a high priority on imports to meet their healthcare demands, which has resulted in a reliance on outside suppliers and higher medical expenditures. In order to address these issues, governments have implemented

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

initiatives to encourage domestic pharmaceutical manufacturing, which will lessen dependency on imports and guarantee a consistent supply of necessary medications at reasonable costs. In addition to enhancing healthcare accessibility, these initiatives boost regional economic growth by generating jobs and cultivating an environment that is favorable for pharmaceutical entrepreneurship.

Furthermore, streamlining the regulatory procedures that oversee the pharmaceutical industry is another goal of the new policies' adoption. In the past, onerous regulations have frequently discouraged investment and slowed the expansion of the pharmaceutical sector in the area. Acknowledging the necessity of a more effective and transparent regulatory structure, legislators have implemented changes aimed at streamlining approval procedures, fortifying regulatory supervision, and improving compliance requirements.

The aforementioned measures serve to enhance consumer confidence and improve public health outcomes by guaranteeing the safety, efficacy, and quality of pharmaceutical products while also facilitating the entry of new competitors into the market. The new regulations also emphasize how crucial it is to fund infrastructure for pharmaceutical industry research and development (R&D). Historically, the R&D infrastructure and innovation skills of the northeastern states have fallen behind those of other areas, which has limited the region's potential to address new health concerns and produce breakthrough cures. In order to close this gap, governments have set aside funds for the development of research and development organizations, the encouragement of industry-academia cooperation, and the provision of incentives for research projects in high-priority fields such as neglected tropical diseases, infectious diseases, and traditional medicine. These investments not only establish the northeastern states as centers of pharmaceutical excellence but also allow them to make significant contributions to scientific advancement and global health innovation by promoting a culture of creativity and knowledge production.

2. REVIEW OF LITREATURE

Bokephode's(2013)A comprehensive analysis of human resource (HR) policy in the pharmaceutical industry may be found in PhD dissertations. The author applies a critical lens to examine the efficacy of these policies and their ramifications for different stakeholders, such as workers, management, and the industry at large. Bokephode's work makes a substantial contribution to our understanding of the opportunities and problems associated with managing human capital in pharmaceutical businesses by providing insights into the nuances of HR practices. This dissertation is a useful tool for academics, professionals, and decision-makers who want to improve HR tactics in the pharmaceutical industry.

Bordoloi's (2023)According to studies, organic farming in North East India has the potential to encourage entrepreneurship among young people living in rural areas. Examining the state and extent of organic agricultural projects, the report highlights the contribution of agriculture to community empowerment and economic growth. Bordoloi illustrates the potential and difficulties faced by young entrepreneurs entering the organic agriculture sector with real data

and case studies. In addition to adding to the body of knowledge in academia, this work offers development professionals and policymakers useful information for advancing sustainable lives in rural communities.

Brunner, (2010) This book provides a thorough examination of North East India's regional economic growth and how it interacts with international markets. The book explores the socio-economic processes influencing the region's economic landscape, including trade, entrepreneurship, and governance, from interdisciplinary viewpoints. With its careful analysis and thoughtful policy recommendations, each chapter offers insightful perspectives on the opportunities and problems that North East India faces in the context of globalization. This edited volume, which has contributions from eminent academics, is an essential tool for comprehending the intricacies of market integration and regional development in North East India.

3. MAJOR EXPORTERS OF PHARMACEUTICAL PRODUCTS IN NORTH EASTERN STATES OF INDIA

The states of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim in Northeastern India have been steadily making a substantial contribution to the nation's pharmaceutical industry. Several states in the North East have been making progress in the pharmaceutical industry, even though the region may not be as well-known as certain other regions of India. Assam has been one of the main exporters in the area thanks to its environment that is ideal for the production of pharmaceuticals. Because of the state's abundant biodiversity, a wide range of therapeutic plants and resources are accessible, serving as raw materials for the manufacturing of pharmaceuticals. Furthermore, Assam's advantageous geographic position facilitates the logistical export of pharmaceutical goods to Bangladesh, Bhutan, and Myanmar, among other nearby nations. Assamese pharmaceutical businesses that are well-known for their work have been exporting a variety of goods, such as herbal supplements, APIs (Active Pharmaceutical Ingredients), and generic medications, which has helped the state's export economy tremendously.

Though it produces comparatively less pharmaceuticals than other states, Arunachal Pradesh has been steadily making a name for itself in the sector. Due to the state's wealth of natural resources and climate, which is ideal for growing medicinal plants, small and medium-sized pharmaceutical businesses have emerged. These businesses cater mainly to the growing demand for natural healthcare solutions worldwide by producing herbal and Ayurvedic goods. Despite being relatively small in comparison to other states, Arunachal Pradesh's pharmaceutical export industry has room to grow and diversify. Another state in the Northeast, Manipur, has also been involved in pharmaceutical exports quite a bit. The primary focus of the state's pharmaceutical sector is the production of generic medications and formulations for both local and foreign markets. The geographical location of Manipur, adjacent to Myanmar, presents trading prospects and facilitates the export of pharmaceutical items to nations in Southeast Asia. Additionally, the construction of pharmaceutical units has been promoted by

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact February 2024

the state government's attempts to support industrial growth and investment, which has improved export capacities and boosted the state's economy.

Meghalaya has been using its natural resources to support pharmaceutical manufacture because of its favorable agro-climatic conditions. The state has drawn investments in the pharmaceutical industry due to its emphasis on organic farming and the production of medicinal plants. Pharmaceutical firms established in Meghalaya have been exporting a range of products to foreign markets, such as nutraceuticals, herbal medications, and traditional treatments. Additionally, the state's accessibility to important ports and transportation hubs makes it easier to export pharmaceutical products to other countries, increasing its competitiveness on the international market. Even though they are smaller than other Northeastern states, Mizoram, Nagaland, Tripura, and Sikkim have been contributing to the pharmaceutical export scene. Pharmaceutical firms that specialize in herbal and traditional medicine, nutraceuticals, and specialist formulations have emerged in these states. Even though these states only export a small number of pharmaceuticals, they are important for diversifying India's pharmaceutical exports and reaching specialized markets where there is a great demand for particular items.

Table 1: Leading Pharmaceutical Product Exporters in India's Northeast

| State | Major Exporters of Pharmaceutical Products | Frequency |
|-------------------|--|-----------|
| Assam | - North East Pharmaceutical Pvt. Ltd. | 10 |
| | - NIPER-Guwahati | 10 |
| | - Sun Pharma Industries Ltd. | 26 |
| Meghalaya | - The Shillong Pharmaceuticals | 20 |
| | - Zydus Cadila | 15 |
| Manipur | - Haffkine Bio-Pharmaceutical Corporation Ltd. (Imphal Unit) | 15 |
| | - Esteem Pharmaceuticals | 5 |
| Nagaland | - Biomark Laboratories Ltd. | 15 |
| | - Themis Medicare Ltd. | 13 |
| Arunachal Pradesh | - Lincoln Pharmaceuticals Ltd. | 12 |
| | - Rusan Pharma Ltd. | 11 |
| Tripura | - Sun Pharmaceutical Industries Ltd. | 20 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact February 2024

| | | |
|--------|---------------------------|----|
| | - Medopharm | 10 |
| Sikkim | - Alkem Laboratories Ltd. | 13 |
| | - Mankind Pharma Ltd. | 15 |

An overview of the top pharmaceutical product exporters from the different states in India's northeast is given in the table. The pharmaceutical firms that operate in each state are given, along with the matching frequency of export for each company. NIPER-Guwahati, Sun Pharma Industries Ltd., and North East Pharmaceutical Pvt. Ltd. are prominent exporters in Assam; Sun Pharma Industries Ltd. has the greatest export frequency (26). The Shillong Pharmaceuticals and Zydus Cadila are the representatives of Meghalaya; The Shillong Pharmaceuticals has a slightly higher export frequency of 20 compared to Zydus Cadila's 15. Esteem Pharmaceuticals and Haffkine Bio-Pharmaceutical Corporation Ltd. are the two companies that export the most pharmaceuticals from Manipur; Haffkine Bio-Pharmaceutical Corporation Ltd. is in the lead with an export frequency of 15. Themis Medicare Ltd. and Biomark Laboratories Ltd. are two of Nagaland's largest exporters, with export frequencies of 13 and 15, respectively. Lincoln Pharmaceuticals Ltd. and Rusan Pharma Ltd., with export frequencies of 12 and 11, respectively, are regarded as major players in Arunachal Pradesh. Sun Pharmaceutical Industries Ltd. and Medopharm, with export frequencies of 20 and 10, respectively, are the main exporters to Tripura. Lastly, with export frequencies of 13 and 15, respectively, Alkem Laboratories Ltd. and Mankind Pharma Ltd. are the primary exporters of pharmaceuticals from Sikkim. This information sheds light on how pharmaceutical manufacturing and export activities are distributed among India's northeastern states.

4. CHALLENGES IN POLICY IMPLEMENTATION

❖ Infrastructure Restrictions:

Limited Facilities: The area could not have the proper roads, energy, or water supply that are required for the production and delivery of pharmaceuticals.

Remote Locations: Establishing and maintaining pharmaceutical facilities can be challenging in several of the northeastern states due to their geographic isolation.

Logistical Challenges: Inadequate transportation systems and connectivity problems can cause problems for the supply chain, making it more difficult to deliver raw materials and completed goods on time.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

❖ **Complexity of Regulatory Compliance:**

Strict restrictions: Regulatory bodies like the Food and Drug Administration (FDA) and the Central Drugs Standard Control Organisation (CDSCO) enforce strict restrictions and quality requirements on the pharmaceutical business.

Costs of Compliance: It can be expensive to comply with regulations, especially for smaller pharmaceutical companies with tighter budgets.

Capacity Building: For policy implementation to be successful, it is essential to guarantee that pharmaceutical companies have the knowledge and resources needed to adhere to rules.

❖ **Diversity in Geography and Culture:**

Diverse Socio-Economic Conditions: The states in the Northeast have different levels of infrastructure and development as well as cultural and socioeconomic diversity.

Local Context: The distinct requirements and difficulties faced by various towns and areas in the Northeastern states must be considered by policies.

Language and Communication: Linguistic and cultural limitations may make it more difficult to communicate effectively and disseminate policy information.

❖ **Limited Human Resources:**

Skills Shortage: The pharmaceutical business may not have enough qualified workers in the area in fields like quality control, regulatory affairs, and research and development.

Training and Education: In order to overcome the shortage of human resources, it is crucial to fund education and training initiatives that will increase local ability and competence.

Brain Drain: The lack of qualified workers in the pharmaceutical industry may be exacerbated by talented people leaving their home country or region in quest of better possibilities.

❖ **Red tape in the political system and political instability:**

Policy Uncertainty: Political unrest and governmental transitions may result in uncertainty over the creation and application of policies, which may have an impact on the pharmaceutical industry's long-term planning and investment decisions.

Bureaucratic Delays: The establishment and growth of pharmaceutical operations may be postponed by convoluted bureaucratic processes and red tape that impede the acquisition of regulatory permissions and permits.

Corruption: The efficacy of laws and regulations may be compromised by corruption and rent-seeking activity within government organizations, which would erode public confidence in the pharmaceutical industry.

5. CONCLUSION

In conclusion, there are possibilities and problems associated with the pharmaceutical industry's adoption of new rules in India's northeastern states. These policies seek to promote innovation, provide access to healthcare, and stimulate economic growth in the area, but they face a number of challenges before they can fully accomplish their goals. The pharmaceutical industry faces numerous problems in implementing policies, including those related to infrastructure, political instability, cultural and geographic variety, regulatory compliance complexity, and human resource limits. These obstacles can be addressed, nevertheless, by taking a multifaceted strategy that entails cooperation between governmental bodies, business partners, civil society organizations, and foreign allies. Investments in regulatory changes, sound governance practices, infrastructure development, and capacity-building programmers are essential elements in establishing an environment that will allow new policies to be implemented successfully in the pharmaceutical industry. In the end, the North Eastern states of India can achieve their pharmaceutical sector's full potential by tackling these issues and utilising the region's advantages, like its abundant biodiversity and skilled workforce, which will enhance healthcare outcomes and promote sustainable development in the area.

REFERENCES

1. Biehl, J. G. (2004). The activist state: Global pharmaceuticals, AIDS, and citizenship in Brazil. *Social Text*, 22(3), 105-132.
2. Bokephode, S. (2013). Critical analysis of HR policies being implemented in pharmaceutical industries (Doctoral dissertation, Tilak Maharashtra Vidyapeeth).
3. Bordoloi, P. (2023). Status and scope of organic farming for entrepreneurship development among rural youth of North East India.
4. Brunner, H. P. (Ed.). (2010). North East India: Local economic development and global markets. SAGE Publications Ltd.
5. Chettri, M. (2023). New jobs, new spatialised patriarchy: creating factory workers in a Himalayan pharmaceutical hub. *Gender, Place & Culture*, 30(10), 1482-1502.
6. Chittoor, R., Ray, S., Aulakh, P. S., & Sarkar, M. B. (2008). Strategic responses to institutional changes: 'Indigenous growth' model of the Indian pharmaceutical industry. *Journal of International Management*, 14(3), 252-269.
7. Guennif, S., & Ramani, S. V. (2012). Explaining divergence in catching-up in pharma between India and Brazil using the NSI framework. *Research Policy*, 41(2), 430-441.
8. Jain, S. C. (Ed.). (2006). Emerging economies and the transformation of international business: Brazil, Russia, India and China (BRICs). Edward Elgar Publishing.
9. Kapczynski, A. (2009). Harmonization and its discontents: A case study of TRIPS implementation in India's pharmaceutical sector. *Calif. L. Rev.*, 97, 1571.
10. Singh, K. N., & Singh, N. T. (2022). India's Act East Policy with ASEAN countries: Manipur's outlook. *Journal of Algebraic Statistics*, 13(3), 289-296.

AN ANALYSIS ON THE PARADIGM SHIFT IN CROP PRODUCTION MANAGEMENT FOR MODERN SUSTAINABILITY

Renshu

Research Scholar Department of Physics,
Baba Mastnath University, Rohtak
renshudeshwal17@gmail.com

ABSTRACT

Developing management structures that guarantee that the essential activities and plans are done to get an attractive result from the movement of the undertaking's functioning system is the fundamental errand of production management in cultivating tries. The issue of overseeing crop production is incredibly pertinent today on the grounds that most provincial undertakings that attention just on crop production dismiss suggested headways for crop advancement and abuse science-based agricultural practices. These issues are connected to the absence of modern hardware and specific materials, the unstable monetary circumstances looked by most farmsteads, and the deficiency of regulatory work in the field of crop production. Huge mechanical headways in cultivating production have been made conceivable by modern varieties, transgenic crops, and the green revolution (GR) (GM crops). Albeit the reception of GR expanded the area's general adequacy internationally, it is additionally remembered to be adding to resource debasement in nations like India, for the most part because of the development pack itself and somewhat to the impossible execution of its partner. Nonetheless, plants with hereditarily changed groupings are helpless against long haul medical problems and ecological results. Understanding the parts of imaginative shifts toward sustainability that are reasonable for agricultural production accordingly requires cautious idea.

Keywords: Paradigm Shift, Crop Production Management, Modern Sustainability, Green Revolution, Precision Agriculture, Precision Conservation

1. INTRODUCTION

One of the essential parts of agriculture is crop production. The explanation the populace has food and the creature's business feed is a direct result of crop yield. Besides, crop items are

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

utilized in many undertakings as unrefined substances got from plants, like food, fuel, materials, and medications. Agriculture incorporates the development of crops for field advancement, vegetable turn of events, natural item improvement, etc. This area gives fundamental food. Unrefined components are provided to food and item gathering organizations. Thus, the trained creature area utilizes extras like straw, silage, and food industry squander.

Notwithstanding the difficult production conditions brought about by high production resource costs, bad quality of life in rustic regions, and challenges getting credit, cultivating tries offer a high potential for production. Under troublesome circumstances, homegrown agricultural drives are compelled to incorporate headways with endeavours to work on the productivity of production affiliation. Preparing shows that the results of homegrown agricultural undertakings are popular with people in general notwithstanding their greater costs because of the significant expenses brought about contrasted with those of unfamiliar makers.

This is principally made sense of by the way that homegrown makers make items that are ok for the climate, in any event, when the most common way of creating them includes the utilization of fundamental added substances. The interest in cultivating items is fuelled by these conditions. Besides, the market for farm style agricultural items — that is, those made under average circumstances — is as of now developing. The economy should guarantee both the development of production and independence in the quickly evolving socio-political and monetary scene of today. In this manner, without expanding the utilization of research, advancement, and developments, the shift to pragmatic money related improvement and further improvement of the relationship of crop production is impossible. An inside and out investigation of the thing's actual assembling cycles, including its slant, course, and parts, is essential for a solitary assurance of the important executions.

Systems for crop production that produce more food with more healthy benefit are essential, however they likewise need to affect the climate. The 20th century saw an enormous development in country regions because of the broad utilization of pesticides, manure, and water systems, all at a critical biological expense. The Green Revolution, which accomplished food security for billions of individuals, benefited enormously from these innovations. Be that as it may, the difficulties confronting the twenty-first century are unmistakable. To guarantee food security, conservation of soil and water will be fundamental, and common sense precision

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

agriculture and environment (SPAEE) will be expected to guarantee that serious agriculture and a changing climate don't have unexpected impacts that could rush natural change. Bleeding edge cropping structures that join natural advancements (plant-helpful microorganisms, cover crops) with precision agriculture (FAIR) and precision conservation (PC) ought to be created as a feature of practical agriculture to lessen how much compost, pesticide, and water inputs while expanding the feasibility of conservation to keep up with supportable agriculture at the field level and all through a watershed.

1.1. Objective of the study

- To know which kind of soil is good for what kind of crop.

2. LITERATURE REVIEW

Bhalla and Singh's (2010) The report, requested by the Indian Orchestrating Commission, centers around the areas of agriculture advancement in India at the neighborhood level. This exhaustive research gives a reasonable examination of elements impacting cultivation efficiency, sustainability, and monetary profit in various pieces of the country. The discoveries introduced in this research probably envelop different parts of cultivating activities, like crop development strategies, resource usage, market parts, methodology techniques, and the effect of mechanical interventions. Bhalla and Singh give significant experiences to policymakers, specialists, and colleagues associated with advancing cultivation development and provincial advancement in India by looking at the perplexing connections among agriculture, funds, and methodology.

Choudhary and Gaur's (2010) The ISAAA Series of Biotech Crop Profiles remembers a national profile for Bt cotton in India that gives an itemized outline of the improvement of hereditarily changed (GM) cotton in the country and its effect. This dissemination no doubt gives goodies of information about the agronomic show, monetary advantages, ecological worries, and managerial cycles related with the reception of Bt cotton in India. The creators probably look at the monetary ramifications for farmers, the climate, and the bigger agricultural locale notwithstanding the technique's conversation of GM crop advancement. Choudhary and Gaur add to the worldwide talk on biotechnology in agriculture by looking at India's encounters with Bt cotton. Their examination gives huge contextual analyses and viewpoints for partners, experts, and policymakers intrigued by the globalization of hereditarily changed agriculture.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Evenson and Gollin (2003) give an intensive examination of the effect of the Green Revolution more than a forty-year time span. The presentation of high-yielding crop assortments, water system systems, and pesticide inputs, once in a while alluded to as the "Green Revolution," essentially expanded cultivation efficiency and created unmistakable outcomes in different regions of the planet. This original work assesses the monetary, social, and ecological effects of the Green Revolution, featuring its job in diminishing neediness, improving food security, and prodding financial development. The creators stress the significance of proceeding to be keen on country research and improvement to resolve arising issues like changing dietary inclinations, resource weariness, and ecological change.

Gómez-Limón and Sanchez-Fernandez (2010) add to the discussion on manageable cultivating rehearses by putting out a system for observational assessment that utilizes composite pointers. Perceiving the intricacy of sustainability, its fashioners advance composite pointers that synchronize monetary, natural, and social aspects. They evaluate the sustainability of cultivating systems' execution by observational investigation, representing components including social worth, normal impact, and resource use viability. This paper accentuates the need of taking on sweeping systems to address the present status of cultivating, offsetting financial development with natural assurance and social guide from the public authority.

3. TECHNOLOGY PARADIGMS AND TECHNOLOGY TRANSITIONS - TOWARDS AN ANALYTICAL FRAMEWORK

Ordinary models make sense of the construction and wellsprings of agricultural improvement in a straight style. As per the immediate model, developments stream from worldwide research offices to national research workplaces prior to growing to arrive at farmers. This clarification isn't completely erroneous in light of the fact that it validated in numerous non-industrialized nations during the green revolution. Nonetheless, for the reasons recorded beneath, the materialness of this immediate paradigm in contemporary agriculture is raised doubt about. To start with, the development of the confidential area in agricultural research and improvement; second, the significant changes to the precepts of the authorized development opportunities (UPOV1) that guide the progression of knowledge. The National Agricultural Research Systems (NARS), which stress co-arrangement among schools and research affiliations, Agricultural Knowledge and Information Systems (AKIS), and most as of late the National Agricultural Improvement Systems, are among the elective viewpoints to the straight model

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

that have developed after some time. A couple of scholastics propose supplanting the immediate model with a clever diversion improvement system structure. In their battle for a systems approach, these researchers likewise incorporate breaking point improvement.

Subsequent to accomplishing extraordinary steps, it is pivotal to determine that the use of progression systems structure settle three significant disturbances in overhauling the development age and scattering. They are responsible for the information/knowledge stream and co-arrangement in the general execution (quantifiable outcomes). Co-arrangement is one of the primary subjects that progression systems welcome and are prepared for conversation. Chats on open classified affiliations, international co-action, industry joint effort in advanced education, and creative non-state performer help are all important for the co-arrangement. Setting the standards of the game (inspirations) accurately is one method for overseeing co- arrangement frustration. Also, the information streams inside the structure can be improved by dealing with the bottle-necks and hindrances by utilizing the performer network strategy. A legitimate methodology like this is vital for understanding the issues of non-industrialized countries with respect to information irregular characteristics and co-arrangement disillusionment in the development of agriculture.

3.1. Technology paradigms and the global technological landscape

It is essential to initially comprehend what a development paradigm and is a paradigm shift prior to diving into the conversation of the rise of development paradigms. "An illustration of common decisive reasoning activity on the grounds of such an imaginative paradigm," is the manner by which he portrays mechanical course. By the by, this material covers a truly enormous measure of ground with regards to separating a complex mechanical space into four fundamental parts that are valuable for describing a development paradigm. These are the accompanying: the issues, the regular fields of coherent examination, the prevailing game plan model (or model for further developing courses of action), and the game plan group (or the reason for course of action conveyance). Thusly, mechanical courses of action fall under the classification of paradigms that arise, create, and (occasionally match) over the long run, as well as those that contrast as far as the issues being tended to, the chose sensible fields that act as rules and their transcendent game plan plans, and the reason for plan transport (materials and advancements).

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

With these center components of a development paradigm as a main priority, we are right now attempting to work on this whole documentation. In the first place, the issue set is where we start. Consider a few mechanical difficulties that might emerge during production. Z issues might exist, demonstrating production hardships at a particular second in time.

Expect that the issue space is $W = \{1, 2, p, z, \dots Z\}$.

Let $T = \{t_1, t_2, \dots t_i \dots \dots, t_n\}$ address the setup of all current mechanical answers for the issues in W .

Let $S = \{s_1, s_2, \dots s_i \dots \dots, s_n\}$ be a foreordained game plan of legitimate fields where answers for the difficulties in W may be found.

Allow us to think about an issue p from the assortment W . As of this moment, let n conceivable mechanical designs for a representative issue p be addressed by the set $Tp = \{tp_1, tp_2, \dots tp_i \dots, tp_n\}$. In the impossible occasion that no open development plans are accessible at a specific time, this might be an unfilled set. We just feature issues for which the set Tp is non-void for convenience.

Besides, any mechanical game plan tpp could be laid out on m conceivable coherent fields; among these, let spp be one head consistent field in $Sp = \{sp_1, sp_2, \dots spp \dots, spp\}$, where the set Sp alludes to the m conceivable legitimate fields that help the essential creative course of action tpp . This proposes that for an issue p in the issue space, there might be n related effective fixes that rely essentially upon a specific sensible field however are connected with one of m conceivable legitimate fields.

How about we examine one such imaginative design tpp and the pivotal consistent field spp that upholds it in the touple (tpp, spp) .

Like Dosi, we currently characterize a development paradigm as an assortment of "mechanical plan" triplets comprising of a few issues, proper game plans for each issue, and various coherent fields (related to a current game plan) that act as the essential starting point for the game plans.

Deciphering this form according to the viewpoint of development improvement isn't hard. Since a predominant plan design arises inside an alternate sensible discipline and co-develops

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

with it, the space of legitimate spaces is likewise deciphered, for effortlessness, as illustrative of the prevailing course of action plan that is deserted in our origination.

Therefore, we examine a Gw development paradigm in such detail that:

$$G_w = \{w, T_w, S_w\} \text{ where } w \in W; T_w \in T; S_w \in S \quad (1)$$

Toward the finish of the a paradigm for development Gw is an assortment of 3D-centered regions that take care of a specific arrangement of issues. w inside an issue region W, an assortment of imaginative arrangements Tw for those issues that depend on various consistent spaces of thought Sw, a subset of all coherent fields that are proper, S. We may now show an advancement scene utilizing this meaning of a development paradigm (Gw).

Allow Lp to address the development scene 7 for a specific issue set p, and allow p to be a plane of all mechanical designs that are possible and sensible, as well as the essential consistent fields that contrast with the issue set p. For this situation, the issues are firmly connected with each other. This recommends that the development scene, $L_p = \{(t_{pi}, s_{pi}) \in R^2\}$, where $t_{pi} \in T_p$; $s_{pi} \in S_p$, is provided in contrast with a given arrangement of immovably related concerns, p.

At the end of the day, a mechanical arrangement tpi and the standard coherent field spi for an issue The establishment (building block) of a development scene is pi. For this situation, the clever fix can likewise be viewed as tending to "a particular issue" of a bigger moderate framework. As such, the tuple (tpi, spi) addresses the plan and the hid standard sensible field that the game plan relies upon, assuming that a decisive reasoning strategy (computation) involves different free progressions.

In Figures 1, we dole out the issues to the X-center, each conceivable setup to the Z-center point, and each consistent field to the Y-turn to delineate these ideas. The "balls" address the "development game plan triplet," which comprises of a particular issue, a mechanical plan that is equivalent, and the vitally legitimate field that frames the premise of the course of action, since we are managing a three-layered space. In this manner, the entirety of the current "creative paradigms" and "development plan threesomes" are broadly organized in a worldwide mechanical scene.

In this specific circumstance, a development paradigm ought to be evident as a build encasing the three sets (or "balls" as displayed in Figures 1) for various related issues including plans

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

got from a standard course of action of coherent principles (that stick to a current course of action plan). Essentially, a headway in the planar plans of mechanical scenes for a specific issue set is viewed as a mechanical course inside a paradigm considering a few coherent fields that describe the development paradigm.

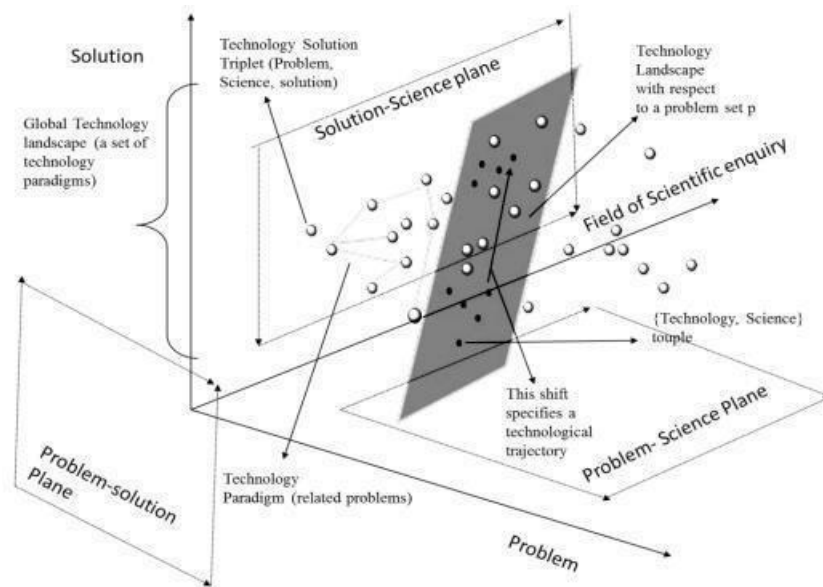


Figure 1:Global technological landscape

There might be an answer accessible on L_p for a particular issue at a particular second for an issue p_i . Be that as it may, an issue p_i requires an answer; in this way, a logical examination concerning an overarching development scene T_p (expecting to be the as of late existing) for a connected issue set starts. That is, researchers and engineers apply methods appropriate to the prevailing plan models of the scene while the pursuit happens inside the scene's locales of consistent request. In the far-fetched occasion that an answer can't be recognized inside the current scene, the pursuit extends to incorporate consistently related areas outside the scene's limits while remaining inside the boundaries of the paradigm. In the far-fetched occasion that an answer is found in consistent regions beyond the scene however inside the paradigm, new scenes may consequently show up. The paradigm slowly extends toward the scenes.

3.2. Emergence and Selection

At the point when 'assortment' leads to an effective and extremist turn of events, the rise of a paradigm should be clear as the improvement of a few predictable progressions on top of that

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

extreme turn of events. The to and fro powers in the money related structure — that is, the business areas' solicitations and the science — can be utilized to make sense of how an advancement paradigm creates. Here, intelligent research regions are viewed as fundamentally subject to supply and intensely impacted by the group of existing knowledge. The probability of one more paradigm arising is expanded by any eminent headway around here. Nonetheless, the market's interest decides the way that broadly a specific development is taken on. Because of market influences, pioneers are compelled to zero in their endeavors on making reliable upgrades in light of previous ones, while ineffectual developments at last disappear and mechanical headway continues thusly.

As recently referenced, the extraordinary clarification of money related factors requires resolve. There is a determinant part that penetrates an improvement structure to where, for each plan of a gathering of troubles, a predominant development at last arises through the performers' exercises and coordinated efforts as well as unambiguous system perspectives (made sense of later). Subsequently, its decision gives a pathway to various gradual headways to expand upon, in the end leading to an entire paradigm. Choices are thusly both genuine and deadly simultaneously, contingent upon your perspective. It will let loose space for wasteful innovations and clear the entryway for new, productive turns of events. Thusly, direction is a continuous cycle that influences the rise, strength, and progress of paradigms inside a worldwide mechanical climate.

Certifiable occasions and technique constancy are helpful contentions to grasp the consistency (or deficiency in that department) of progress inside an emanant paradigm. Strength can likewise prompt a circumstance known as "secure," in which an imaginative thought that was effective in the end neglects to rival an inefficient one because of developing criticism circles, great analysis, and hierarchical externalities. The force of a prevailing development and, subsequently, the idleness of the advancement scene are expanded by growing returns and way dependence. This makes the paradigm change trying for that specific arrangement of issues. Comparable powers additionally block the progression of monetary advances. To end the lock-in, an express way to deal with intervention that considers specialization might be vital.

3.3. Response

Not at all like Agricultural production, which happens on the shop floor of a handling plant as opposed to in common natural surroundings, agricultural production happens in a typical region. Thus, production at assembling plants happens in a controlled climate with very little connection with the normal world. Since organic limits are not piece of production, it has little effect whether the making of assembling plants makes normal externalities like water and ecological defilement; the impact on (not entirely set in stone by the idea of information sources) is immaterial. In this way, the general trait of agricultural production is the climate's capacity to respond, which decides the sort of information sources and eventually impacts the result.

Albeit a response capacity's development and nature are fairly complicated, perceiving such a capacity and its part in the change elements is significant. Subsequently, in the improvement paradigm, "Nature" (or "Climate") is a non-monetary performer whose reactions are vital since its activities are reflected by generally acknowledged bi-genuine standards. Accomplishing a bio-genuine equilibrium is a part of the climate's outcome capacity.

Biophysical changing cycles at the same time decide Characteristics' reaction to intervention (human and specialized intercession). 10 They are composed to gain feeling of the headway viewpoints since conceptualizing such non-market components in the creation and progression of advancement paradigms in writing is testing.

Allow F to address Nature's response capacity to the degree that it is impacted by various difficulties $p(t)$ over the course of time t and the development scene T_p cutting through the ruling paradigm G_w . One more game plan of issues $p(t+1)$ with a probability β in time $t+1$ is the result. That is:

$$p(t+1) = F(p(t), T_p) \quad (2)$$

For this situation, n is limited, $p(t+1)$ has an area with $\{P; 0 \leq P \leq n\}$, and $p(t+1)$ has a few issues that could seriously risk the production later on.

All in all, the development of a not so great (normally substandard) paradigm as the prevailing one sets off a response capacity by the climate, which without a doubt makes new difficulties as unidentified (or, as of not long ago, dark) issues or issues that subvert genuine production.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

That is, a natural reaction could sabotage the structure's capacity to bring in cash. In this way, it is vital to evaluate the sustainability of development paradigms in agriculture as far as both a. the secret concentrated change's monetary viability and b. the development's negative normal externalities, which affect the production structure's drawn out sustainability.

3.4. Transition or paradigm shift

A predominant paradigm might contain the best method for imparting the answer for the issue. For this situation, the examination might dive into a subdominant or drowsy development paradigm that coincides close by the prevailing paradigm. The simultaneousness can be acknowledged as given at this intersection since there is sufficient proof to acknowledge that such dormant paradigms containing less productive (monetarily), locally knowledge driven or culture driven, or appropriate emerge after some time, despite the fact that examination of the beginning stages for such combination is basic. In agriculture, models consolidate the agnormal paradigm, which depends on traditional knowledge (sustenance and bug management utilizing locally available natural resources), as well as the paradigm of elective medication (homeopathy, needle treatment, and standard prescriptions) for illnesses connected with well-being. The traditional interpretations could possibly make sense of a portion of the parts of such a languid paradigm.

In the event that a lethargic paradigm ends up having a more effective game plan, trading is a more affordable choice than beginning without any preparation while searching for new thoughts. This fundamentally intends that on the off chance that a reaction from a predominant paradigm brings about negative normal externalities (nonmarket), changing to an alternate, more useful plan could be represented by the monetary performers' activities. Considering the extraordinary abilities that impact the determination and support of development paradigms, this probably won't be possible.

In the far-fetched occasion when neither the predominant paradigm nor the languid paradigm offers a naturally useful plan, development search might continue in new coherent locales that might prompt an extraordinary development. In the event that this uncommon improvement is chosen, it might prompt an unpreventable paradigm shift or development change for a specific gathering of issues.

Figure 2 represents the development of advancement in a worldwide mechanical scene, including quest for advancement, rise of issues, determination and rise of development paradigms, and reaction of the climate. In the worldwide mechanical scene, the development of an issue starts a mechanical pursue. Over the long run, because of the improvement structure's activities, a predominant paradigm arises. After the conveyance is finished, an overall paradigm might lead to new issues that subvert the production cycle considering the natural response. To resolve the new issue, sharing thoughts is considered looking through the current climate (directing the possible improvement of a bearing), on the other hand looking through the momentum paradigm (or winning paradigm), and looking through a drowsy paradigm. In the case of exchanging isn't thought of, then an entirely different mechanical hunt starts in the worldwide mechanical scene, prompting a remarkable headway in development.

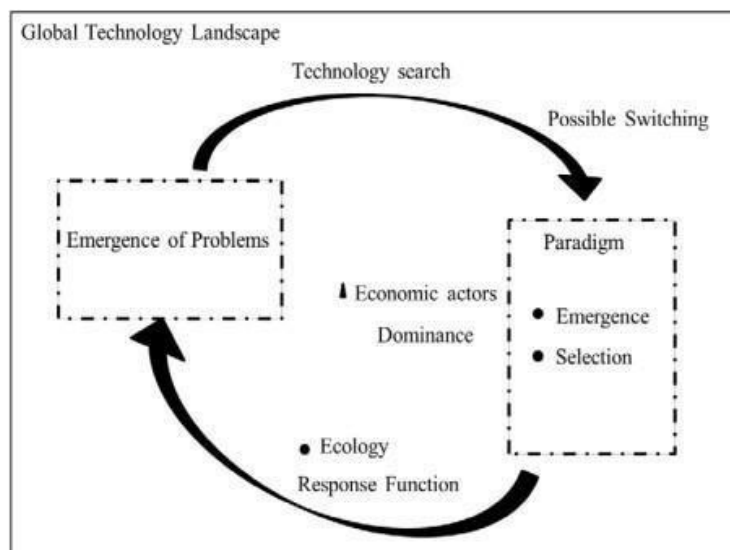


Figure 2: Technology paradigm shift

4. APPLICATION OF THE CONCEPTUAL FRAMEWORK TO AGRICULTURAL PRODUCTION

Being developed focuses, paradigmatic portrayal of contemporary advancements is ordinary; in agriculture, it is less considered normal. This could be ascribed to the multiplication of both non-modern (regular) and modern (compound and mechanical) mechanical systems in agricultural result. Few researchers really immensely affect the paradigm-shifting ideas of development and agricultural headings. Nonetheless, there is restricted start to finish investigation of changing variables utilizing agricultural production.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

As indicated by our own portrayal, biotechnologies (GM crops and biotech-upheld raising techniques), agro-organic methods (customary, uninformed, normal developing practices), early and late green revolution progresses (MVs), and biotechnologies (Half and Parts) describe agricultural production. Notwithstanding, we can comprehend the conscious contrasts in the person and style of the mechanical plans being presented by every one of these paradigms in the event that the early and late green revolution paradigms are joined to address a typical paradigm of headways before the appearance of biotechnology.

- **Problems:** Any inventive arrangement that seems OK for agriculture can save work or land. Since there is a lot of work in a non-modern culture, land-saving developments have been generally fitting, as was featured in the past segments. We should now inspect the attributes of the land effectiveness issue (yield) from the back to front. The yield issue, most importantly, is muddled. It's actually an assortment of related and periodically expansive issues, for example, poor germplasm, failure to battle off sicknesses and vermin, absence of flexibility to a specific agro-climate, and powerlessness to deliver more because of poor morphological qualities, (for example, feeble stalks in field crops).
- **Areas of scientific enquiry:** Researchers are persistently pushing the limits of the essential sciences, which is changing the way that even significant points are organized and conveyed. The solution to higher agricultural yields came from basic plant sciences, which over not entirely settled and duplicated short diminutive groupings involving the best neighbourhood cultivars as per Mendelian hereditary qualities standards¹⁷. In any case, progresses in numerous coherent fields ultimately bring about mechanical game plans, and sensible norms engaged with course of action transport commonly cross-over.

Fundamental plant sciences like inherent science, plant science, plant physiology (shape and size), plant pathology (vulnerability to diseases), and entomology (to break down bug populaces and their approach to acting towards a host plant creature gatherings) stayed the area of focal point of sensible enquiry during the start of decisive reasoning for additional created yields. By the by, as plant hereditary attributes have advanced over the course of time, nuclear science and bioinformatics have been applied to the improvement of novel agricultural assortments. Elements, for example, resistance to herbicides and bug blockage were accomplished through the joining of unfamiliar hereditary material. Genetically changed plants was the term given to these plants. Utilizing contemporary biotechnology procedures to lay out

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

duplicating, transgenic or GM crops¹⁸ were created. Improvements in bioinformatics have at the same time expanded research viability and given a makeover to the regular strategies utilized in research and advancement.

- **The solution design:** From the beginning in the green revolution, new plant assortments were fostered that could answer the utilization of fertilizers without lodging, empowering the plant to deliver more grains per tail. Thus, the plants' morphological and physiological qualities were adjusted to all the more likely suit agroecology. The ongoing cultivars were painstakingly crossed with short dwarf and worked on yielding combinations to refresh the morphological elements and improve the probability of a more prominent return for each plant by forestalling lodging. One of the principal objectives was additionally to cause the crops to answer the use of fertilizers, particularly in the beginning phases of the green revolution. To oblige expansions in flexibility, crop reactions to photograph responsiveness, thermoresponsiveness, and a scope of ecological limits were explored. All the more explicitly, endeavors were made to develop combinations with further developed germination, predictable improvement qualities, and a quicker production cycle. Joining different techniques for plant reproduction brought about a typical organizing plan. Afterward, as biotechnology progressed, it was feasible to complete plant raising with expanded exactness and productivity, prompting sensational changes in the course of action design.
- **Solution delivery/package:** Lower yields might have solutions for the sub-gives that are all hidden, like high-yielding plant assortments, insect sprays, fertilizers, herbicides, or hereditarily modified blended seeds (that address weeds, bugs, and greater yields). As a rule, plan pack is joined by a bunch of practices that guide its execution in the field for ideal outcomes.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | Conventional | Biotech | Agro-ecological |
|-----------------------------------|---|---|--|
| Solution package | Modern varieties, chemical fertilizers, pesticides + package of practices | GM seeds, chemical fertilizers + package of practices | Bio-fertilizers, bio-pesticides, integrated pest management, zero-tillage. |
| Solution model | Natural selection for desired traits | Marker assisted selection (DNA based) of genes for desired traits | Self-regenerative and eco-friendly models |
| Selected principles | Plant breeding | Transgenic or non-transgenic methods to achieve desired trait + Plant breeding | Minimizing the resource usage |
| Area of scientific enquiry | Plant Sciences (biology, plant physiology, botany, entomology) Chemistry | Modern biotechnology (micro-biology, bio-chemistry, genetic engineering) + traditional plant Sciences | Agro-ecological and environmental sciences |

Figure 3: Agricultural production technology paradigm classification

Figure 3 shows that while certain difficulties are normal to every one of the three mechanical advancement paradigms, every development paradigm has unmistakable parts, like consistent request districts, chose rule legitimate fields, and their overwhelming course of action arrangements. Moreover, there are contrasts in the course of action transportation. Subatomic science and hereditary designing show an exceptional jump from the prior spaces of traditional plant sciences, despite the fact that the spaces of coherent request for the green revolution (standard) and inherited designing (Agri-biotechnology) paradigms cross-over. The field of intelligent request is the innate sciences, and agroecology is reliant upon the key standards of agronomy and climate. In agro-normal spaces, decisive reasoning frequently includes information sources and exercises that keep up with balance between the estate and its environmental factors.

5. CONCLUSION

The examination causes to notice the significant paradigm shift toward contemporary sustainability rehearses that is happening in agricultural production management. The research discoveries approve the gather pattern up from customary methodologies and toward widely inclusive methodologies that focus on resource efficiency, monetary reasonability, and ecological stewardship. Accomplices in the agricultural range are understanding the need to embrace methods like precision agriculture, agroecology, and coordinated bother management to moderate natural corruption, adjust to difficulties presented by ecological change, and guarantee long haul food security. Besides, this change stretches out past direct cultivating

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

works on, enveloping more significant essential changes in system structures, market parts, and customer conduct. As we research the intricacies of really focusing on a developing worldwide populace while safeguarding the planet's limited assets, this shift recommends a crucial point in time in shifting agriculture's future course toward an extra feasible and hearty paradigm. It will be fundamental for embrace progress, joint effort, and knowledge partaking to prepare these arising paradigms to the furthest reaches conceivable to handle the difficulties representing things to come.

REFERENCES

1. A.M. Petrov, M.A. Kanaev, Yu.A. Savelev, S.A. Vasilev, E.S. Kanaeva, *Research J. of Pharmaceutical, Biological and Chemical Sciences* 5, 925-934 (2018)
2. Bhalla, G. S., & Gurmail, Singh. (2010). *Final Report on Planning Commission Project Growth of Indian Agriculture: A District Level Study. Planning Commission of India Project Report.*
3. Choudhary, Bhagirath, & Gaur, Kadambini. (2010). *Bt cotton in India: A country profile. ISAAA Series of Biotech Crop Profiles. ISAAA: Ithaca, NY.*
4. Evenson, Robert E, & Gollin, Douglas. (2003). *Assessing the impact of the Green Revolution, 1960 to 2000. Science, 300(5620), 758-762.*
5. Gómez-Limón, José A., & Sanchez-Fernandez, Gabriela. (2010). *Empirical evaluation of agricultural sustainability using composite indicators. Ecological Economics, 69(5), 1062-1075. doi: 10.1016/j.ecolecon.2009.11.027*
6. Hall, Andy, Dijkman, Jeroen, & Sulaiman, Rasheed. (2010). *Research into Use: investigating the relationship between agricultural research and innovation: United nations university (UNU). Maastricht economic and social research and training centre on innovation and technology (MERIT)*
7. Kathage, Jonas, & Qaim, Martin. (2012). *Economic impacts and impact dynamics of Bt (Bacillus thuringiensis) cotton in India. Proceedings of the National Academy of Sciences, 109(29), 11652-11656.*
8. Loganathan, R., Balasubramanian, R., Mani, K., & Gurunathan, S. (2009). *Productivity and Profitability Impact of Genetically Modified Crops – An Economic Analysis of Bt Cotton Cultivation in Tamil Nadu. Agricultural Economics Research Review, 22, 331-340.*

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

9. M.A. Mastepanenko, S.Z. Gabrielyan, I.N. Vorotnikov, S.V. Mashkov, E.V. Kulaev, *Research J. of Pharmaceutical, Biological and Chemical Sciences* 6, 1846-1851 (2018)
10. Narayanamoorthy, A., &Kalamkar, S. S. (2006). *Is Bt cotton cultivation economically viable for Indian farmers? An empirical analysis. Economic and Political Weekly*, 2716- 2724.
11. O. Mamai, R. Nekrasov, V. Parsova, *Proc. of the 19 th Int. Scientific Conf. "Economic Science for Rural Development 2018"* 47, 189-195 (Jelgava, LLU ESAF, 2018)
12. P.A. Chekmarev, S.V. Obushhenko, V.B. Trocz, N.M. Trocz, *The achievements of science and technology APK* 8, 28-31 (2018) (In Russ.)
13. Sadashivappa, Prakash, &Qaim, Martin. (2009). *Bt cotton in India: development of benefits and the role of government seed price interventions. Agbioforum*, 12(2), 172-183.
14. Upadhyay, R. K. (2014, July-Sept). *Socio-Cultural Impact of Globalization in India. The Discussant Journal of Centre for Reforms, Development and Justice*, 65-72.
15. V.A. Milyutkin, V.E. Buksman, *Machinery and equipment for the village* 7, 10-12 (2018) (In Russ.)

COMPLEX CARBOHYDRATES AND GESTATIONAL DIABETES CONTROL WITHOUT INSULIN

MONIKA RAJUBHAI MER

Nursing REGIS-

TERED DIETICIAN PHD

STUDENT SAURASHTRA UNIVERSITY

ms.monikamer2012@gmail.com

ABSTRACT

Gestational diabetes (GDM) is hyperglycemia that is recognized for the first time during pregnancy. GDM is associated with a wide range of short- and long-term adverse health consequences for both mother and offspring. Historically, insulin has been the therapeutic agent of choice for controlling hyperglycemia in pregnant women. However, difficulty in medication administration with multiple daily injections, the potential for hypoglycemia, and increase in appetite and weight make this therapeutic option cumbersome for many pregnant patients. We want to present an overview of the lifestyle adjustments that can be advised in the management of GDM in this research. The diet for women with GDM should include enough macronutrients and micronutrients to promote the foetus' development while also limiting postprandial glucose excursions and encouraging normal maternal gestational weight gain. Carbohydrate consumption determines blood glucose excursions and hyperglycemic episodes. Nutritional counseling should thus concentrate on the kind, quantity, and distribution of carbohydrates in the diet. So, in this article, we tried to study the treatment of gestational diabetes without the use of insulin. Continued research is needed to understand and develop tools to facilitate patient adherence to treatment goals, individualize interventions and improve outcomes.

Keywords: Diabetes, Insulin, Carbohydrates, Diet, Nutrients

I. INTRODUCTION

Gestational Diabetes is a type of diabetes that only pregnant women are susceptible to developing. Gestational, in reality, refers to the time of pregnancy. Gestational diabetes occurs when a pregnant woman develops diabetes or hyperglycemia for the first time. Gestational diabetes mellitus (abbreviated GDM) is the medical term for this condition. Gestational diabetes can only be explained with a basic understanding of diabetes. The complications of gestational diabetes might be catastrophic if they are not managed. If you have gestational diabetes, the best method to ensure a safe

pregnancy is to adhere to your doctor's treatment plan.

If gestational diabetes is not addressed, it might cause major health complications. If you have gestational diabetes, the best method to ensure a safe pregnancy is to adhere to your doctor's treatment plan.

Recall that gestational diabetes is unique to pregnant women. There are many physical changes that occur during pregnancy. Pregnancy, in this situation, had an effect on your metabolism. During pregnancy, your insulin is unable to complete its job. Your cells

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

can't use the sugar in your blood because your body can't move it out of your blood and into them.

II. EPIDEMIOLOGY AND PATHOPHYSIOLOGY OF GESTATIONAL DIABETES

Epidemiology

In different locations of India, the prevalence of gestational diabetes has been observed to range from 3.8 percent to 17.9 percent. Because of the huge range of living situations, socioeconomic levels, and dietary habits in India, it is impossible to forecast any standard prevalence levels of GDM. The American Diabetes Association (ADA), the International Association of Diabetes and Pregnancy Study Group (IADPSG), and the Diabetes in Pregnancy Study Group of India (DIPSI) have all suggested that GDM screening be made mandatory. In India, where diabetes is highly common, the chances of discovering preexisting diabetes with screening are fairly high. Despite the high incidence of GDM in Indian women, pregnant women are not routinely screened for the disease as part of the standard prenatal care.

Pathophysiology

In pregnancy, insulin resistance begins to build as early as the second trimester and continues to rise into the third trimester. Insulin sensitivity decreases by about 50 percent in late pregnancy. Placental hormones, which have been shown to reduce insulin sensitivity, are also a major factor to insulin resistance. Post-delivery changes in insulin resistance suggest a role for placental hormones in the process. These hormones are produced by the placental lactogen (formerly known as human placental lactogen) and are bound and released by HCS (HCS, formerly known as human placental lactogen). HCS increases insulin production in the foetus and reduces glucose uptake in the mother's peripheral tissues. Insulin resistance

can be caused by an increase in hormone synthesis when the placenta grows in size during pregnancy. Normal pregnancies in non-diabetic women compensate for the loss of glucose tolerance by increasing beta cell size through first and second phase insulin responses. This extra insulin secretory potential is lacking in women, which leads to GDM. GDM-related beta-cell failure can fall into one of three categories: One or more of the following: Autoimmune, monogenic, or occurring on a background of insulin resistance (as is most common).

III. REASON FOR AVOIDANCE OF INSULIN

There are several hormones that inhibit insulin from acting properly in the placenta, the system of capillaries that carries nutrition, blood, and water from mother to foetus. It's known as insulin resistance. In order to maintain a normal metabolic rate, the placenta's hormones must be overcome by three times the normal quantity of insulin.

A healthy blood sugar level for most women is maintained by the additional insulin produced by the pancreas. It's very uncommon for 5% of pregnant women to have blood sugar levels that are too high even with the extra insulin they receive. Gestational diabetes or elevated blood sugar occurs throughout the second and third trimesters of pregnancy. In order to detect the effects of insulin resistance on your body, testing for gestational diabetes is typically performed between the 24th and 28th weeks of pregnancy.

IV. EFFECTS OF GESTATIONAL DIABETES

Gestational diabetes can cause a variety of health issues, including the following. If you have gestational diabetes, it does not mean that you will experience any of these issues at all.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- Babies with macrosomia have larger than average bodies. Large-bodied babies can be damaged during natural delivery and may need to be delivered via caesarean section if it is the only option. In these babies, the most common problem is shoulder dystocia.
- When a baby's blood sugar is too low, it's called hypoglycemia. As soon as possible, you may need to begin nursing to provide the baby's body with the glucose it needs. If you are unable to begin feedings, the baby may need to receive glucose through a thin, plastic tube inserted into his or her arm.
- Babies with jaundice have a yellowish appearance to their skin and white areas of their eyes. The baby's jaundice isn't a big deal if it's taken care of properly.
- a condition in which a baby has difficulty breathing, known as respiratory distress syndrome (RDS). RDS may necessitate the use of oxygen or other breathing aids for the baby.
- This could induce twitching or cramping in the baby's muscles if the baby has low levels of calcium and magnesium in their blood. Taking calcium and magnesium supplements can help alleviate the symptoms of this disease.

V. **RELATION AMONG CARBOHYDRATES, GLYCAEMIC INDEX, AND GLYCAEMIC LOAD**

Although carbohydrates are an important source of energy, they have a higher PPG than other macronutrients. Because an increase in PPG has been linked to a diet high in CHO [55 percent], it is advisable to limit CHO consumption in GDM. However, limiting CHO intake is not required to reduce PPG. PPG excessive increases can be prevented by slowing down the digestion and absorption of CHO. In addition to the total amount of CHOs, the type of CHO has an impact on blood glucose levels.. When it comes to digestibility

and absorption, the length of CHO polymers may play a role.

In order to understand the impact of different foods on glycaemic response, glycaemic index (GI) and glycaemic load (GL) are used. Consuming CHO-containing meals results in an alteration of PPG, which causes the GR. When we talk about "available CHO," we're talking about how much CHO gets digested, absorbed, and used by the body. Glycaemic index (GI) is the proportion of the Glycaemic Response (GR) caused by 50 grammes of food with 50 grammes of glucose (CHO) (generally glucose or white wheat bread). High GI meals, such as rice and potatoes, cause a rapid rise in glycaemia, which then lowers quickly. Because they include CHOs that take longer to break down, fruits and dairy are termed low-glycemic index foods (LGI). These foods are considered high-glycemic index (GI) foods, which means that they contain a lot of carbohydrates that are quickly processed and digested. In contrast, LGI meals are digested and processed more slowly, with a GI 55. As a result, GI is a standardised measure of GR, defined by a measured amount of CHO, and it is compared to a reference diet. In addition, it can serve as a gauge for the quality of CHO. The GL is an indicator of both the quality and quantity of CHO. When the GI is multiplied by the amount of accessible CHO in the food, the GL is determined ($GL = GI \times \text{available CHO/food}$). It is simple to compare the glycaemic load of various foods, meals, and diets using their GL values. For the first time, the term "GI" was used to describe a soldier. GI tables based on the reference approach produced by the International Organization for Standardization (ISO) are still in use. In addition to being used to classify and compare single items, GI is now being used to classify and compare mixed meals and complete diets. It is true that the weighted average of the GI of each food in a meal or diet is calculated, considering the

quantity of CHO in it, in clinical studies and in clinical settings.

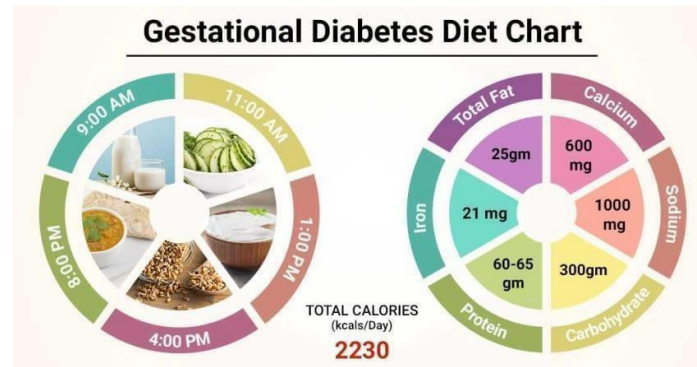


Figure 1: Diet chart for Gestational Diabetes patients

A further way to gauge the nutritional value of food is to look at the amount of nondigestible dietary fibre (DF), a plant-based CHO. Fruits, vegetables, and legumes all contain DF, which is a water-soluble substance. Soluble DF slows digestion, reduces PPG absorption, and lowers cholesterol intake. Wholegrain bread and cereals include insoluble DF, as do nuts and wholegrain bread. Potato and rice are rich in resistant starch. Reducing the metabolic activity of DF and resistant starch is impossible.

VI. ROLE OF DIETARY CARBOHYDRATES IN GDM

Both the mother and the foetus require 175 grammes of dietary carbohydrates (CHO) per day, including 28 grammes of dietary fibre. It is generally known that dietary CHO have the biggest impact on blood glucose levels, which is why women with GDM should pay extra attention to the amount and type of CHO they consume. A wide range of dietary carbohydrates (CHO) have varying impacts on blood glucose levels and other physiological reactions. Dietary sugars such as sucrose and glucose are quickly digested and absorbed in the small intestine, resulting in a spike in blood glucose levels that can be dangerous. In some cases, the structure of dietary CHO makes them difficult or impossible to digest, and this results in a smaller or delayed rise in blood glucose levels (e.g., low glycemic index, LGI). In the

small and large intestines, nondigestible CHO components (fibre) can give physiological benefits such as stimulation of incretin synthesis, energy source for colonic bacteria, and regular bowel motions.

Increased glucose transport to the foetus is associated with greater postprandial glucose responses, according to early studies. Hyperglycemia is also substantially associated with newborn size and/or obesity. Studies have also shown that the overall amount of CHO or the type of CHO ingested might have a significant impact on the maternal glucose responses. When sucrose and maltodextrin are replaced with more slowly digestible CHO in animal models of gestational diabetes, the detrimental effects of high-GI sucrose and maltodextrin on the pathophysiology of GDM can be reversed (i.e., isomaltulose and resistant maltodextrins). This means that in order to optimise maternal fasting and postprandial glucose levels during gestational diabetes mellitus (GDM), current dietary recommendations propose either restricting CHO intake or substituting HGI CHO with slower-digesting alternatives.

Nutritional strategies for avoiding gestational diabetes mellitus (GDM) have been studied. It is common for pregnant women to combine increased physical activity with calorie restriction by reducing or modifying the kind of

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

CHO consumed in order to reduce or halt weight gain. There is a wide range of research and conclusions that have been drawn from it. Pregnant women who were overweight or obese were randomly assigned to either routine care or an intensive lifestyle intervention that included guidance to minimize intake of refined CHO in the LIMIT trial before 20 weeks of gestation, with over 2000 participants. LGA, RDS, and length of hospital stay were all lower in babies whose mothers participated in the intensive lifestyle intervention. A study of 139 women at high risk of GDM found that those who followed a low-GI diet required less insulin to maintain normal blood sugar levels ($p = 0.007$).

VII. REQUIREMENTS AND DISTRIBUTION OF NUTRIENTS DURING PREGNANCY

Although there is no universal consensus on the exact calorie requirements during the three trimesters, a separate estimate of daily energy requirements during pregnancy is based on trimesters. Women with GDM, like those with NGTP, may have a wide range of total energy requirements, hence each patient should be weighed often during pregnancy.

Table 1: Additional daily calorie requirements during pregnancy

| Trimester | NNR | IOM |
|---------------------------|-----------|----------|
| 1 st Trimester | 1103 kcal | 0 kcal |
| 2 nd Trimester | 329 kcal | 340 kcal |
| 3 rd Trimester | 537 kcal | 452 kcal |

Table 2: Recommendation of specific micronutrients in pregnancy

| Micronutrient | NNR | IOM |
|--|-----|------|
| Folic acid, $\mu\text{g/day}$ | 500 | 600 |
| 25-Hydroxyvitamin D, $\mu\text{g/day}$ | 10 | 5 |
| Calcium, mg/day | 900 | 1000 |
| Iron, mg/day | 40 | 27 |

Meal Frequency and Carbohydrate Distribution

To avoid excessive food consumption at the same time, a daily meal frequency of three main

meals and two–three short meals or snacks is advised to avoid significant amounts of carbohydrate and, thus, lower the postprandial blood glucose seen in Figure 1.

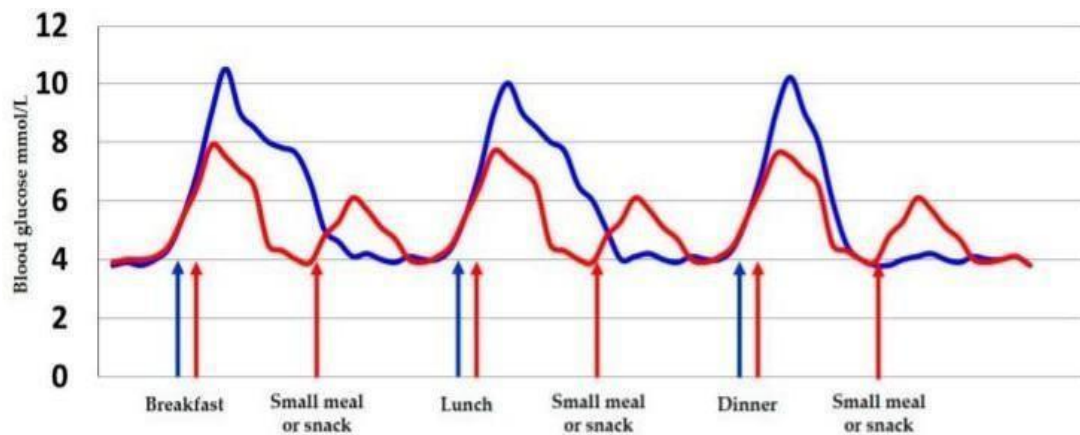


Figure 2: The blood glucose levels according to different strategies for daily food intake. Blue curve illustrates the normal meal pattern and red curve illustrates meal pattern in women with gestational diabetes mellitus (GDM) to avoid excessive blood glucose fluctuations and to preserve the planned number of calories to be ingested. Blue arrows: Three main meals. Red arrows: three main meals and three snacks.

VIII. TREATMENT FOR GESTATIONAL DIABETES WITH HELP OF PROPER DIET

The goal of gestational diabetes treatment is to keep blood glucose levels in pregnant women who don't have the disease at the same level as those who don't. Special food planning and organised physical activity are always part of the therapy, as are daily blood glucose monitoring and insulin shots.

The American Diabetes Association recommends the following objectives for women who acquire gestational diabetes during pregnancy if you're measuring your blood glucose. For each person, more or less severe glycemic targets may be suitable.

- Before a meal (preprandial): 95 mg/dl or less
- One hour after a meal (postprandial): 140 mg/dl or less
- Two hours after a meal (postprandial): 120 mg/dl or less

If you've been diagnosed with gestational diabetes, you'll need assistance from your doctor, nurse educator, and other members of your health care team to adjust your treatment as necessary. For you, the expectant woman, good therapy reduces the danger of a caesarean section birth, which may be necessary in the case of particularly big newborns.

Following your treatment plan will ensure a successful pregnancy and birth, as well as assist your baby avoid future health problems.

Dietary Guidelines for gestational diabetes

It's critical to see a qualified dietician have your diet evaluated. The quantity of carbs you require at meals and snacks will be calculated by the nutritionist. You'll also learn how to keep track of carbs.

The following are some food suggestions to help you maintain a healthy blood sugar level:

Each day, divide your diet into three meals and two or three snacks.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

When you eat too much at once, your blood sugar levels might skyrocket. It is critical that you do not miss meals. You have higher nutritional demands during pregnancy, and your baby requires a well-balanced diet.

Consume enough amounts of starch.

It's crucial not to eat too many starchy meals since they ultimately transform into glucose. Starch, on the other hand, should be provided in every meal. One cup of total carbohydrate each meal, or two slices of bread, is a fair quantity.

One cup of milk at a time should be consumed.

Milk is a nutritious food that is high in calcium. Milk, on the other hand, is a liquid carbohydrate, and drinking too much at once might cause your blood sugar to spike.

Fruit servings should be limited.

Fruit is a nutritious food, yet it contains a lot of natural sugars. One to three servings of fruit per day are permissible, but only one at a time. One very little piece of fruit, half of a big piece of fruit, or around a one-half cup of mixed fruit is a portion of fruit. Fruit that has been bottled in syrup should not be consumed.

Breakfast is crucial.

Because of regular hormone swings, blood sugar regulation might be challenging in the morning.

Refined cereals, fruits, and even milk may be difficult to digest in the morning. You should not consume these meals for breakfast if your post-breakfast blood sugar level rises too significantly after eating them. Breakfasts that include carbs and protein are generally the most well tolerated.

Fruit juice should be avoided.

A glass of juice necessitates the use of numerous fruits. Juice is a rich carbohydrate source. Juice may swiftly elevate blood sugar levels due to its liquid nature.

Limit your intake of sweets and desserts.

Carbohydrates are commonly found in cakes, cookies, sweets, and pastries. These meals frequently contain a lot of fat and provide relatively little nutrients. Also, stay away from any sugar-sweetened drinks including conventional sodas.

Stay away from added sugars

Add no sugar, honey, or syrup to your meals.

IX. CONCLUSION

Obstetricians, gynaecologists, dietitians, paediatricians, cardiovascular specialists, nephrologists, ophthalmologists, and nursing personnel all play a role in the care of gestational diabetes. Obstetricians and endocrinologists are still grappling with how to best treat GDM. So one can treat it with proper nutritional diet according to requirement of their body.

Dietary counselling should be delivered to all women with GDM by a professional dietician, as it is the cornerstone of GDM therapy. The influence of nutrition on blood glucose is critical for reducing difficulties later in life, such as delivery issues, caesarean section, LGA-babies, and type 2 diabetes. The lady should be given instructions on how to build a diversified diet and avoid hyperglycemia. Carbohydrate consumption should be prioritised since the type, quantity, and distribution of carbohydrate are all critical factors in postprandial blood glucose levels.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

REFERENCES: -

- [1] Mustad, & Huynh, & López-Pedrosa, &Campoy, &Rueda,. (2020). The Role of Dietary Carbohydrates in Gestational Diabetes. *Nutrients*. 12. 385. 10.3390/nu12020385.
- [2] Farabi, Sarah & Hernandez, Teri. (2019). Low-Carbohydrate Diets for Gestational Diabetes. *Nutrients*. 11. 1737. 10.3390/nu11081737.
- [3] Filardi, Tiziana&Panimolle, Francesca &Crescioli, Clara &Lenzi, Andrea &Morano, Susanna. (2019). Gestational Diabetes Mellitus: The Impact of Carbohydrate Quality in Diet. *Nutrients*. 11. 1549. 10.3390/nu11071549.
- [4] Blair, Rachel & Rosenberg, Emily & Palermo, Nadine. (2019). The Use of Non- insulin Agents in Gestational Diabetes: Clinical Considerations in Tailoring Therapy. *Current Diabetes Reports*. 19. 10.1007/s11892-019-1243-1.
- [5] Koning, Sarah &Hoogenberg, Klaas&Lutgers, Helen & Berg, Paul &Wolffenbuttel, Bruce. (2016). Gestational Diabetes Mellitus:current knowledge and unmet needs. *Journal of diabetes*. 8. 10.1111/1753-0407.12422.
- [6] Saleh, Hend&Abdelsalam, Walid &Mowafy, Hala&ElHameid, Azza. (2016). Could Metformin Manage Gestational Diabetes Mellitus instead of Insulin?. *International Journal of Reproductive Medicine*. 2016. 1-8. 10.1155/2016/3480629.
- [7] Chelakkadan, Muhas&Naseef, Punnoth. (2016). A REVIEW ARTICLE- GESTATIONAL DIABETES MELLITUS. *International Journal of Current Pharmaceutical Research*. 9. 1. 10.22159/ijcpr.2017v9i1.16615.
- [8] Alfadhli, Eman. (2015). Gestational diabetes mellitus. *Saudi medical journal*. 36. 399-406. 10.15537/smj.2015.4.10307.
- [9] Moreno Castilla, Cristina & Marta, Hernandez &Bergua, Merce & Alvarez, Maria & Arce, Maria & Rodriguez, Karen & Martinez-Alonso, Montserrat & Iglesias, Montserrat &Mateu, Magdalena & Santos, Maria & Pacheco, Linda &Blasco, Yolanda & Martin, Eva &Balsells, Nuria & Aranda, Nuria & Mauricio, Didac. (2013). Low-Carbohydrate Diet for the Treatment of Gestational Diabetes Mellitus. *Diabetes care*. 36. 10.2337/dc12- 2714.

CHARACTERIZING SCATTERING IONIZATION PATHWAYS IN CHEMICAL MOLECULES THROUGH ELECTRON INTERACTION STUDIES

Riya Sharma

Department of Physics

Baba MastNath University, Asthal Bohr, Rohtak

riya1990sharma20@gmail.com

Abstract

Using a new semiclassical method described in recent literature, this work explores the complex dynamics of scattering ionization routes in $Ne^(3P2,0)$ -Ng (Ng = Ar, Kr, Xe) systems. With the primary goal of clarifying the function of electron-molecule interactions, the study offers a thorough examination of experimental data, such as ionization cross sections and Penning ionization electron spectra (PIES), in order to identify underlying processes. Two basic microscopic reaction pathways are identified by the analysis: an indirect mechanism that is primarily controlled by noncovalent forces like dispersion and induction-polarization contributions at larger separations, and a direct mechanism that is driven by efficient charge transfer between reagents at short separation distances. The work provides insights into the development of reaction transition states by highlighting the crucial effects of collision energy, separation distance, and relative alignment of valence orbitals on reaction kinetics. Interestingly, ionization cross section energy dependency in Ne^* -molecule systems displays a variety of tendencies that are indicative of the distinct electronic structures of the molecules involved. Molecular characteristics, such as σ -holes and quadrupole moments, become important factors influencing the kinetics of interactions. With implications for atmospheric chemistry, materials science, and basic chemical kinetics, the discoveries advance our knowledge of chemical processes that are sparked by electron interactions. This work provides a framework for further investigation into scattering ionization routes and theoretical model improvement in the clarification of intricate chemical processes.*

Keywords: Scattering Ionization, Electron Interaction Studies, Chemical Molecules, Ionization Pathways, Semiclassical Treatment.

1. INTRODUCTION

Deciphering the underlying principles of ionization routes in chemical molecules is crucial to the advancement of several scientific areas as well as basic chemical processes. Important applications of ionization processes brought about by electron interactions may be found in atmospheric chemistry, materials science, and chemical kinetics. Electron interaction studies provide important insights into the molecular dynamics of chemical events by characterizing these scattering ionization routes.

Studies of electron interactions provide a potent way to look at the complex interactions that occur between electrons and molecules during collisions. These investigations combine experimental methods with theoretical models to provide contrasting views of the underlying chemistry and physics. With the use of complex experimental setups and cutting-edge theoretical models, scientists may investigate the dynamics of electron-molecule interactions with extreme resolution and accuracy.

Advances in semiclassical treatments in recent times have made it possible for scientists to study scattering ionization route dynamics in more detail. Through the use of advanced theoretical models and computer simulations, researchers can clarify the intricate mechanisms that underpin these phenomena. Branching ratios (BRs), total and partial ionization cross sections, and Penning ionization electron spectra (PIES) may all be thoroughly analyzed using this multidisciplinary method.

Because of their use in a variety of scientific situations, certain chemical systems, such $\text{Ne}^*(3\text{P}2,0)\text{-Ng}$ ($\text{Ng} = \text{Ar}, \text{Kr}, \text{Xe}$), are often the subject of research into scattering ionization routes. Researchers may learn essential things about electron-molecule interactions and how they play a part in starting chemical reactions by examining these systems. Furthermore, the examination of actual results serves as a foundation for creating theoretical frameworks that faithfully capture the phenomena that are seen.

Rationalizing experimental results and occurrences is a primary goal of characterization of scattering ionization routes. Scientists can clarify the variables affecting reaction kinetics, product distributions, and energy dependency by determining and examining the mechanisms driving ionization processes. This information is essential for expanding our understanding of chemical reactivity, creating effective analytical tools, and creating prediction models.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

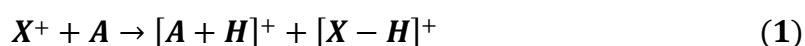
In this work, we use electron interaction studies to characterize scattering ionization processes in chemical compounds. We seek to shed light on the dynamics of electron-molecule interactions, clarify the fundamental principles guiding ionization processes, and advance our knowledge of molecular chemical reactions by applying a novel semiclassical treatment and examining experimental data. By using an interdisciplinary approach, we want to increase our understanding of basic chemical processes and how they affect other fields of science.

Scientific science research discoveries on atom and particle connections are straightforwardly utilized in the delicate ionization technique known as synthetic ionization(CI). Electron bombardment ionization (EI) was the first method of ionization. Dissecting the outcome created utilizing EI is trying because of its many pieces. CI began during the 1950s and has a great deal of commitment in scientific science, however it created generally couple of pieces.

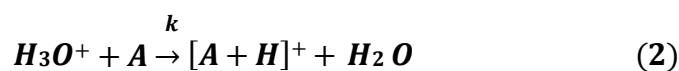
To make reagent particles in the CI cycle, electrons should initially attack the reagent gas. The reagent particles then ionize the example atoms by means of particle and sub-atomic response pathways. Throughout the entire existence of CI, the 1970s were viewed as a defining moment. Around that time, researchers sorted out some way to make CI capability in an air by fixing its imperfections in a vacuum. The variety of uses for corona discharge energy is substantially expanded by atmospheric chemical ionization, which does not need a vacuum environment. Currently, the mass spectrometry approach makes extensive use of CI.

2. THE PRINCIPLE OF CHEMICAL IONIZATION

The objective of CI is to ionize the analyte by responding the reagent particle X^+ with the analyte atom A:



The ionized response gas is the wellspring of X^+ in the process depicted previously. Smelling salts, water, isobutane, and methane are a couple of run of the mill reagent gases. You might get the equation's reaction time and rate consistent (k) by estimations or readings in the writing. For the situation where X^+ is a H_3O^+ reagent particle, equation (2) is:



Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

A particle source creates reagent particles. Particle sources that are frequently utilized incorporate radiation sources, standard shine release power sources, and empty cathode release power sources. The two most incessant radiation sources are ^{210}Po and ^{241}Am . ^{210}Po and ^{241}Am delivery alpha particles, what start the ionization cycle. It might create reagent particles and electrons when it slams into the reagent gas because of its high energy. To make extra reagent particles and electronics, the delivered electrons might slam into the reagent gas in the event that their energy is sufficiently high. An empty cathode release power source is in many cases used in the CI that involves H_3O^+ as a reagent particle and can create 99.5% of H_3O^+ .

2.1. Advantages and Disadvantages of CI

It is possible to determine the precise molecular weight of the analyte by simply resolving the CI spectrum. The analyte's molecules and ions make up the majority of the product produced by CI, which contains very few fragments. By choosing the right reagent ion, one may readily boost the selectivity of CI. For instance, only organic substances with a proton affinity larger than H_3O^+ would react with the reagent ion H_3O^+ . Furthermore, CI responds quickly (15 s) and with great sensitivity. However, mass spectrometry becomes challenging if the reactive ions are impure and many chemical ionization events happen simultaneously.

3. RESEARCH METHODOLOGY

We explored $\text{Ne}^*(3\text{P}_2,0) - \text{Ng}$ ($\text{Ng} = \text{Ar}, \text{Kr}, \text{Xe}$) frameworks utilizing a new semiclassical treatment that has been completely portrayed in late papers. The examination offered an inside steady legitimization of accessible exploratory outcomes, including Writing ionization electron spectra (PIES), aggregate and halfway ionization cross areas, and their stretching proportions (BRs). New understandings of the capability of revision and the rakish force coupling of valence electrons in chemical energy were gotten by the careful portrayal of the molecule ion response elements. These insights must be regarded as being of general importance for many other reactions. Specifically, the method's use indicates that:

- The optical potential model is described as a mix of a real and an imaginary portion. It was initially presented to explain the dynamics of nuclear processes and is also used to CHEMI. We have shown that, as they originate from the same interaction components, the two components—which regulate, respectively, the collision dynamics and the "opacity" or likelihood of CHEMI—must be interdependent.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- Two competing microscopic response mechanisms are generated by the disparate balance of these components. Independently, they have been recognized as a backhanded system that starts from noncovalent powers, for example, scattering, enlistment polarization commitments, turn circle and outward Coriolis impacts, and an immediate instrument that is predominant at large separation distances of reagents driven by chemical powers. In particular, the immediate cycle is started by viable charge move (CT) impacts between reagents, which are improved by valence orbital cross-over. Ionization that likewise occurs because of a planned discharge retention of a "virtual" photon that is traded by reagents inside the feebly bound crash complex is made sense of by the roundabout interaction. Thusly, the roundabout system starts normal radiative (photo-graph)- ionization processes, while the immediate component coordinates the advancement of model rudimentary oxidation responses.
- The relative alignment of valence orbitals, separation distance R , and collision energy (E_{coll}) are crucial variables that impact the stability and structure of the adducts created when reagents collide, which in turn affects the reaction TS.
- Twelve reaction channels have been identified, each of which is impacted by a distinct relative role played by the two fundamental processes previously discussed. These channels are thought to represent certain transitions from a quantum state of reagents to that of products.

4. RESULTS AND DISCUSSION

4.1. General Trends

The notable examination of Beijerinck and partners demonstrates that the sub-atomic frameworks that produce CHEMI, which were all completely concentrated on tentatively in the gas stage under single crash conditions utilizing the sub-atomic shaft method, can be partitioned into two gatherings: those that show an unmistakable pattern toward a decline in cross segments and those that display an undeniable expansion in the all out ionization cross area as E_{coll} increments. An immediate and quantitative correlation of obtained discoveries is straightforward since the energy reliance of the complete ionization cross segment not entirely settled in that frame of mind in an inside predictable way for various frameworks utilizing Ne^* . In Figure 1, a few prototype instances are provided.

Table 1: Collision Energy (meV)

| | NH ₃ | O ₂ | Cl ₂ | Co | N ₂ | CH ₄ | C ₂ H ₂ | C ₂ H ₄ | C ₂ H ₆ |
|-------------|-----------------|----------------|-----------------|----|----------------|-----------------|-------------------------------|-------------------------------|-------------------------------|
| 10 | 70 | 40 | 70 | 12 | 5 | 12 | 25 | 25 | 15 |
| 100 | 50 | 45 | 28 | 15 | 10 | 16 | 15 | 15 | 20 |
| 1000 | 45 | 20 | 18 | 20 | 20 | 19 | 16 | 15 | 25 |

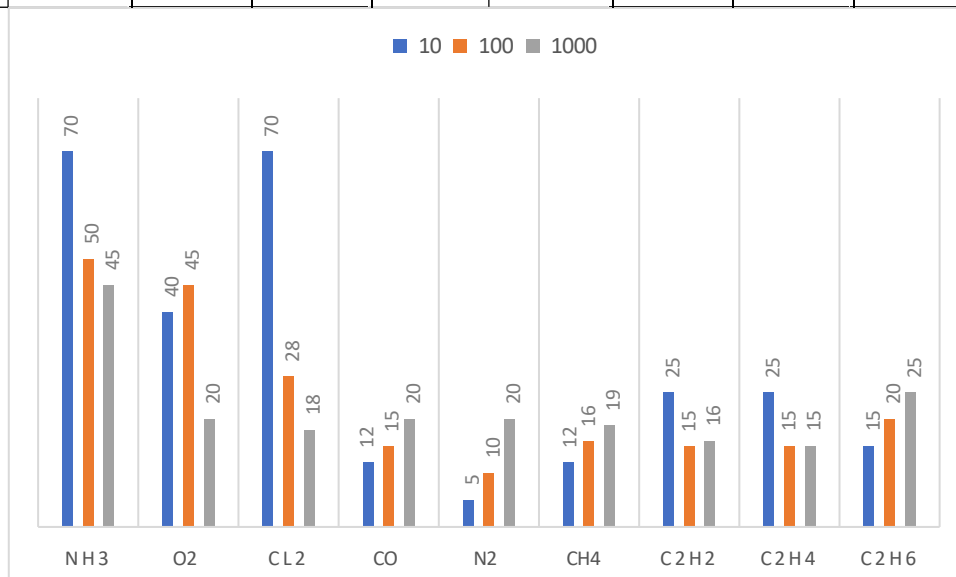


Figure 1: Collision Energy (meV)

Total ionization cross sections in relation to collision energy for some Ne*-molecule complexes. Third-degree polynomials of experimental data are interpolated by the curves in the following cases: (a) some inorganic compounds. (b) Saturated and unsaturated hydrocarbons in their most basic form.

The distinct behaviours shown by the different partners of the Ne* reagent is contingent upon their basic chemical and physical characteristics, as seen in Figure 2 for three instances of inorganic molecules. In the case of Ne*-Cl₂, when an effective ion pair is formed by harpooning, it is guessed that the limiting energy in the crash complex would ascend by something like two significant degrees contrasted with Ne*-N₂, leaning toward a nearer approach of reagents. By and by, here we likewise dissect exhaustively the Ne*-NH₃ framework, for which the intermolecular interaction is significantly anisotropic, shows a

transitional strength between $\text{Ne}^*\text{-Cl}_2$ and $\text{Ne}^*\text{-N}_2$, and has been as of late detailed in logical structure, notwithstanding the exceptional properties of $\text{Ne}^*\text{-Cl}_2$.

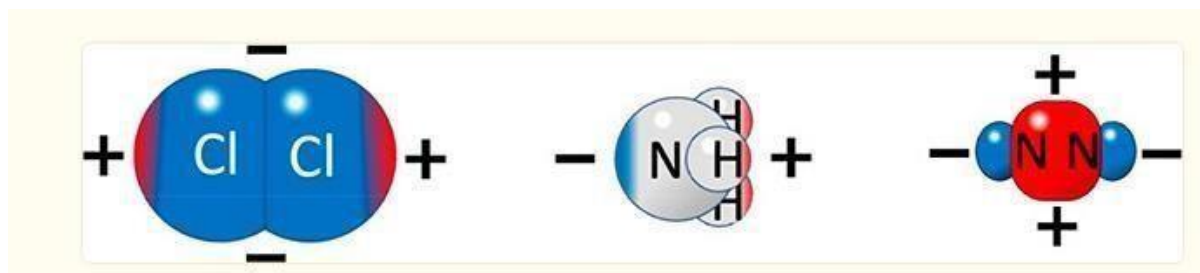


Figure 2: Fundamental features of Cl_2 , NH_3 , and N_2

Cl_2 , NH_3 , and N_2 molecules share basic characteristics related to varying electronic charge distribution along their molecular axis. There are two σ -holes in the chlorine molecule that are aligned with the bond axis. This explains why Cl_2 has a significant and positive quadrupole moment. There is a significant dipole moment in the ammonia molecule. The quadrupole moment of the nitrogen molecule is high and negative. The greater extent of the colour red roughly indicates an increase in positive charge density, whereas the colour blue similarly indicates an increase in negative charge density.

4.2. The $\text{Ne}^*\text{-Cl}_2$ Case

We first endeavor to defend the phenomenology noticed for the $\text{Ne}^*\text{-Cl}_2$ framework displayed in Figure 1a, fully intent on revealing insight into the basic job of the interaction parts that are supposed to specifically tweak the overall load of the two principal minuscule components demonstrated above as an element of impact energy. $\text{Ne}^*\text{-Cl}_2$ specifically is one of the frameworks showing the biggest cross-area esteem in the Ecoll warm reach. This way of behaving for the Cl_2 reagent should be connected with the electrical qualities of its design. Using the MRD-CI method, the interested reader may consult Peyer Imhoff and Buenker's probable bends for the ground and excited states of the chlorine atom, as well as its positive and negative particles. Specifically, this particle exhibits a σ -opening, a strong electron affinity (2.44 eV), and a large long-lasting electric quadrupole moment (+3.8 au). The positive electrostatic potential is restricted to the outer segments of the Cl bond.. A thorough examination of the σ -hole subject, using electron density plots of the ground electronic state of the Cl_2 molecule, is provided in ref (also refer to the references therein).

Even with lighter Ng atoms in their ground electronic state, the creation of the intermolecular halogen bond is in fact caused by these special properties of Cl₂. As a result, the long-range intermolecular interaction field tends to polarize Ne*'s "floppy" outer electronic cloud as it approaches Cl₂. The existence of the σ -hole in the collinear approach is what essentially initiates this electron transfer. The freshly formed Cl₂-anion moves closer to its center along the interatomic Ne...Cl...Cl division R, and the Coulomb attraction in the initial particle pair Ne⁺-Cl₂- suggests the capture of reagents, as seen schematically in Figure 3. Indeed, in Cl₂- the extra electron in the external 3p_u* antibonding orbital, which is part of the Cl bond's outer segment, entirely fills the σ -opening and significantly reduces the subatomic bond strength, rendering Cl₂-an ecologically unsound animal group, particularly when exposed to Ne⁺.

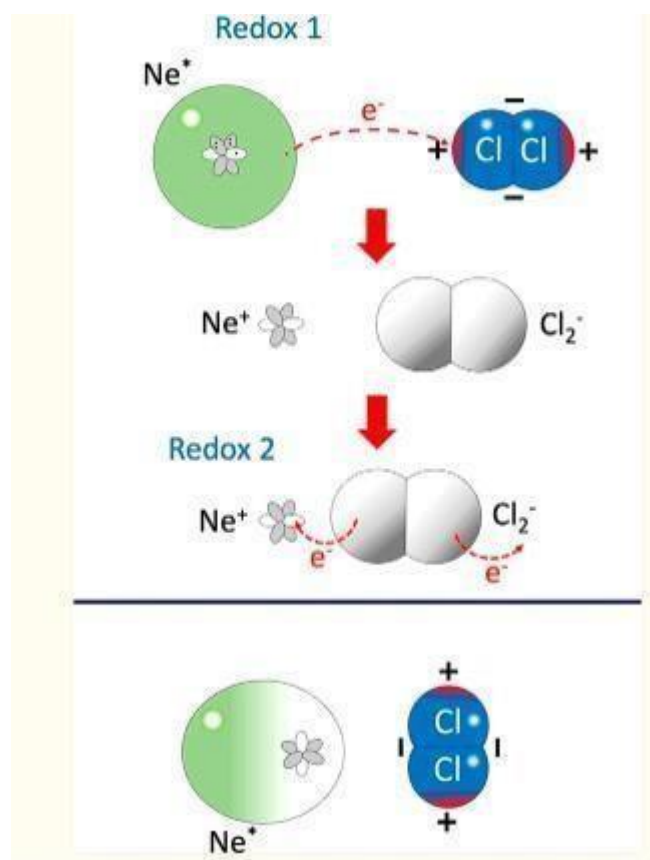


Figure 3: Microscopic Dynamics Schematic Diagram for the Ne*-Cl₂ CHEMI Reaction

A schematic outline of the Ne*-Cl₂ CHEMI response's minuscule elements. Redox 1 in the top board The Rydberg electron of Ne* might fill the σ -opening of Cl₂ a good way off of around 6 Å when collinear Cl₂ is available, prompting the making of Ne⁺-Cl₂-particle matches. The antibonding 3 σ _u* orbital contains the additional electron in Cl₂-. Redox 2 on the centre panel

Two electrons from the 3σ molecular orbitals may be involved in the ionization process at shorter distances. In this instance, the dissociative $B2\Sigma_g^+$ ion subsequently forms the Cl_2^+ ion. (bottom panel) The Ne^* atom is polarized in the event of a perpendicular approach, and the ionization may occur primarily at a short distance via an exchange (chemical-redox) process or at a wide distance via a radiative (physical-photoionization) mechanism. The greater extent of the color red roughly represents the rise in positive charge density, whereas the color blue represents the equivalent shift in negative charge density.

Stronger attraction due to ion pair formation and Cl_2^- instability causes the highly excited $NeCl^*$ adduct to form, which then autoionizes to produce $Ne + Cl^+ + e^-$ products. At a short R , the overlap between the populated 3σ molecular orbitals of Cl_2 and the half-filled orbital of Ne^+ initiates a further electronic rearrangement process, as seen in the center panel of Figure 3. In particular, this overlap generates enough energy to expel one of the two electrons that occupy the $3\sigma_g$ bonding molecular orbital of Cl_2 , together with a single electron transfer from the outer $3\sigma_u^*$ of Cl_2^- to the half-filled orbital of the Ne^+ core. Consequently, there is a tendency for the product Cl_2^+ to develop in the dissociative $B2\Sigma_g^+$ state, where the bond order is 0.5. This unusual property of the chlorine molecule may be attributed to a chemical catalyst because electrons that populate both the $3\sigma_u^*$ and $3\sigma_g$ molecular orbitals are mostly contained in the σ hole region. On the other hand, a synchronization between the usual collision time and the amount of time needed by an interacting complex to produce an electronic rearrangement is necessary for the production of the fragment Cl^+ . As E_{coll} increases, this synchronization is both fully and partly loosened. Consequently, it is anticipated that Cl_2^+ production would rise with E_{coll} , which is in line with the experimental results obtained in our lab and by Kischlat and Morgner.

It is interesting to see that the chemical (direct) process predominates under these circumstances and that it follows these two fundamental steps: First, Cl_2 is reduced to Cl_2^- by CT, which results in a neon that acts as a reducing agent (Na, see Redox 1 in Figure 3). Besides, the Coulomb fascination supports the catching of the $Ne^+-Cl_2^-$ particle pair at nearer goes, where an organized CT including both inward $3\sigma_g$ and outside $3\sigma_u^*$ populated sub-atomic orbitals of Cl_2^- (where the external electron fills the p-orbital of the Ne and the other deepest electron is launched out) decides the oxidation to the last territory of Cl^+ . In the last option occasion, the Ne^+ oxidizes with similar qualities as a halogen iodine (F).

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

The proficiency of this worldwide system, which is started by the Cl_2 with the sub-atomic pivot adjusted along R , does, be that as it may, decrease with expanding impact energy in light of the fact that the crash time abbreviates, the section through the going among nonpartisan and ionic states assumes a less adiabatic personality, and arrangement impacts become more outlandish. In these conditions, the worldwide reactivity drops and impacts become genuinely doable for all overall directions of the two accomplices, including the Cl_2 particle's opposite way to deal with the Ne^* molecule. Here, both backhanded (counting expected radiative impacts) and direct (chemical or trade) systems become cutthroat in the opposite arrangement of the shaped adduct, which is fairly shaky because of the absence of solid alluring parts. Most importantly, an electron expulsion from the external $3\pi u^*$ atomic orbital becomes compelling, bringing about the single-step development of Cl_2^+ in its ground electronic state, $X^2\Pi_g$. Comparable to Cl^+ , the creation probability of Cl_2^+ is expanded by this clever channel.

Table 2: The Dependence of l_{\max} , Defining the Absolute Maximum of the Centrifugal Barrier, for the Two Selected Geometries for Each Collision Energy

| $\theta = 90^\circ; \phi = 220^\circ$ | | $\theta = 15^\circ; \phi = 270^\circ$ |
|---------------------------------------|------------|---------------------------------------|
| $E_{\text{coll}} \text{ (meV)}$ | l_{\max} | l_{\max} |
| 0.1 | 10 | 10 |
| 0.3 | 15 | 15 |
| 1 | 23 | 23 |
| 3 | 34 | 34 |
| 10 | 52 | 37 |
| 30 | 78 | 44 |
| 100 | 114 | 55 |
| 300 | 140 | 110 |
| 1000 | 190 | 115 |

The acquired cross-segment values and their proportions show that just when Ecoll is more noteworthy than the pivotal worth does the commitment from the most elevated b or values become recognizable. Subsequently, the outward hindrance's specific capability begins to decrease, and a particular scope of b or values empowers the response, making those values greater than bmax or lmax successful too since defining moments are distinguished at moderate and genuinely huge R.

5. CONCLUSION

The study on scattering ionization pathways in $\text{Ne}^*(3P2,0)\text{-Ng}$ systems provide insights into chemical reactions initiated by electron-molecule interactions. The review uncovers the relationship of genuine and non-existent pieces of the optical likely model, which control crash elements and the likelihood of chemical ionization. Two cutthroat minute response instruments are recognized: an immediate system driven by compelling charge move and a roundabout component beginning from noncovalent powers. The reactivity of the frameworks relies upon impact energy, detachment distance, and valence orbital arrangement. Twelve response channels have been distinguished, each addressing explicit sections from the quantum condition of reagents to items. The findings have implications for atmospheric chemistry, materials science, and fundamental chemical kinetics.

REFERENCES

1. Aguilar A.; Brunetti B.; González M.; Vecchiocattivi F. A crossed beam study of the ionization of molecules by metastable neon atoms. *Chem. Phys.* 1990, 145, 211–218. 10.1016/0301-0104(90)89116-8.
2. Alagia M.; Balucani N.; Candori P.; Falcinelli S.; Pirani F.; Richter R.; Rosi M.; Stranges S.; Vecchiocattivi F. Production of ions at high energy and its role in extraterrestrial environments. *Rend. Lincei Sci. Fis. Nat.* 2013, 24 (1), 53–65. 10.1007/s12210-012-0215-z.
3. Brunetti B.; Falcinelli S.; Paul S.; Vecchiocattivi F.; Volpi G. G. Collisional Autoionization Dynamics of $\text{Ne}^*\text{-Cl}_2$. *J. Chem. Soc., Faraday Trans.* 1993, 89, 1505–1509. 10.1039/FT9938901505.
4. Brunetti B.; Falcinelli S.; Sassara A.; de Andres J.; Vecchiocattivi F. Auto-Ionization of the Collisional Complexes of Metastable Neon and H_2 , D_2 , or HD . *Chem. Phys.* 1996, 209 (2–3), 205–216. 10.1016/0301-0104(96)00096-1.

5. Conrad H.; Ertl G.; Küppers J.; Sesselman W.; Haberland H. Deexcitation mechanisms in metastable He*-surface collisions. *Surf. Sci.* 1980, 100, L461–L466. 10.1016/0039-6028(80)90372-6.
6. Falcinelli S.; Pirani F.; Vecchiocattivi F. The Possible Role of Penning Ionization Processes in Planetary Atmospheres. *Atmosphere* 2015, 6, 299–317. 10.3390/atmos6030299.
7. Falcinelli S.; Rosi M.; Cavalli S.; Pirani F.; Vecchiocattivi F. Stereoselectivity in Autoionization Reactions of Hydrogenated Molecules by Metastable Noble Gas Atoms: The Role of Electronic Couplings. *Chem. - Eur. J.* 2016, 22, 12518–12526. 10.1002/chem.201601811
8. Harada Y.; Masuda S.; Ozaki H. Electron Spectroscopy Using Metastable Atoms as Probes for Solid Surfaces. *Chem. Rev.* 1997, 97, 1897–1952. 10.1021/cr940315v.
9. Kischlat W.; Morgner H. Investigation of Penning ionization of Cl₂ by He(23S) by means of an electron-ion coincidence technique. *Z. Phys. A: At. Nucl.* 1983, 312, 305–313. 10.1007/BF01414057. [CrossRef] [Google Scholar]
10. Mihajlov A. A.; Ignjatović L. M.; Srećković V. A.; Dimitrijević M. S. Chemi-ionization in Solar Photosphere: Influence on the Hydrogen Atom Excited States Population. *Astrophys. J., Suppl. Ser.* 2011, 193, 1–7. 10.1088/0067-0049/193/1/2.
11. Miller W. H.; Morgner H. A unified treatment of Penning ionization and excitation transfer. *J. Chem. Phys.* 1977, 67, 4923–4930. 10.1063/1.434674
12. Pirani F.; Cappelletti D.; Falcinelli S.; Cesario D.; Nunzi F.; Belpassi L.; Tarantelli F. Selective emergence of the halogen bond in ground and excited states of noble gas-chlorine systems. *Angew. Chem.* 2019, 131, 4239–4243. 10.1002/ange.201812889. [PubMed] [CrossRef] [Google Scholar]
13. Pirani F.; Giulivi A.; Cappelletti D.; Aquilanti V. Coupling by charge transfer: role of the bond stabilization for open-shell systems and ionic molecules and in harpooning and proton attachment processes. *Mol. Phys.* 2000, 98, 1749–1762. 10.1080/00268970009483379. [CrossRef] [Google Scholar]
14. Radzig A. A.; Smirnov B. M.. *Reference Data on Atoms, Molecules and Ions* ;Springer-Verlag: Berlin, Germany, 1985. [Google Scholar]
15. Van Den Berg F. T. M.; Schonenberg J. H. M.; Beijerinck H. C. W. Ionisation of Small Molecules by State-Selected Ne*(³P₀, ³P₂) Metastable Atoms in the 0.06 < E < 6 eV Energy Range. *Chem. Phys.* 1987, 115, 359–379. 10.1016/0301-0104(87)80049-6.

THE ROLE OF EMOTIONAL INTELLIGENCE IN EFFECTIVE TEACHING A COMPREHENSIVE TEACHER TRAINING APPROACH

Dr. Anuradha Sharma

Education

Satyam College of Education Sonipat idanusan-jay7768@gmail.com

Abstract

The bright indicator of a teacher's efficacy in the classroom is their level of emotional intelligence. Investigating the association between instructors' emotional intelligence (EI) and teaching effectiveness (TE) was the main goal of this research. Character development should be the cornerstone of a society when people's goodness is torn apart by violence, selfishness, and uncontrollable emotions in daily life. Our kids need to learn how to read people's emotions, respect their needs, be kind to one another, be compassionate, and practise self-control. These are characteristics that have been shown to provide advantages and are valued in all human communities. Controlling one's emotions allows one to see things from another person's point of view, which promotes tolerance and accepting of diversity. These abilities are essential in a democratic environment that is becoming more diverse. This may result in the development of a peaceful and respectful community where residents coexist. The pre-post, quasi-experimental design research used in this work was carried out to assess the benefits of a 56-hour "Emotional Intelligence" training programme. The concept was created and researched in an effort to meet the rising need on educators to practise and establish "emotionally intelligent" learning environments. In this research, 106 educators from ten Indian primary schools took part. The results showed that from the start to the finish of the course, there was an increase in emotional intelligence and empathic care. Subsequent regression analysis revealed that empathy at the conclusion of the course was predicted by both emotional expression and control. Reflective tasks completed by participants revealed improvements in emotional intelligence, emotional control, self-awareness, and empathy.

Keywords: Effective Teaching, Emotional Intelligence, Teacher Training, Correlations.

1. Introduction

The emotional domain of instructors is vital to the growth of their pupils, since teaching is a challenging profession requiring a wide range of competences and skills. Educators who need to encourage scholastic splendor and advance in their vocations should have emotional intelligence (EI). The capacity to distinguish, fathom, and evaluate feelings impacts emotional intelligence (EI) and impacts conduct. While instructors with low EI have more anxiety at work but are less successful, those with high EI have less anxiety at work but are less effective. In schools, emotional intelligence (EI) is a key component of leadership, creativity, collaboration, and dedication. Since EI and teacher effectiveness are correlated, educators should concentrate on developing classroom routines and exercises that support students in managing their emotions in relation to expectations and objectives. Research at the secondary school level is required to investigate the relationship between TE and EI in the Lahore division.

1.1 Understanding Emotional Intelligence

Emotional intelligence is the capacity to perceive, comprehend, direct, and manage emotions. It was first presented in 1964, and Daniel Goleman's book Emotional Intelligence helped to popularise it. The abilities and characteristics of EI influence leadership performance. While some research believe EI may be learned, others believe it is natural. The Emotional Quotient (EQ) and trait model are examples of EI models.

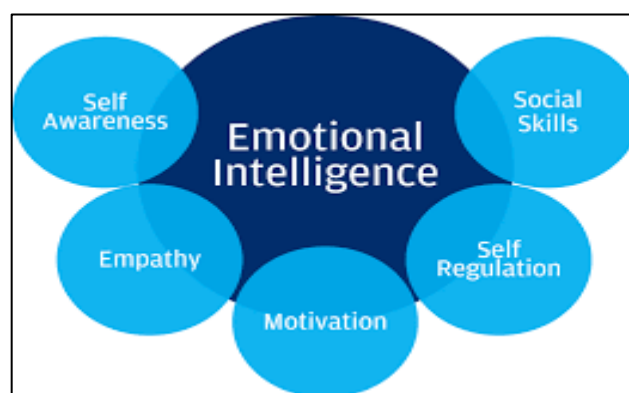


Figure 1: Emotional Intelligence

Recent studies have examined the neuroscience of emotional intelligence and emotion recognition. Studies show a correlation between high EI and successful occupational performance, even if it is not causal. EI and empathy are often associated since it involves

sharing personal experiences. Among executives looking to become better, EI development techniques are becoming more and more common. The legitimacy of EI in contrast with level of intelligence and the Large Five-character qualities is addressed by some. Numerous EI measures remain relevant even when IQ and personality are taken into account, according to meta-analyses.

1.2. The Significance of Emotional Intelligence in Teaching

Children's character development depends heavily on their emotional intelligence. It entails controlling connections, holding onto emotional impulses, and interpreting the feelings of others. Teachers mould students' characters by teaching them empathy and self-control. To achieve this, educators must get training in emotional intelligence. Models of emotional intelligence are present both within and outside of schools. People who succeed intellectually tend to be more emotionally capable, according to research.

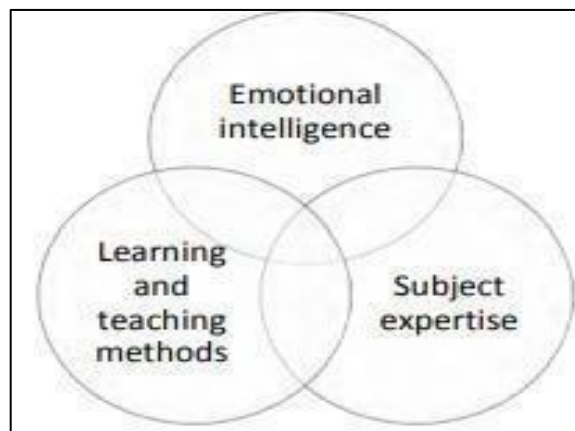


Figure 2: Rol of EM in teacher's performance

This study assesses the ability to figure out individuals on a more profound degree of teacher educators in the Barak Valley in Assam. All people from the get-together, paying little brain to geography or direction, showed typical ability to see the value in anybody on a more profound level. Students could cultivate their ability to see the value in individuals on a significant level, and different purposes for living have different accomplishment necessities. To succeed, instructors need to major areas of strength for have knowledge. With the utilization of interactive abilities, mindfulness, self-administration, and social mindfulness, the review measures the capacity to appreciate anyone on a profound level of instructor teachers. It

likewise takes a gander at how geographic area — provincial versus metropolitan — and orientation influence the capacity to understand people on a deeper level.

2. Literature Review

Brackett and Katulak (2006) stress the value of emotional intelligence (EI) in the classroom and suggest that instructors and students get skill-based training. They contend that raising educators' emotional intelligence (EI) may result in better classroom management, stronger bonds between students and teachers, and higher academic achievement. The authors stress the need of include emotional intelligence (EI) training in teacher education programmes so that teachers have the skills they need to successfully negotiate the challenging emotional terrain of the classroom.

Chan (2006) According to the research, there is a negative relationship between EI and burnout, indicating that instructors who score higher on EI also tend to be less burned out. The results emphasise how important it is to attend to educators' mental health in order to prevent burnout and foster work satisfaction in the teaching environment.

Chang (2009) examines teacher burnout from an assessment viewpoint, emphasising the emotional labour associated with teaching. The research investigates the relationship between teachers' experiences of burnout and their views and assessments of their workplace. The research offers insights into methods for avoiding and managing teacher burnout by recognising the emotional labour that comes with teaching, eventually enhancing teachers' well-being and work satisfaction.

Chechi (2012) investigates the connection between instructional efficacy and emotional intelligence (EI). The research looks at how instructors' emotional intelligence (EI) skills affect their methods of education, ways to manage the classroom, and how students connect with each other. The results imply that instructors with greater EI are better able to manage the emotional demands of the profession, which leads to better instruction and more student involvement.

Clarke (2010) The research evaluates how EI training affects team dynamics, project results, and project managers' leadership abilities. The results emphasise the value of EI abilities in the context of project management by indicating that EI training enhances project performance and effective leadership.

3. Materials and Method

3.1. Sample and procedure

This blended model, pre-post semi trial research is supported by a diary concentrate on that is intelligent. A 56-hour course on emotional intelligence was attended by 200 teachers from 10 primary schools in central India.

Throughout the 14-week programme, the instructors were expected to maintain a reflective notebook. Instructors presented an intelligent last task three months after the course finished. The research was voluntary and anonymous to participants. Of the participants, 25% were men and 75% were women. A little over 60% have a BEd, 25% have a BA, and 15% have an MA. 20% are single, 50% are divorced, and around 65% are married.

Table 1: Education Level of The Teachers

| EDUCATION LEVEL | PERCENTAGE |
|-----------------|------------|
| BEd | 60% |
| BA | 25% |
| MA | 15% |

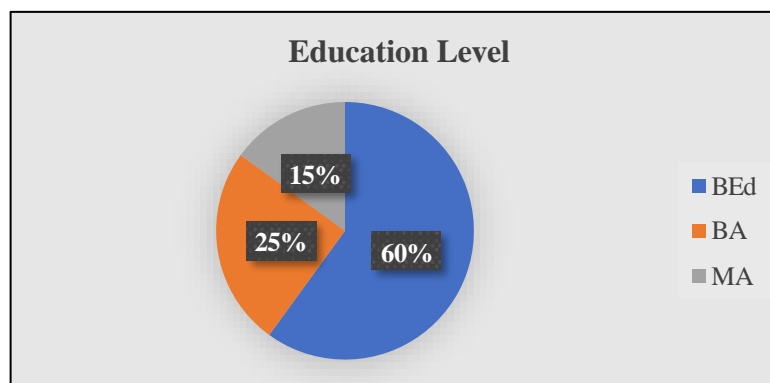


Figure3: Graphical presentation of TheEducation Level of The Teachers

Table 2: Marital Status of The Teachers

| MARITAL STATUS | PERCENTAGE |
|----------------|------------|
| Married | 65% |
| Divorced | 15% |
| Single | 20% |

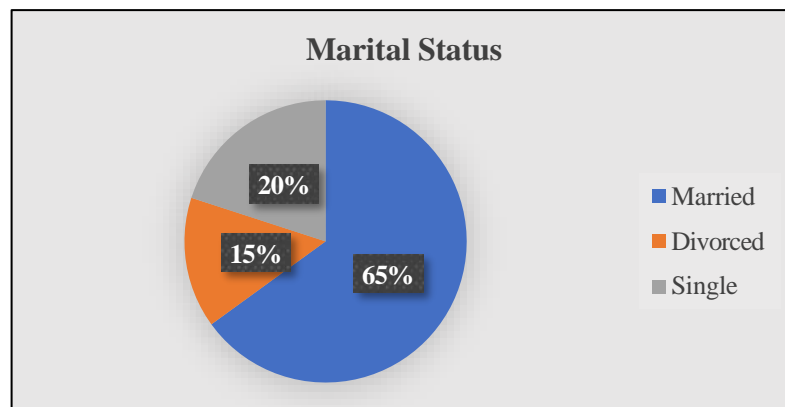


Figure 4:Graphical presentation of The Marital Status of The Teachers

3.2. Instruments

3.2.1. Emotional intelligence scale

Considering the Salovey and Mayer perspective, Schutte et al. made the 33-thing Schutte Self-Report The ability to figure out people on a more profound level Test, a self-uncovering assessment of the capacity to grasp individuals on a more profound level. Likert scales, with values going from 1 (not all around portrayed) to 5 (very much depicted), are utilized to grade the test things. This trait test of emotional intelligence (EI) has subscales for evaluating and expressing emotions, controlling emotions, and using emotions that have acceptable internal dependability.

3.2.2. The Interpersonal Reactivity Index

One strategy for estimating compassion is the Interpersonal Reactivity Index (IRI). It has 28 things and a 5-point Likert scale for scoring. Four subscales comprise the IRI: perspective taking, imagination, empathic worry, and personal suffering. Test-retest and internal reliability of the subscales are both good, with internal reliability ranging from .71 to .77. The IRI

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

subscales' internal reliability in one research varied from .72 to .79. The IRI is effective for evaluating empathy since its test-retest and internal reliabilities have been shown to be good.

3.3.3. Reflective questionnaire

The study used the approach proposed by Shoffner, Shapiro, and Darby to examine instructors' learning via reflective writing. Before answering, participants were asked to write down their expectations, describe a challenging student, express their feelings, and exercise moderation. They also spoke about how they help kids learn and control their emotions. At the midterm, educators were approached to survey the course satisfied and its effect. Following the instruction, students were expected to consider how they had learned on their own, describe the student they had first portrayed, and explain how they would control their emotions and actions. Three months after the course, participants gave a reflective final project in which they described how the training affected their teaching and student interactions. The goal of the study was to comprehend how instructors learn.

4. Results And discussion

A matched models t-test was used to quantify the students' ability to grasp individuals on a more profound level from the very start of the course to the fulfilment. The ability to see the value in anybody on a more profound level mean toward the completion of the course ($M = 143.09$, $SD = 15.43$) was significantly higher than close to the beginning ($M = 130.17$, $SD = 5.51$) ($t = -4.054$; $p < .001$), as demonstrated by the data. Furthermore, from the very outset to the consummation of the course, every one of the three subscales of the ability to grasp individuals on a more profound level (enunciation, rule, and the board) showed a critical climb in the revelations ($p < .06$).

Table 3: Implies, standard deviation, and t-trial of five "IRI" and four "SSREIT" parts by season of reaction (previously/in the wake of preparing, $n = 200$).

| | Before | | After | | | |
|-----------------------|--------|------|-------|------|--------|------|
| Factor | M | SD | M | SD | t | p |
| Fantasy (FS) | 26.28 | 5.51 | 26.59 | 5.37 | -1.177 | .288 |
| Empathic concern (EC) | 31.30 | 3.76 | 31.62 | 3.36 | -1.879 | .446 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | | | | | |
|-------------------------|--------|-------|--------|-------|--------|------|
| Perspective taking (PT) | 27.50 | 4.44 | 28.30 | 3.60 | -3.322 | .013 |
| Personal distress (PD) | 20.97 | 4.86 | 20.38 | 4.94 | 2.566 | .116 |
| Empathy index | 112.94 | 11.82 | 113.66 | 9.82 | -1.364 | .323 |
| Expression of emotion | 52.16 | 6.88 | 53.38 | 6.88 | -3.551 | .112 |
| Regulation of emotion | 40.52 | 5.95 | 40.87 | 5.88 | -2.284 | .142 |
| Management of emotion | 39.78 | 5.18 | 40.96 | 5.19 | -4.220 | .111 |
| Emotional Intelligence | 130.17 | 5.51 | 143.09 | 15.43 | -4.165 | .111 |

Two empathy subscales changed considerably from course start to finish, but the overall empathy index did not ($p > .06$). The training led to increased perspective-taking ($M = 27.50$, $SD = 4.44$) and decreased personal discomfort ($M = 20.97$, $SD = 4.86$) ($t = -3.211$, $p < .01$; $M = 20.38$, $SD = 4.94$). Toward the finish of the course, a different relapse investigation anticipated sympathy by the three capacities to understand individuals on a deeper level part to more readily figure out the relationship. Various relapse was utilized to see whether the three abilities to appreciate people on a deeper level part foresee sympathy.

The relapse investigation showed $R^2 = .27$, $F(2296) = 22.54$, $p < .001$. The capacity to understand anyone at their core was fundamentally anticipated by articulation ($\beta = .59$, $p < .001$) and guideline ($\beta = -.21$, $p < .06$), however not by feeling the executives. End-course information uncovered feeling articulation and guideline anticipated compassion. Pearson connection was utilized to analyze the connection among "IRI" and "SSREIT" polls when the course. The two tables demonstrate comparative connection qualities and bearings. The main distinctions between the two arrangements of estimations are (1) the relationship between's demeanor of feelings and individual trouble (sympathy scale) turned out to be adversely huge after the course (.167) and (2) the connection between's guideline of feeling and the general compassion list became non-critical (.248) All associations in the two tables are great aside from individual distress.

4.1. Reflective questionnaires

Intelligent substance gathered toward the beginning, midterm, and end of the course was broke down and eventually summed up into principal subjects to additional comprehension

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

specialists might interpret the formative cycles that instructors experienced from the very start to the furthest limit of the course and 90 days after the fruition of the course. The schedule that was assembled presents those thoughts, and afterward a few cases:

Table 4:Utilizing different relapse investigation, the three parts of the ability to appreciate people on a deeper level survey (SSEIT) might be utilized to foresee compassion.

| Factor | B | SE B | β |
|-----------------------|-------|----------|---------|
| Expression of emotion | 0.96 | 0.22 | 0.60*** |
| Regulation of emotion | -0.55 | 0.31 | -0.32* |
| Management of emotion | 0.06 | 0.29 | 0.14 |
| R ² | | 0.27 | |
| F ₍₂₂₉₆₎ | | 22.54*** | |

Table 5:Prior to the course, Pearson correlations between the components on the "IRI" and "SSREIT" questionnaires (n = 200)

| Factor | Expression of Emotion | Regulation of Emotion | Management of Emotion | Emotional Intelligence |
|-------------------------|-----------------------|-----------------------|-----------------------|------------------------|
| Fantasy (FS) | 0.489*** | 0.228 | 0.314** | 0.383*** |
| Empathic concern (EC) | 0.568*** | 0.523*** | 0.493*** | 0.588*** |
| Perspective taking (PT) | 0.588*** | 0.489*** | 0.447*** | 0.588*** |
| Personal distress (PD) | -0.139 | -0.368*** | -0.379*** | -0.288** |
| Empathy index | 0.638*** | 0.345** | 0.356** | 0.528*** |

Table 6:Pearson connections between's the "IRI" and "SSREIT" poll parts after the course (n = 200).

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

| Factor | Expression of emotion | Regulation of emotion | Management of emotion | Emotional intelligence |
|-------------------------|-----------------------|-----------------------|-----------------------|------------------------|
| Fantasy (FS) | 0.512*** | 0.241 | 0.329** | 0.422*** |
| Empathic concern (EC) | 0.567*** | 0.463*** | 0.452*** | 0.566*** |
| Perspective taking (PT) | 0.586*** | 0.455*** | 0.444*** | 0.579*** |
| Personal distress (PD) | -0.278* | -0.491*** | -0.448*** | -0.437*** |
| Empathy index | 0.605*** | 0.248 | 0.289** | 0.457*** |

4.2. Beginning of the course

Most participants sought educational materials to understand and manage problematic students. Some instructors wanted to learn how to manage challenging circumstances, while others wanted to know how their emotions effect kids. "I realise working with people requires lifelong self-improvement". Some participants don't believe this course will help or educate them. During training, introspection and personal effort raised concerns. I caved in to my worries and didn't sign up for this course at the start of the year, thinking it would help me confront my fears and failing. Teachers were fatigued, annoyed, lonely, indignant, and unprepared to teach kids with LD, ADHD, and other behavioural disorders. Although I want to confront the difficulties, I don't feel ready. "How can teachers teach 40 kids alone? Many youngsters need my help." "Dissatisfied teachers make it hard to help frustrated students. "

4.3. During the course

Instructors expressed the course substance and procedure raised mindfulness. "During the course I thought of myself as crying, fretful, and overpowered with feeling." "I battled with internal world ideas as classes went on". Analysts showed instructors were more mindful. They communicated more and had less internal life tension. "The course set off a surge of feelings, recollections, and qualms in me and made me think like both a teacher and an understudy". Members additionally said the program encourages consideration, which frequently prompts

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

close to home eruptions and troublesome inquiries. As the course proceeded and members were presented to different wellsprings of data, their own and proficient cognizance, comprehension of the educators' interaction, and concerns started to blur. "Relating to the subject from two different and polar points of view (student and educator) helped me understand the importance of revealing and working through the educator's own discovery, development, and awareness before educating others". Participants also learn how emotional talents, teaching ability, and student emotions relate: "I am learning to accept criticism without being hurt, to try and analyse experience in a reflective and practical way". The training connected personal awareness with professional consolidation as an instructor for me. I believe the material helps me understand and manage educational challenges that used to bother me. Believe in and experience the power of these tools and information gives me confidence and capacity".

4.4. The end of the course

In the wake of preparing and composing their last reflections, teachers comprehended the huge cycle they had attempted and perceived their own sentiments. They understood the course's methods and recognised their strengths. Different courses use different resources. This course started well, but it must be sustained to turn knowledge into power, according to most participants. "The course helped me breathe deeply and relax in difficult situations". "Even if I don't have an immediate solution, I know that stopping, thinking, seeking advice, working through the emotions, and making a plan is best". "I think I've learned to forgive myself and give constructive criticism after mistakes". I figured out how to clarify some things and search inside all through preparing. I asked why I was angry. I figured out how to inhale profoundly and control feelings". Repeatingly going through my sentiments as a restorative system and the capacity to think simultaneously and know about my limits are capacities I educated in the studio and wish to create.

4.5. In the last intelligent survey

90 days after the preparation, 75% of educators consider and utilize "the capacity to appreciate people on a deeper level device" in their instructing. They grasp their feelings, yet control and help are troublesome, and they need to learn. "I frequently respond rapidly, unfit to pause and think - however basically I know and trust it will improve". End of day, I can't help thinking about how I feel? How was instructing today? I treated understudies how? Associates? I

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

presently grasp my sentiments. "The preparation began well, yet instructors need profound language abilities". 82% of educators knew the troublesome understudy and were hopeful.

5. Conclusion

The research investigates how an emotional intelligence training programme affects the emotional competencies of elementary school teachers. The emphasis is on emotional intelligence and empathy, two concepts that are essential for educators. Following the training, the study revealed a substantial increase in empathy, a reduction in personal stress, and increases in emotional intelligence aspects. Empathy barely little increased despite the training model's use of an experienced interactive teaching approach. Moreover, that is the very thing the assessment found albeit the ability to comprehend individuals on a significant level and compassion were comparative when the readiness, there was a critical connection between the ability to grasp people on a significant level and individual bother. The examination additionally found that at the finish of the course, compassion was anticipated by the articulation and tweak of emotions. The preparation incorporates intelligent reflection, and the outcomes loan confidence to the idea that emotional change might happen even for a brief time. The study adds to the expanding corpus of research on improving teachers' emotional intelligence and incorporating emotions into the teaching and learning processes.

References

1. Brackett, M. A., & Katulak, N. A. (2006). *Emotional intelligence in the classroom: Skill-based training for teachers and students*. In
2. Chan, D. W. (2006). *Emotional intelligence and components of burnout among Chinese secondary school teachers in Hong Kong*. *Teaching and Teacher Education*, 22, 1042–1054.
3. Chang, M. L. (2009). *An appraisal perspective of teacher burnout: Examining the emotional work of teachers*. *Educational Psychology Review*, 21, 193–218.
4. Chechi, K. V. (2012). *Emotional intelligence and teaching*. *International Journal of Research in Economics & Social Sciences*, 2, 297–304.

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

5. Clarke, N. (2010). *The impact of a training programme designed to target the emotional intelligence abilities of project managers. International Journal of Project Management*, 28, 461–468.
6. Cohen, A. D. (2006). *Social, emotional, ethical, and academic education: Creating a climate for learning, participation in democracy, and well-being. Harvard Educational Review*, 76, 201–237.
7. Cooper, B. (2004). *Empathy, interaction and caring: Teachers' roles in a constrained environment. Pastoral Care in Education*, 4, 12–21.
8. Darby, A. (2008). *Teachers' emotions in the reconstruction of professional self-understanding. Teaching and Teacher Education*, 24, 1160–1172.
9. Ergur, D. O. (2009). *How can education professionals become emotionally intelligent? Procedia – Social and Behavioral Sciences*, 1, 1023–1028.
10. Fletcher, I., Leadbetter, P., Curran, A., & O'Sullivan, H. (2009). *A pilot study assessing emotional intelligence training and communication skills with 3rd year medical students. Patient Education and Counseling*, 76, 376–379.
11. Hackett, P. T., & Hortman, J. W. (2008). *The relationship of emotional competencies to transformational leadership: Using a corporate model to assess the dispositions of educational leaders. Journal of Educational Research & Policy Studies*, 8, 92–111.
12. Hen, M., & Walter, O. (2012). *Sherbone Developmental Movement (SDM) teaching model in Higher Education. Support for Learning*, 27, 11–19.
13. J. Ciarrochi & J. D. Mayer (Eds.), *Improving emotional intelligence: A practitioners guide* (pp. 1–27). New York, NY: Psychology Press/Taylor & Francis.
14. Jennings, P. A., & Greenberg, M. T. (2009). *The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes. Review of Educational Research*, 79, 1491–1525.
15. Lopes, P. N., Salovey, P., Côté, S., & Beers, M. (2005). *Emotion regulation abilities and the quality of social interaction. Emotion*, 5, 113–118.

IMPACT OF EWOM ON ONLINE PURCHASE DECISION AMONG MILLENNIALS IN UTTARAKHAND REGION

Vaishali Mittal

Research Scholar

Marketing

Dr. Monika Bangari

Gudie

University is Shri Guru Ram Rai University vaishalimittalprakash@gmail.com

Abstract

This study investigates how millennials in the Uttarakhand region make online purchasing decisions and the influence of electronic word-of-mouth (eWOM). The widespread use of virtual entertainment and internet stages has made electronic word-of-mouth (eWOM) a powerful force molding consumer behavior. Through an exhaustive examination of relevant literature and experimental investigation, this study plans to investigate the extent to which eWOM impacts millennials' decision-production processes when they purchase labor and products online in Uttarakhand. A survey of fifteen items that were evaluated utilizing the Likert scale model served as the examination instrument. The examples were selected involving a purposive inspection strategy that targeted buyers in the millennial and Z-age gatherings. data was used to gather the necessary information. 200 responders altogether contributed to this evaluation. The collected information were analyzed utilizing unmistakable regression examination and clear investigation. That's what the results showed, before making an exchange, most of customers (75.51%) send off the Shopee food application, and 91.34% view item data, surveys, and reviews. 81.41% of purchasers report having had a decent experience in previous exchanges. Testing hypothesis suggested, to some extent, that the power border doesn't matter to the decision to purchase. While this is happening, 36.41% of the purchase choice is influenced and contributed to by the substance boundaries and assessment valence.

Keywords: (EWOM) electronic word-of-mouth, online purchase, decision, millennials

1. INTRODUCTION

The emergence of e-commerce and the internet have revolutionized consumer shopping habits, with millennials emerging as a major demographic driving the expansion of online retail.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Because they grew up in the digital age, millennials are quite skilled at using digital platforms for shopping as well as other purposes. Electronic word-of-mouth, or eWOM, has become a significant online consumer behavior influence in recent years. eWOM, which is defined as the dissemination of user opinions, suggestions, and reviews via digital platforms like social media, forums, and review sites, is crucial in influencing how consumers evaluate products and make decisions about what to buy. Understanding the influence of eWOM on millennials' online shopping decisions is especially important in the context of the Uttarakhand region, which has a diverse population and socioeconomic backdrop. Uttarakhand, a state in northern India, is a fascinating case study for examining consumer behavior in the digital age because of its distinctive fusion of traditional and modern elements. With a rising e-commerce market and a population of tech-savvy millennials, Uttarakhand offers an intriguing backdrop for researching how eWOM shapes consumer preferences and behaviors. Even though the amount of study on eWOM and online consumer behavior is increasing, little is known about how it affects millennials in particular places, like Uttarakhand. This study aims to close this knowledge gap and further our understanding of the factors impacting online purchase decisions in the Uttarakhand region by concentrating on this demographic cohort. This research aims to provide useful insights for businesses, marketers, and policymakers looking to engage with this demographic and take advantage of the opportunities provided by the digital marketplace by clarifying the ways in which eWOM influences millennials' online shopping behavior.

1.1 Overview of Electronic Word-of-Mouth (eWOM):

The digital spread of thoughts, suggestions, and details about goods, services, companies, or experiences via online channels including social media, review websites, blogs, forums, and online communities is known as electronic word-of-mouth, or eWOM. eWOM is a crucial factor in influencing consumer behavior and buying decisions in today's digital environment. In contrast to conventional word-of-mouth, which mostly depended on face-to-face interactions, electronic word-of-mouth (eWOM) makes use of the internet's power to instantly reach a larger audience. The spread of social media platforms and people's growing global connectedness have contributed to this problem. Nowadays, consumers actively seek out and participate in eWOM, using other people's experiences and opinions as a guide for their own purchases. Beyond specific recommendations, eWOM has an impact on brand impression,

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

loyalty, and trust. Companies understand how important electronic word-of-mouth (eWOM) is for increasing customer engagement, brand advocacy, and revenue. Thus, for marketers looking to fully utilize the potential of electronic word-of-mouth (eWOM) and include it into their digital marketing strategy, it is imperative that they comprehend its dynamics.

1.2 Millennial Consumer Behavior in Uttarakhand Region

In the Uttarakhand region, millennial consumer behavior exhibits a synthesis of contemporary tastes and traditional values shaped by fast digitization. The state of Uttarakhand, renowned for its breathtaking scenery and rich cultural legacy, is home to a diverse population of millennials who have distinct shopping preferences. Uttarakhand's millennial population is deeply entrenched in tradition, but they're also tech-savvy and connected, frequently making decisions and shopping online. However, depending on variables like urbanization, educational attainment, and socioeconomic level, their adoption of digital media may differ. The distinct topography of Uttarakhand, which combines rural and urban areas, also influences the purchasing habits of millennials by influencing their inclinations for particular goods and services as well as their accessibility to internet shopping. Businesses operating in Uttarakhand must comprehend the subtleties of millennial consumer behavior in order to customize their marketing strategies, effectively engage this group, and take advantage of new opportunities in the digital marketplace.

1.3 objectives

- To Determine the effect of eWOM on the purchasing decisions of millennials in Uttarakhand.
- To Determine the elements that contribute to successful online transactions.
- To Evaluate Shopee's impact on the purchasing behavior of millennials.
- To Analyze the impact of eWOM factors on decision-making.

2. REVIEW OF LITERATURE

Bashar, Singh, and Pathak (2022) use a thorough bibliometric analysis to look at online impulse purchase behavior. Their research, which was published in the International Journal of Electronic Business, provides insightful information about the elements that influence impulsive online buying. Through a comprehensive analysis of extant literature, the writers

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

offer a sophisticated comprehension of this progressively widespread consumer conduct, emphasizing its consequences for electronic commerce tactics.

Introducing at the twelfth Yearly Worldwide Exploration Gathering of Beneficial interaction Organization of The board Studies, Bharej's (2022) bibliometric investigation centers around eWOM and its effect on purchaser conduct during the pandemic and the approaching new ordinary. This study examines how electronic word-of-mouth influences consumer preferences and buying decisions. It was published by Springer Nature Singapore. The importance of eWOM as a potent tool for companies managing the changing market scenario is highlighted by Bharej's study.

The study conducted by Gupta, Agarwal, and Singh (2020) delves into the impact of instafamous celebrities on customer purchasing behavior. The findings provide novel insights into the influence of social media influencers on purchase intentions. Their research, which was published in the Academy of Marketing Studies Journal, explores the topic of influencer marketing and how well it may draw in customers and increase sales. Through their analysis of the effects of instantly famous individuals, the writers add to the expanding corpus of research on consumer behavior and celebrity endorsements.

Joshi et al. (2021) examine the variables that influence the way millennials in India view online shopping in terms of customer perception, readiness for reception, and perceived value of advanced exchanges. Their study, which was published in the Journal of Operations and Strategic Planning, provides insightful information about the distinct traits and inclinations of the millennial generation in the digital marketplace. The authors present a comprehensive overview of the factors driving millennials' adoption of digital transactions by highlighting important variables like ease, security, and trust. This allows them to make practical advice for companies in this market.

Singh, Mamgain, and Kumar (2023) concentrate on Gen-Z customers and their usage of social media for electronic word-of-mouth marketing. Their research, which was published in the International Journal of Internet Marketing and Advertising, examines how sources and content quality function as mediators in influencing the attitudes and actions of Gen-Z consumers. By means of path modeling study employing Partial Least Squares Structural Equation Modeling (PLS-SEM), the writers reveal the complex interrelationships among Gen-Z consumers

between electronic word-of-mouth communication, source legitimacy, and content quality. Their research advances our knowledge of the mechanisms influencing consumer participation on social media platforms and provides useful information for marketers aiming to reach Gen-Z audiences through electronic word-of-mouth.

3. RESEARCH METHOD

3.1 Study Area: A Quantitative Approach

The present investigation employs a quantitative research paradigm, which is particularly congruent with the goals of associative research. The main goal of the study is to investigate how Millennial and Generation Z customers' buying decisions relate to electronic word-of-mouth (e-WOM) variables. The primary method of gathering data is through direct surveys in Uttarakhand region has been designated as an extra study area.

3.2 Data Collection:

Quantitative data from direct subject surveys is used in the study. The research tool is a questionnaire with 15 statements that are split between two variables: the measurement of purchasing decisions and the e-WOM variables (intensity, content, and valence of opinion). On a 5-point Likert scale, where 1 represents strongly disagree and 5 represents strongly agree, respondents indicate how much they agree with each statement. To guarantee the questionnaire's efficacy as a research tool, extensive validity and reliability testing was conducted before it was put into use. Through validation testing, all items were found to be appropriate; the coefficients (r counts) ranged from 0.34 to 0.85, exceeding the r table's threshold of 0.26. The instrument's consistency was confirmed by reliability testing, which yielded a Cronbach's Alpha score of 0.88, over the allowed cutoff of 0.60.

3.3 Sampling Technique and Population:

Millennials and Generation Z residents of the Uttarakhand region, ranging in age from 16 to 40, make up the study population. Because of the unknown size of the population, non-probability sampling methods were used. The Cochran equation was used to calculate the sample size, guaranteeing a representative sample for the investigation.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact February 2024

3.4 Hypothesis

H0:E-WOM had no impact on the online decisions made by millennials and Generation Z regarding the purchase of food and/or beverage products.

H1: E-WOM has a direct impact on millennials' and Generation Z's online decisions to buy food and/or beverage products.

4. DATA ANALYSIS AND RESULT

Table 1 displays the customer evaluation of Shopee food's electronic word-of-mouth.

Table 1:Customer Evaluation of Shopee food's E-Wom

| E-WOM Dimension | Consumer Action | % Approval |
|---------------------------|--|-------------------|
| Intensity | Launching the Shopee food application | 20.11 |
| | Speaking (via chat) with vendors | 20.10 |
| | Getting to other clients' remarks | 19.09 |
| Average | | 60.12% |
| Content | Getting to item varieties | |
| | Taking into account item quality | 30.09 |
| | Taking into account the item cost | 10.02 |
| | Perusing other purchaser tributes | 20.11 |
| Average | | 60.22% |
| Valence of Opinion | Giving positive surveys on the off chance that the items and administrations live up to assumptions | 15.12 |
| | Giving suggestions to different shoppers | 20.26 |
| | Composing negative surveys in the event that the items and administrations are less/not true to form | 24.12 |
| | Not giving suggestions to different shoppers | 20.15 |
| Average | | 79.66% |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

The information given sheds light on customer behavior and the acceptance rates that go along with it in relation to the three aspects of electronic word-of-mouth (E-WOM): valence of opinion, content, and intensity. The Shopee food application and chat sessions with merchants had relatively low approval percentages (20.11% and 20.10%, respectively) in terms of intensity, indicating a modest level of participation. On the other hand, viewing other users' remarks receives a higher acceptance rate (19.09%), indicating a larger inclination towards obtaining input from peers. All things considered, the average acceptance percentage for Intensity is 60.12%, which suggests that customers are somewhat involved in E-WOM activities. Regarding the Content dimension, there is a moderate level of interest in product-related information as seen by the acceptance percentages of 30.09% and 20.11% for accessing product variations and taking product quality into consideration, respectively. Nevertheless, just 10.02% of respondents approve of taking the product price into consideration, indicating that in this situation, consumers may be less influenced by price. However, the average approval rate for content is marginally higher at 60.22%, indicating a moderate level of participation in E-WOM activities connected to content. Lastly, the Valence of Opinion dimension shows that recommending products and services to other customers obtains a somewhat higher approval percentage of 20.26%, while favorable reviews are given if they match expectations and receive a 15.12% approval rating. On the other hand, leaving unfavorable reviews when goods or services don't live up to expectations and not making recommendations result in approval percentages of 24.12% and 20.15%, respectively. The average acceptance rate for valence of opinion is significantly higher at 79.66%, suggesting a generally good attitude toward voicing ideas and offering suggestions, whether positive or negative.

We at first performed old style suspicion tests, which included multicollinearity, linearity, and ordinariness tests, before doing direct relapse examination and speculation testing. Table 2 presents the discoveries.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

Table 2: Results of the Classical Assumption Test

| Classical Assumption Test | Significance | Decision | Criteria | Source |
|---------------------------------|--------------|-----------------------------------|-----------------------|---|
| Normality Test | 0.51 | Normal Distribution | Sig. \geq 0.06 | One-Sample Kolmogorov–Smirnov Test |
| Linearity Test | 0.39 | Linear | Sig. \geq 0.06 | Anova Table |
| Multicollinearity Test | | Multicollinearity Does Not Happen | Tolerance \geq 0.11 | Table of Coefficients (Collinearity Statistics) |
| Tolerance Value (X.1) | 0.61 | Multicollinearity Does Not Happen | Tolerance \geq 0.11 | |
| Tolerance Value (X.2) | 0.60 | Multicollinearity Does Not Happen | Tolerance \geq 0.11 | |
| Tolerance Value (X.3) | 0.59 | Multicollinearity Does Not Happen | Tolerance \geq 0.11 | |
| Variance Inflating Factor (VIF) | X.1 = 2.05 | VIF < 10 | | |
| Variance Inflating Factor (VIF) | X.2 = 2.50 | VIF < 10 | | |
| Variance Inflating Factor (VIF) | X.3 = 2.51 | VIF < 10 | | |

The statistical analysis's classical assumption tests produced a number of important conclusions. First, the normality test, which determines whether the data has a normal distribution or not, produced a significance level of 0.51; this means that the data does follow a normal distribution because the p-value is higher than the 0.06 significance level. In a similar vein, the linearity test, which looks at the linear relationship between variables, produced a significance level of 0.39, indicating that the data is linear since the p-value is higher than the 0.06 cutoff. The multicollinearity test was also performed to see whether multicollinearity existed among the independent variables. Since each independent variable (X.1, X.2, X.3) has a tolerance value greater than 0.11, which ensures that each variable adds distinct information

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

to the model without duplication, the findings showed that multicollinearity does not arise. Moreover, the variance inflating factors (VIF) were determined to be below the threshold of 10 for all independent variables ($X.1 = 2.05$, $X.2 = 2.50$, and $X.3 = 2.51$), indicating that multicollinearity is not a cause for worry in the analysis.

The objective of numerous straight relapse examination in research is to evaluate how much Shopee food buying decisions are impacted by the aspects/factors of power ($x1$), content ($x2$), and valence of assessment ($x3$). Table 3 shows the numerous direct relapse test results.

Table 3:Test Results for Multiple Linear Regression

| Coefficient | Anova | Model Summary |
|-----------------------------|--------|-------------------|
| Constant | 7.151 | Fcount = 15.812 |
| | | Sig. < 0.002 |
| | | R-squared = 0.412 |
| Intensity ($x1$) | -0.002 | |
| | -0.151 | |
| | 0.912 | |
| Content ($x2$) | 0.612 | |
| | 4.251 | |
| | 0.001 | |
| Valence of Opinion ($x3$) | 0.312 | |
| | 3.061 | |
| | 0.058 | |

The association between the independent variables—Intensity, Content, and Valence of Opinion—and the dependent variable is significantly revealed by the regression analysis. The constant term, 7.151, is shown to have an associated Fcount statistic of 15.812, which, at a significance level of less than 0.002, indicates the overall relevance of the model. Furthermore, the dependent variable's variation is estimated to be explained by the independent variables in

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

the model by an R-squared value of 0.412, or about 41.2%. Upon examining the coefficients, Content (x2) exhibits a statistically significant impact on the dependent variable, as seen by its coefficient of 0.612 and p-value of 0.001. In contrast, Valence of Opinion (x3) has a coefficient of 0.312 with a marginal significance level of 0.058, while Intensity (x1) displays a non-significant coefficient of -0.002 with a p-value of 0.9112. These results highlight the significance of Content in predicting the outcome variable, indicating that Intensity and Valence of Opinion have a minimal impact.

5. DISCUSSION

The results of the research indicated that, when it comes to an individual's decision to buy this kind of food product on an online marketplace, e-WOM—which is measured by the dimensions of intensity, substance, and valence of opinion—contributes very little. An individual's decision to make a purchase is unaffected by the degree of intensity or frequency (intensity) of their market access. Decisions regarding what to buy are influenced by the information available in the market as well as the experiences and opinions of other customers. As a result, e-WOM in the marketplace continues to have an impact on consumer choice. For customers to decide what to buy, in particular, comprehensive product information and reviews based on prior user experiences are essential. According to the study's conclusions, a person using several marketplaces occasionally does so purely to pass the time, experiment, browse, and so on rather than always making a purchase decision. In the meantime, informed buyers who plan to make selections about what to buy online first examine the product's specifications in great detail. For instance, cost, product composition, quality presumptions, food additive content, and packaging. Apart from examining product details, shoppers also take into account reviews left by past customers when making judgments about what to buy online. In light of this, even though customers have visited the marketplace, carefully examining product details and other customers' reviews does not always enable them to make a purchase.

Several variables contribute to the limited impact of electronic word-of-mouth (e-WOM) on food item buying decisions in the marketplace. Most of cellphones belonging to the Millennial and Z generations are already networked and have applications installed from different suppliers. Their day to day routines involve accessing the marketplace. The motivated e-lifestyles of Generation Z are linked to elements like e-activities, e-interests, e-conclusions, and e-values, as per a review Correspondence, entertainment, shopping, and local area

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

activities are the fundamental reasons people utilize web-based entertainment and get data. Millennials are more receptive to and dependent on older generations' online information than earlier generations where the second reason is that many only purchase foods online as a last resort because of a variety of circumstances, such being overly lethargic or having a busy schedule that prevents them from leaving the house. All four components of e-WOM— relevance, correctness, timeliness, and completeness—have an impact on potential customers' purchase intentions, and this study supports some of the findings of earlier research, including those Furthermore, demonstrates that the amount, credibility, and quality of e-WOM have a significant and favorable impact on purchase intention. Similar to this, hypothesized that e- WOM has a big impact on restaurant patrons' purchasing choices. This research partially supports earlier findings that customer reviews (content) influence product selection and that opinions' valence influences decisions to buy Conversely, showed that content has no influence on a purchase choice, noted that intensity against buying decision. Therefore, the study's subject and object are where this study and others are similar. When it comes to making purchasing decisions, the "millennial and Z" generations definitely don't comprehend the factors of e- WOM the same way. The product to be purchased also influences how foresighted one is after viewing the components of e-WOM.

Potential customers, particularly millennial, Z, and next-generation consumers, are now taking into account e-word-of-mouth on different marketplaces. Social media and information technology are two areas in which this generation excels. For many people, especially businesspeople, the media is their lifeblood. Numerous researches shown that the majority of prospective buyers take notice to prior remarks made on certain e-commerce or marketplace systems. When making judgments about what to buy, they can readily access their favorable or unfavorable feedback. In the digital age, this condition motivates entrepreneurs to take prospective customers' inclinations into account.

6. CONCLUSION

The most noteworthy finding of the study is that e-WOM is increasingly considered by potential clients when doing online business transactions, especially in the sector that caters to food and beverage suppliers. To summarize, when it comes to making online purchases, millennials in the Uttarakhand region are greatly impacted by Electronic Word-of-Mouth (eWOM). This influence is extensive and multifaceted. Digital natives, millennials mostly use

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

the internet and social media to check things, read reviews, and seek advice before deciding. The pervasive influence of electronic word-of-mouth (eWOM) on review websites, online forums, and social media platforms is critical in shaping the opinions, attitudes, and ultimately the consumer behavior of millennials. Positive eWOM can boost credibility and confidence, clear up confusion, and promote purchase intention, whereas negative eWOM may deter potential buyers and diminish sales. Furthermore, because eWOM is participatory and encourages the development of a vibrant online consumer community, millennials may engage in dialogue, seek advice from peers, and share their own experiences.

REFERENCES

1. Bashar, A., Singh, S., & Pathak, V. K. (2022). A bibliometric review of online impulse buying behaviour. *International Journal of Electronic Business*, 17(2), 162-183.
2. Bharej, K. (2022, September). A Bibliometric Analysis on eWOM and Consumer Behavior. In *Pandemic, New Normal and Implications on Business: 12th Annual International Research Conference of Symbiosis Institute of Management Studies (SIMSARC21)* (pp. 183-200). Singapore: Springer Nature Singapore.
3. Gupta, Y., Agarwal, S., & Singh, P. B. (2020). To study the impact of instafamous celebrities on consumer buying behavior. *Academy of Marketing Studies Journal*, 24(2), 1- 13.
4. Joshi, S., Sharma, M., Bisht, P., & Singh, S. (2021). Explaining the factors influencing consumer perception, adoption readiness, and perceived usefulness toward digital transactions: online retailing experience of millennials in India. *Journal of Operations and Strategic Planning*, 4(2), 202-223.
5. Kumar, M., Mamgain, P., & Singh, K. P. (2023). Gen-Z social electronic word of mouth communication and mediating role of contents quality and sources: PLS-SEM path modeling. *International Journal of Internet Marketing and Advertising*, 19(1-2), 122-145.
6. Lallukka, T. (2021). The impact of user-generated online reviews on pre-travel planning and accommodation selection processes of Finnish millennial consumers (Master's thesis).
7. Lubis, A. H., Amelia, W. R., Ramadhani, S. N., Pane, A. A., & Aryza, S. (2019). Indonesian millennials' behavior intention to online shopping through instagram. *International Journal of Scientific and Technology Research*, 8(11), 2466-2471.

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

8. Mohanty, S. (2021). An Analysis of Factors Affecting Consumer Behaviour: A Case of E-Retailing in Goa (Doctoral dissertation, Goa University).
9. PANDEY, U., ISLAM, M. T., & HOSSAIN, M. I. (2023). Exploring the influence of servicescape, e-WoM, and satisfaction on tourists' revisit intention to yoga tourist destination: Evidence from Patanjali Yogpeeth, India. *Revista Turismo & Desenvolvimento (RT&D)/Journal of Tourism & Development*, (44).
10. Pant, M., Kumar, R., Intezar, M. T., Gupta, O., Chaudhary, S., & Painoli, A. K. Analysing the moderation effect of advertisement and word of mouth on green purchase intention.
11. Rusidah, S. (2023). The role of digital marketing in the Sustainable performance of Indonesian MSMEs: Do the online purchase intention and actual purchase decision matter?. *Transnational Marketing Journal*, 11(1), 17-30.
12. Sharma, N., & Arora, N. (2023). Do Instagram reels influence travelers' behavioral and e-WOM intentions for the selection of ecotourism destination?. *Journal of Hospitality and Tourism Insights*.
13. Singh, S., Singh, G., & Dhir, S. (2022). Impact of digital marketing on the competitiveness of the restaurant industry. *Journal of Foodservice Business Research*, 1-29.
14. Tariyal, A., Bisht, S., Roy, S., & Chopra, G. (2023). Assessing the impact of perceived social media usefulness on Indian millennials' online booking decision. *Journal of Marketing Analytics*, 1-17.
15. Tariyal, A., Singh, S., & Bisht, S. (2020). IMPACT OF E-REVIEWS ON MILLENNIAL'S CAFÉ VISIT DECISION MAKING WITH REFERENCE TO DEHRADUN REGION. *Academy of Marketing Studies Journal*, 24(2), 1-13.

Improving Encrypting Images using Kronecker Method and the Hill Cipher

Abhishek Garg¹, Kishan Pal Singh², Javed Wasim³, Santosh kr. Bharti⁴

¹Department of Computer Engineering & Applications, Mangalayatan University, Aligarh, UP

²Department of Mechanical Engineering, Mangalayatan University, Aligarh, UP

³Department of Computer Engineering & Applications, Mangalayatan University, Aligarh, UP

⁴Department of Computer Science & Engineering, Pt. Deendayal University, Gandhi Nagar, Gujarat

Corresponding Authors Email: ¹abhishek47722@gmail.com, ²kishan.singh@mangalayatan.edu.in

³javed.wasim@mangalayatan.edu.in, ⁴sbharti1984@gmail.com

Abstract: Image encryption plays a crucial role in safeguarding the confidentiality and integrity of digital images during transmission and storage. This paper proposes a novel approach for enhancing image encryption using a combination of the Kronecker method and the Hill Cipher. The Kronecker XOR product is employed to introduce confusion, while the Hill Cipher is utilized for permutation. The synergy of these two techniques aims to provide robust encryption with improved security properties. Experimental results demonstrate the effectiveness and security of the proposed method against various cryptographic attacks, showcasing its potential for practical applications in image encryption. This paper aims to provide a comprehensive investigation into the integration of the Kronecker XOR product and the Hill Cipher for enhancing image encryption. The proposed methodology is evaluated through extensive experiments and security analysis to demonstrate its effectiveness and suitability for practical applications.

Keywords: Image encryption, Hill cipher, Kronecker product, multimedia applications, attacks.

1. Introduction:

In the contemporary digital era, the protection and privacy of data, including images, are of paramount significance. With the proliferation of digital communication channels and the increasing reliance on cloud storage, there exists an urgent requirement for robust encryption techniques to protect sensitive data from unauthorized access and tampering. Among various forms of data, images represent a significant portion due to their widespread use in fields such as healthcare, surveillance, and multimedia applications.

The proliferation of image encryption techniques has been fueled by the need to ensure the privacy and integrity of visual data. Traditional encryption algorithms, while effective for text-based data, may not be suitable for images due to their unique characteristics such as large data size, high redundancy, and susceptibility to various attacks. As a result, specialized visual data encryption methods have been created to tackle these challenges and provide robust protection for visual data. Numerous approaches to encrypting images have been introduced and utilized, among them Chaos-Based Encryption methods [1].

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

The objectives of image encryption techniques are multifaceted. First and foremost, they aim to ensure the confidentiality of images by transforming them into unintelligible ciphertext that can be decrypted by authorized parties possessing the corresponding decryption key. Additionally, image encryption techniques strive to preserve the integrity of images, thwarting unauthorized alterations or tampering. Moreover, efficiency and computational complexity are essential considerations, particularly in real-time applications where encryption and decryption operations must be performed swiftly without significant overhead[1].

In this context, the proposed approach aims to enhance encrypting images through harnessing the collaborations between the Kronecker XOR operation and the Hill Cipher. The Kronecker XOR product introduces confusion by performing bitwise XOR operations between pixels, while the Hill Cipher provides permutation-based encryption by transforming pixel values using a matrix-based approach. By combining these two techniques, we seek to achieve robust encryption with improved security properties, thereby addressing the shortcomings of existing methods and contributing to the advancement of image encryption technology[2].

In the following sections of this document, we will explore into the details of the proposed methodology, including the theoretical foundations of the Kronecker XOR product and the Hill Cipher, their integration for image encryption, experimental evaluation, security analysis, and practical considerations. Through comprehensive investigation and analysis, we aim to demonstrate the efficacy and relevance of our approach within the framework of modern visual data encryption requirements[3].

2. Related Work:

Review of Existing Image Encryption Methods:

The realm of visual data encryption has witnessed significant advancements in recent years, leading to the emergence of diverse encryption methodologies tailored to the unique characteristics of visual data. A review of existing image encryption methods reveals a diverse range of approaches, each with its strengths and weaknesses. Below, we present an overview of several notable visual data encryption methods:

Advanced Encryption Standard (AES): This symmetric encryption algorithm is widely embraced that has been applied to image encryption. It works on blocks of a fixed size data and employs substitution-permutation network (SPN) structures to achieve confusion and diffusion. While AES offers strong security guarantees and efficient implementation on modern hardware, it may suffer from computational overhead when applied to large images due to its block-based nature[4].

Chaos-Based Encryption: Chaos-based encryption methods utilize the deterministic behavior of chaotic systems to generate encryption keys and transform image data. These methods often exhibit high sensitivity to initial conditions and parameter settings, leading to enhanced

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

security. However, they may also suffer from issues such as key space exploration attacks and poor statistical properties of encrypted images.

Pixel Scrambling Techniques: Pixel scrambling techniques involve shuffling the positions of pixels within an image to introduce confusion. Simple permutation-based methods as well as more complex algorithms based on graph theory and optimization techniques have been proposed. While pixel scrambling can effectively thwart certain attacks, it may struggle to provide sufficient security against advanced cryptanalytic techniques[5].

Transform-Based Encryption: Transform-based encryption methods leverage mathematical operations like the Discrete Fourier Transform to convert images into frequency domains before applying encryption operations. These techniques offer advantages in terms of security and robustness against certain attacks, but they may also introduce computational complexity and require careful parameter selection.

Hybrid Encryption Schemes: Hybrid encryption schemes combine multiple cryptographic primitives, like symmetric and asymmetric encryption algorithms, aiming for a harmony between security and efficiency. By leveraging the complementary strengths of different encryption techniques, hybrid schemes can enhance overall security while mitigating individual weaknesses[6].

Analysis of Strengths and Weaknesses:

Each image encryption method has its unique advantages and limitations, which require careful consideration within the context of a particular application requirements and security objectives. Strengths of existing methods include:

Strong Security Guarantees: Many image encryption techniques offer provable security properties, making them suitable for applications requiring high levels of confidentiality and integrity.

Computational Efficiency: Some encryption methods are optimized for efficient implementation on resource-constrained devices, enabling real-time encryption and decryption operations.

Robustness Against Attacks: Certain encryption techniques demonstrate resilience against common cryptographic attacks, including differential and statistical attacks.

However, these methods also exhibit certain weaknesses that warrant attention:

Vulnerability to Cryptanalysis: Despite their security guarantees, image encryption methods may be susceptible to cryptanalytic techniques that exploit weaknesses in their design or implementation.

Limited Scalability: Some encryption techniques may face scalability challenges when applied to large images or multimedia streams, leading to increased computational overhead and storage requirements.

Lack of Standardization: The absence of standardized image encryption algorithms and protocols may hinder interoperability and compatibility across different systems and platforms.

In light of these considerations, there is a need for further research and innovation to address the limitations of existing image encryption methods and develop more robust and scalable solutions tailored to the evolving security landscape. The proposed approach aims to contribute to this endeavour by leveraging the synergies between the Kronecker exclusive OR operation and the Hill Cipher to enhance the security and efficiency of image encryption[7].

3. The Kronecker XOR Product:

The Kronecker XOR product is a mathematical procedure that combines two matrices through element-wise exclusive OR (XOR) operations. It is defined as follows:

Given two matrices A and B of the same size $m \times n$, the Kronecker XOR product (denoted as \otimes) of A and B , denoted as $C = A \otimes B$, is computed by performing element-wise XOR operations between corresponding elements of A and B :

$$C_{ij} = A_{ij} \oplus B_{ij}$$

Where C_{ij} denotes the element located at the i th row and j th column of matrix C , and A_{ij} and B_{ij} denote the corresponding elements of matrices A and B , respectively[8].

Application in Image Encryption:

The Kronecker XOR product has been applied in image encryption primarily to introduce confusion and improve the security of encrypted images. In image encryption, the unencrypted image is usually depicted as a matrix of pixel values and the encryption process involves applying cryptographic operations to transform these pixel values into ciphertext. The Kronecker XOR product can be employed as part of this encryption process to obfuscate the relationship between the plaintext and ciphertext pixels.

One common approach to utilizing the Kronecker XOR product in image encryption is to combine it with other encryption techniques, such as permutation-based methods or chaotic systems. For example, the Kronecker XOR product can be applied in conjunction with a permutation matrix to achieve confusion and diffusion simultaneously. By performing XOR operations between the plaintext image matrix and the permutation matrix, the Kronecker XOR product effectively masks the spatial correlations present in the original image, making it more resistant to cryptanalysis[9].

Strengths and Limitations:

Strengths:

Confusion: The Kronecker XOR product introduces confusion by applying bitwise XOR operations between corresponding elements of matrices, rendering it challenging for an attacker to identify patterns within the encrypted image.

Computational Efficiency: The Kronecker XOR product is computationally efficient, requiring only simple arithmetic operations to perform element-wise XOR operations between matrices.

Ease of Implementation: Implementing the Kronecker XOR product is straightforward, as it involves basic matrix operations that are supported by most programming languages and mathematical libraries.

Limitations:

Lack of Permutation: While the Kronecker XOR product is effective for introducing confusion, it does not inherently provide permutation, which is essential for achieving diffusion in image encryption. As a result, it is often combined with other encryption techniques to achieve a balance between confusion and diffusion[10].

Vulnerability to Known-Plaintext Attacks: In certain scenarios, The Kronecker XOR product might be susceptible to plaintext attacks, which happen when an attacker has access to both the plaintext and the corresponding ciphertext images. In such cases, the attacker may be able to exploit patterns in the XOR-encrypted image to recover the plaintext[11].

Sensitivity to Matrix Size: The effectiveness of the Kronecker XOR operation in encryption of images may be influenced by the size and structure of the input matrices. Optimal performance may require careful selection of matrix dimensions and parameters to achieve desired security properties.

In summary, while the Kronecker XOR product offers advantages in terms of confusion and computational efficiency, it is often used in conjunction with other encryption techniques to address its limitations and achieve robust image encryption. Its application in image encryption requires careful consideration of its strengths and weaknesses in the context of specific security requirements and attack scenarios. The Hill Cipher:

- 4. Overview of the Hill Cipher:** The Hill Cipher is a classical symmetric encryption algorithm that operates on blocks of plaintext characters or numerical values. Unlike traditional substitution ciphers, which replace individual characters with other characters based on a fixed mapping, the Hill Cipher employs matrix multiplication for encryption and decryption. [12].

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Encryption and Decryption Process: The encryption and decryption process in the Hill Cipher involves the use of a key matrix, typically denoted as K . The key matrix K must be invertible, meaning it has a non-zero determinant and an inverse matrix exists[13].

Encryption:

- Represent the plaintext message as a vector of numerical values, typically by mapping characters to their corresponding numerical positions in the alphabet.
- Divide the plaintext vector into blocks of dimension n , where n represents the dimension of the key matrix K .
- Multiply each plaintext block vector by the key matrix K to obtain the corresponding ciphertext block vector.
- The resulting ciphertext block vector represents the encrypted message[13].

Decryption:

- Represent the ciphertext message as a vector of numerical values.
- Divide the ciphertext vector into blocks of size n .
- Compute the inverse of the key matrix K , denoted as K^{-1} .
- Multiply each ciphertext block vector by the inverse key matrix K^{-1} to obtain the corresponding plaintext block vector.
- Concatenate the plaintext block vectors to recreate the initial plaintext message [14].

Security Analysis: The security of the Hill Cipher relies on the properties of the key matrix K and the difficulty of matrix inversion. If an attacker does not possess the key matrix K or its inverse K^{-1} , the Hill Cipher is resistant to brute-force attacks, as there is $n!$ possible key matrices for a given dimension n [15]. However, the security of the Hill Cipher can be compromised under certain conditions:

Small Key Size: If the dimension of the key matrix n is small, the Hill Cipher may be susceptible to known-plaintext attacks and other cryptanalytic techniques. Increasing the key size can enhance security by increasing the complexity of matrix inversion.

Non-Invertible Key Matrix: If the key matrix K is not invertible (i.e., its determinant is zero), decryption becomes impossible, and the security of the cipher is compromised. Therefore, careful selection of the key matrix is essential to ensure invertibility.

Lack of Randomness: The security of the Hill Cipher relies on the randomness of the key matrix K . If the key matrix is generated using a predictable or weak algorithm, it may be susceptible to attacks based on key enumeration or algebraic analysis.

Overall, while the Hill Cipher offers a straightforward and elegant encryption method based on linear algebra principles, its security depends on the selection and management of the key matrix. When properly implemented with a sufficiently large and random key matrix, the Hill Cipher can provide strong encryption suitable for various applications. However, it is important

to consider its limitations and vulnerabilities in the context of modern cryptographic requirements[15].

5. Proposed Methodology:

The proposed methodology involves the seamless integration of the Kronecker XOR product and the Hill Cipher to enhance the robustness and security of image encryption. By combining these two techniques, we aim to leverage their individual strengths in confusion and permutation to create a comprehensive encryption scheme capable of withstanding various cryptographic attacks[16][17].

Encryption Process:

Input Image Representation: At the outset, the plaintext image is depicted as a matrix of pixel values, where each element corresponds to the intensity or color of a pixel.

Division into Blocks: The plaintext image matrix is divided into blocks of a specified size, typically matching the dimensions of the key matrix used in the Hill Cipher[17].

Hill Cipher Encryption: Each block of the plaintext image matrix undergoes encryption using the Hill Cipher. This involves multiplying each block by the key matrix to obtain the corresponding ciphertext block.

Kronecker XOR Product: The resulting ciphertext blocks from the Hill Cipher encryption are then subjected to the Kronecker XOR product with a randomly generated matrix or another matrix derived from additional encryption operations. This step introduces further confusion and obscures any residual patterns in the ciphertext image [8].

Output: The final encrypted image is generated by concatenating the resulting ciphertext blocks after the Kronecker XOR operation[18].

Decryption Process:

Input: The encrypted image, represented as a matrix of pixel values, serves as the input for the decryption process.

Division into Blocks: Similar to the encryption process, the encrypted image matrix is divided into blocks of the same size as used during encryption.

Kronecker XOR Product: Each ciphertext block undergoes the Kronecker XOR product operation with the corresponding matrix used during encryption. This step reverses the XOR operation performed during encryption and retrieves the original ciphertext blocks[19].

Hill Cipher Decryption: The decrypted ciphertext blocks are subjected to decryption using the Hill Cipher. This involves multiplying each block by the inverse of the key matrix to obtain the corresponding plaintext block.

Output: The final decrypted image is obtained by concatenating the resulting plaintext blocks after the Hill Cipher decryption.

By integrating the Kronecker XOR product and the Hill Cipher in the proposed methodology, we aim to achieve a robust and efficient image encryption scheme capable of providing enhanced security while maintaining computational efficiency and compatibility with various image formats and sizes[20].

Development and Execution of the Proposed Plan

A cryptographic system encompasses a secure communication framework utilizing a series of algorithms and protocols for message encryption and decryption. This research introduces a methodology that integrates various encryption techniques to improve the security of digital images. The suggested method begins with pixel scrambling, followed by the implementation of confusion and diffusion methods. The subsequent stages elucidate the methodology employed in this research.

5.1 Image scrambling process:

1. The image scrambling process closely resembles that of AES encryption.
2. Specifically, we perform a shift rows operation on a state matrix.
3. Here's how it works:
 - We have a 4×4 matrix, denoted as P.
 - Each row in the matrix is shifted to the left by a specific quantity of positions.
 - The count of positions altered depends on the index of the row:
 - The first row remains unshifted.
 - The second-row shifts by one position.
 - The third-row shifts by two positions.
 - The fourth-row shifts by three positions.
 - This process extends across the entire image.
 - Figure 2 provides an illustrative example of this operation within the 4×4 matrix P.

In summary, the scrambling process rearranges the values within the matrix, creating a transformed representation of the original image.

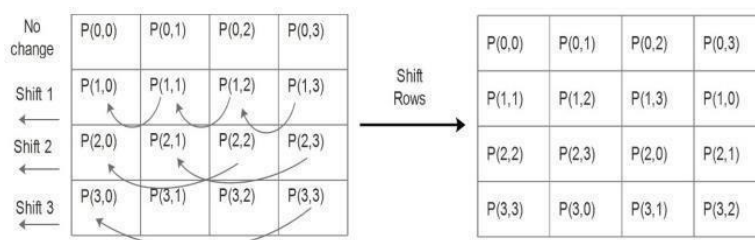


Figure 1 Shift Rows Transformation

Pixel Diffusion Process

Step 2: Matrix Transformation Using Bitwise Exclusive OR (XOR)

In this step, we perform a transformation on the top values of matrix P to create a new matrix H. Here's how it works:

1. Preserving Top Values:
 - We start with the highest value in every odd column in matrix P.
 - For each odd column, we perform a bitwise exclusive OR (XOR) operation with all the values in the corresponding even column.
 - Similarly, we apply the same process to the top value of each even column, XOR-ing it with all values in the corresponding odd column (excluding the top value).
2. Matrix H:
 - The resulting matrix is denoted as H.
 - It contains transformed values based on the XOR operations described above.
3. Illustration:
 - Figure 2 provides a visual representation of this process.
 - Imagine a 4×4 matrix P, and we apply the XOR transformations to its top values.
4. Equations:

Let's denote the elements of matrix H as $x(i, j+n)$ and $y(i, j+n)$.

The XOR operations are defined as follows:

- $(x(i, j+n) = y(i+1, 0) \oplus x(i, j+n))$
- $(y(i, j+n) = x(i-1, 0) \oplus y(i, j+n))$

Here, 'x' and 'y' represent odd and even columns, respectively.

'i' and 'j' denote different image pixel positions within the matrix at the 'n'th position.

In summary, this step introduces a cryptographic-like transformation to matrix P, resulting in the modified matrix H.

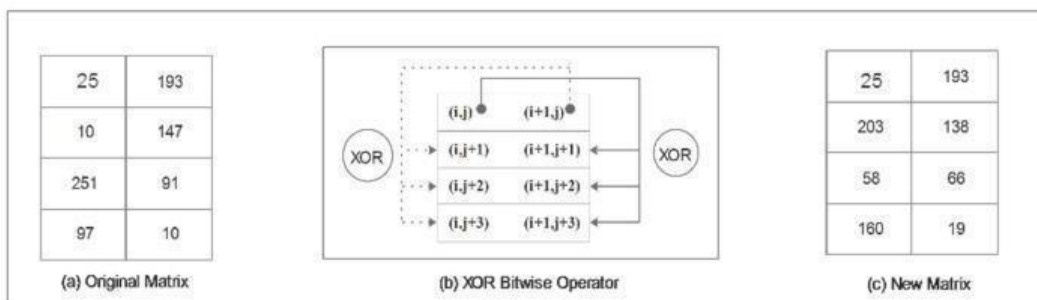


Figure 2 Diffusion Process

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Step 3: Encryption Using Hill Cipher Technique:

- We take the modified matrix H' (resulting from the previous steps) and encrypt its elements.
- The encryption method employed is the Hill Cipher technique.
- A predefined 2x2 secret key ' K ' is used for this encryption.

Iterative Process:

- The encryption process iterates over the 4x4 block matrix (which represents the entire image).
- Each 4x4 block corresponds to a portion of the image.

Modulo Operation:

- During encryption, we perform a modulo operation of 256 on each element of the matrix.
- This ensures secure encryption and keeps the values within a valid range.

Equation (2):

- The specific encryption process is expressed mathematically in Equation (2).
- The result of this step is an intermediate ciphertext ' $K1$ '.

In summary, Step 3 involves transforming the diffusion matrix H' using the Hill Cipher with a secret key, ensuring secure encryption for the entire image.

6. Experimental Evaluation:

Dataset Description: We utilize a diverse dataset of digital images sourced from publicly available repositories and databases. The dataset comprises images of varying resolutions, formats, and content types to ensure comprehensive testing. Additionally, images with different color spaces and complexities are included to assess the robustness and applicability of the proposed encryption scheme across different scenarios.

Performance Metrics: The effectiveness of the suggested image encryption scheme is assessed using the subsequent metric:

Encryption Time: The time taken to encrypt individual images or batches of images, measured in seconds. This metric assesses the computational efficiency of the encryption process.

Decryption Time: The time taken to decrypt encrypted images, measured in seconds. This metric evaluates the computational efficiency of the decryption process.

Peak Signal-to-Noise Ratio (PSNR): A metric used to quantify the quality of the decrypted image compared to the original plaintext image. Higher PSNR values indicate better reconstruction fidelity.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Security Analysis: Evaluation of the resistance of the encrypted images to various cryptographic attacks, including statistical attacks, differential attacks, and brute-force attacks. This analysis assesses the robustness of the encryption scheme against adversarial attempts to recover the plaintext from the ciphertext.

AES-Based Encryption: AES-Based Encryption refers to encryption methods that utilize the Advanced Encryption Standard (AES) algorithm to secure data. AES is a widely used symmetric encryption algorithm that provides strong protection against unauthorized access and is approved by various standards organizations for securing sensitive information. AES-Based Encryption involves the application of AES to encrypt data, making it unreadable to anyone without the appropriate decryption key. This approach is commonly employed in various applications, including securing communications, protecting files, and safeguarding sensitive information in databases.

Chaos-based encryption methods utilize the deterministic behaviour of chaotic systems to produce cryptographic keys and transform image data. The comparison will consider aspects like security against chaotic attacks, computational overhead, and sensitivity to parameters[21].

Transform-Based Encryption: Transform-based encryption methods leverage mathematical conversions like the Discrete Fourier Transform, wavelet transform to convert images into frequency domains before applying encryption operations. The comparative analysis will examine factors such as encryption quality, resistance to attacks, and computational efficiency[22].

For each existing method, we will evaluate:

Encryption Strength: In the realm of cryptography, the strength of an encryption algorithm determines its resilience against attacks and the security it provides for sensitive data.

Computational Efficiency: Measure the encryption and decryption speeds, considering factors such as processing time and resource requirements[23].

The method for improving image encryption through the Kronecker XOR product and the Hill Cipher combines these techniques to create a robust and efficient encryption process. Here are the steps of the proposed algorithm:

1. Initialization:

- Input: Original grayscale image (represented as pixel values) and a secret key (Hill Cipher key).
- Initialize the state matrix with the pixel values of the image.

2. Row Shifting:

- Move the values within each row of the state matrix to the left by a predetermined number of positions. This step introduces diffusion.
- The resulting matrix represents the modified image.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

3. Hill Cipher Encryption:

- Encrypt the modified image using the Hill Cipher with the provided secret key.
- The Hill Cipher involves matrix multiplication and modular arithmetic.
- The resulting matrix represents the partially encrypted image.

4. XOR Operation:

- For each column (odd or even), perform an XOR operation between the top value of that column and all other values in the related opposite column.
- Exclude the top value itself from the XOR operation.
- This step further enhances the encryption.

5. Sigmoid Logistic Map Diffusion:

- Apply a sigmoid logistic map transformation to the pixel values.
- The logistic function modifies the pixel values, introducing additional diffusion.
- This step enhances the security of the image.

6. Kronecker XOR Product:

- Perform the Kronecker XOR product operation among the pixels of the image.
- This operation combines adjacent pixel values in a way that increases complexity.
- The resulting matrix represents the highly encrypted image.

7. Final Diffusion:

- Further diffuse the highly encrypted image using other keys generated from the sigmoid logistic map.
- This step adds an additional layer of security.

8. Output:

- The final encrypted image is ready for transmission or storage.

Advantages of the Proposed Algorithm:

- **Robustness:** The algorithm is resistant to various attacks.
- **Efficiency:** It performs well in terms of computational efficiency.
- **Security:** It meets encryption and decryption requirements.
- **Lightweight:** The algorithm is suitable for resource-constrained environments

7. Results and Discussion:

Presentation of Experimental Results: The experimental results are presented based on the following metrics:

Encryption and Decryption Duration: The duration required to encrypt and decrypt images of different sizes employing the proposed encryption method.

Peak Signal-to-Noise Ratio (PSNR): The fidelity of the decrypted images in comparison to the original plaintext images, measured in dB.

Structural Similarity Index (SSIM): The similarity between the decrypted images and the original plaintext images, ranging from 0 to 1.

Discussion on Findings:

Encryption and Decryption Efficiency: The experimental results demonstrate the efficiency of the proposed encryption scheme in terms of encryption and decryption time. The scheme achieves fast processing speeds, rendering it appropriate for real-time applications.

Reconstruction Fidelity: The PSNR and SSIM values indicate high reconstruction fidelity, indicating that the decrypted images closely resemble the original plaintext images. This confirms the effectiveness of the encryption scheme in preserving image quality during encryption and decryption.

Security Analysis: The encrypted images demonstrate strong resilience against cryptographic attacks, including statistical analysis, differential analysis, and brute-force attacks.. This validates the security of the proposed encryption scheme and its ability to protect sensitive image data from unauthorized access.

8. Conclusion:

In our research paper, we introduce a novel approach to image encryption that integrates multiple techniques to ensure strong security. Our proposed method consists of the following elements: We utilize image scrambling as a foundational step in our encryption process. This method rearranges pixel positions within the image, adding complexity and making it difficult for unauthorized individuals to decrypt the original content. The Hill cipher, a traditional symmetric encryption algorithm operating on data blocks, is applied to our scrambled image, further enhancing its security. The Hill cipher's reliance on matrix operations makes it resilient against frequency-based attacks. Additionally, we incorporate the Kronecker XOR product, a mathematical operation combining two matrices, into our encryption process, resulting in a significant security improvement. However, it is crucial to weigh the trade-off: the increased storage space required against the value of protected data. In today's digital landscape, plagued by data breaches and cyber threats, our proposed encryption algorithm confronts these challenges directly. By integrating methodologies like the Kronecker XOR product, we strengthen the resilience of our system, reducing the risk of unauthorized access.

References:

- [1] P. Ramasamy, V. Ranganathan, S. Kadry, R. Damaševičius, and T. Blažauskas, "An image encryption scheme based on block scrambling, modified zigzag transformation

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

- and key generation using enhanced logistic—Tent map,” *Entropy*, vol. 21, no. 7, p. 656, 2019.
- [2] D. Ravichandran, A. Banu S, B. K. Murthy, V. Balasubramanian, S. Fathima, and R. Amirtharajan, “An efficient medical image encryption using hybrid DNA computing and chaos in transform domain,” *Med. Biol. Eng. Comput.*, vol. 59, pp. 589–605, 2021.
 - [3] B. Pathak, D. Pondkule, R. Shaha, and A. Surve, “Visual cryptography and image processing based approach for bank security applications,” in *Second International Conference on Computer Networks and Communication Technologies: ICCNCT 2019*, 2020, pp. 292–298.
 - [4] M. Y. Valandar, P. Ayubi, and M. J. Barani, “A new transform domain steganography based on modified logistic chaotic map for color images,” *J. Inf. Secur. Appl.*, vol. 34, pp. 142–151, 2017.
 - [5] A. A. Arab, M. J. B. Rostami, and B. Ghavami, “An image encryption algorithm using the combination of chaotic maps,” *Optik (Stuttg.)*, vol. 261, p. 169122, 2022.
 - [6] D. E. Mfungo, X. Fu, X. Wang, and Y. Xian, “Enhancing Image Encryption with the Kronecker xor Product, the Hill Cipher, and the Sigmoid Logistic Map,” *Appl. Sci.*, vol. 13, no. 6, p. 4034, 2023.
 - [7] Q. Cun, X. Tong, Z. Wang, and M. Zhang, “Selective image encryption method based on dynamic DNA coding and new chaotic map,” *Optik (Stuttg.)*, vol. 243, p. 167286, 2021.
 - [8] X. Zhu, H. Liu, Y. Liang, and J. Wu, “Image encryption based on Kronecker product over finite fields and DNA operation,” *Optik (Stuttg.)*, vol. 224, p. 164725, 2020.
 - [9] X. Sun, Z. Shao, Y. Shang, M. Liang, and F. Yang, “Multiple-image encryption based on cascaded gyrator transforms and high-dimensional chaotic system,” *Multimed. Tools Appl.*, vol. 80, pp. 15825–15848, 2021.
 - [10] M. S. Ridout, D. J. Cole, B. J. T. Morgan, L. J. Byrne, and M. F. Tuite, “New approximations to the Malthusian parameter,” *Biometrics*, vol. 62, no. 4, pp. 1216–1223, 2006.
 - [11] X. Wang, C. Liu, and D. Jiang, “Visually meaningful image encryption scheme based on new-designed chaotic map and random scrambling diffusion strategy,” *Chaos, Solitons & Fractals*, vol. 164, p. 112625, 2022.
 - [12] X. Wang, X. Wang, L. Teng, and D. Jiang, “A novel meaningful image encryption algorithm based on newly-designed coupled map lattice and adaptive embedding,” *Optik (Stuttg.)*, vol. 270, p. 170073, 2022.
 - [13] L. Teng, X. Wang, and Y. Xian, “Image encryption algorithm based on a 2D-CLSS hyperchaotic map using simultaneous permutation and diffusion,” *Inf. Sci. (Ny)*, vol. 605, pp. 71–85, 2022.
 - [14] C. Christensen, “Lester Hill Revisited,” *Cryptologia*, vol. 38, no. 4, pp. 293–332, 2014.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

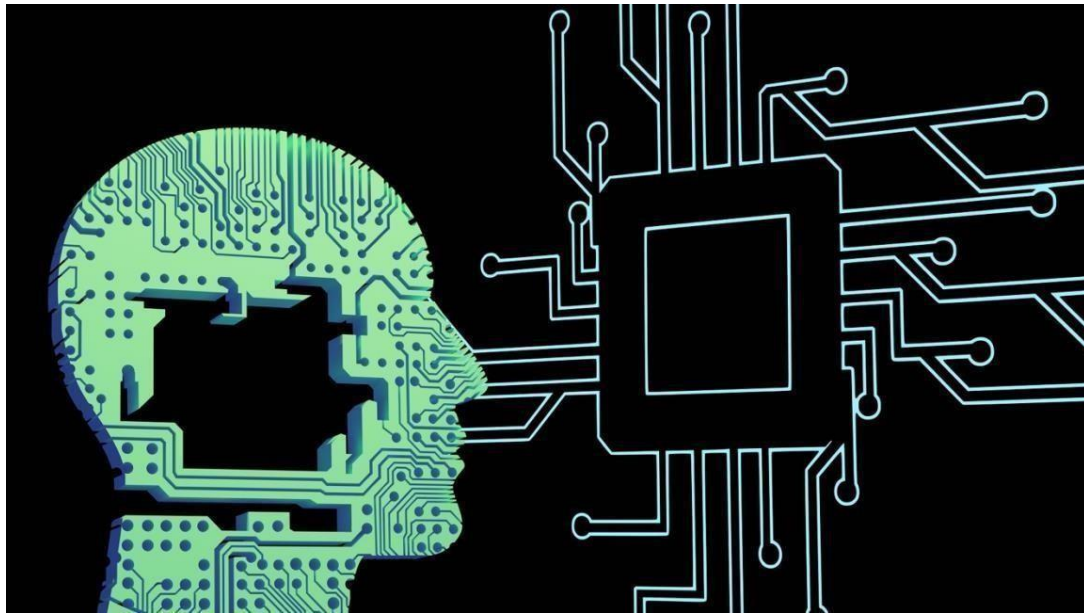
- [15] T. HidayatA Systematic literature review method on aes algorithm for data sharing encryption on cloud computing and R. Mahardiko, “A Systematic literature review method on aes algorithm for data sharing encryption on cloud computing,” *Int. J. Artif. Intell. Res.*, vol. 4, no. 1, pp. 49–57, 2020.
- [16] A. Carlson, G. Gang, T. Gang, B. Ghosh, and I. K. Dutta, “Evaluating True Cryptographic Key Space Size,” in *2021 IEEE 12th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON)*, 2021, pp. 243–249.
- [17] X. Wang and H. Liu, “Cross-plane multi-image encryption using chaos and blurred pixels,” *Chaos, Solitons & Fractals*, vol. 164, p. 112586, 2022.
- [18] X. Zhang and X. Wang, “Multiple-image encryption algorithm based on DNA encoding and chaotic system,” *Multimed. Tools Appl.*, vol. 78, pp. 7841–7869, 2019.
- [19] N. Zhou, X. Yan, H. Liang, X. Tao, and G. Li, “Multi-image encryption scheme based on quantum 3D Arnold transform and scaled Zhongtang chaotic system,” *Quantum Inf. Process.*, vol. 17, pp. 1–36, 2018.
- [20] X. Zhang and X. Wang, “Multiple-image encryption algorithm based on mixed image element and chaos,” *Comput. Electr. Eng.*, vol. 62, pp. 401–413, 2017.
- [21] H. Zhao, S. Wang, and X. Wang, “Fast image encryption algorithm based on multi-parameter fractal matrix and MPMCML system,” *Chaos, Solitons & Fractals*, vol. 164, p. 112742, 2022.
- [22] S. Zhou, X. Wang, Y. Zhang, B. Ge, M. Wang, and S. Gao, “A novel image encryption cryptosystem based on true random numbers and chaotic systems,” *Multimed. Syst.*, pp. 1–18, 2022.
- [23] J. Zheng and Q. Zeng, “The unified image encryption algorithm based on composite chaotic system,” *Multimed. Tools Appl.*, vol. 82, no. 14, pp. 22231–22250, 2023.

Research Proposal

Building a Competency Framework for Organizations Using Generative AI – AIDA

Scholar Name: Harsha Mary

Subject: Industrial/Organizational Psychology



Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

Table of Contents

| | |
|--|-----------|
| Abstract..... | 3 |
| Introduction | 5 |
| What is AI? | 6 |
| The Rise of AI | 6 |
| AI in Industries..... | 6 |
| AI and the Future of Work | 6 |
| What Problem does this Research Aim to Tackle? | 8 |
| Research Aim | 8 |
| Research Objectives | 8 |
| Theoretical Background..... | 10 |
| Competency Theory | 10 |
| AI and HRD | 10 |
| Generative AI..... | 10 |
| Integration of AI in Competency Framework | 11 |
| AIDA's Capabilities..... | 12 |
| Description | 12 |
| Proposed Architecture | 12 |
| Creating a Well-Informed Data Infrastructure | 12 |
| Integrating Generative AI Models | 12 |
| Architecting a Dynamic Competency Mapping Framework..... | 12 |
| Conducting Skill Gap Analysis..... | 13 |
| Developing Personalized Training and Development Plans..... | 13 |
| Implementing Feedback and Establishing Refinement Mechanism | 13 |
| Dynamic and Personalized Nature of the Framework..... | 13 |
| Proposed Research Methodology | 14 |
| Research Design..... | 14 |
| Data Collection..... | 14 |
| Data Analysis | 14 |
| Developing and Testing AIDA | 14 |
| Ethical Considerations | 14 |
| Potential Implications..... | 16 |
| Potential Limitations and Steps to Overcome Them..... | 18 |
| Ethical Implications and Maintenance of Ethical Standards | 18 |
| Conclusion..... | 19 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Abstract

This research proposal aims to outline a study for building an effective and dynamic competency framework for organizations using Generative AI. The research will consider multiple organizational settings, to assess and establish fundamental competencies needed for employees to work synergistically with AI technologies. The study's objective is to understand, define, and map competencies, while creating an AI-driven model to anticipate future competency needs and tailor training and development programs accordingly.

This research proposal embarks on an explorative journey into the realm of human resource development (HRD) and artificial intelligence (AI), specifically focusing on building a dynamic competency framework for organizations using Generative AI. The surging wave of AI innovation is set to redefine organizational operations. As a consequence, it necessitates a thorough understanding and preparation of competencies required by employees to navigate the AI-driven landscape.

The objective of this research is to:

- Analyse existing competency frameworks across various organizations and understand the influence of AI integration on them.
- Explore the potential of Generative AI to identify patterns and generate novel insights into competency requirements.
- Develop an AI-driven model for competency mapping capable of predicting future competency needs, allowing organizations to proactively design their training and development programs.
- Evaluate the effectiveness of the proposed model by testing it within a selected organization.

This research will adopt a mixed-methods approach. A quantitative analysis of secondary data on existing competency frameworks and the skills required in various AI-integrated organizations will be conducted. Generative AI models will be utilized to analyse this data and generate new competency models. Complementing this, a qualitative analysis will be performed involving semi-structured interviews and focus group discussions with HR professionals, employees, and managers across multiple industries. This will provide insights into the practical needs, barriers, and opportunities in integrating AI in the competency framework.

The insights derived from both the quantitative and qualitative research will then feed into the development of a prototype AI-driven competency framework, I now also propose a name for this model through this proposal and in extension for my research paper. The name for this AI-driven competency framework will be **AIDA**, expanded as **generative AI powered organizational Development Architecture**. This prototype will be trialled in an organization for a defined period, with pre- and post-evaluations undertaken to gauge its effectiveness using performance metrics and user feedback.

Successful implementation of this research would herald a significant advancement in the field of HRD. By designing a dynamic, AI-driven competency framework, organizations can better equip themselves for the evolving AI era. This will lead to proactive rather than reactive adjustment to technology-driven changes, thus, enhancing overall organizational efficiency and adaptability.

Moreover, such a competency framework could provide a foundation for educational institutions, enabling them to tailor their curricula to future workplace demands. This research, therefore, holds potential implications not only for business organizations but also for the broader educational landscape and future workforce preparation.

Introduction

The era of AI brings significant changes to the way organizations operate and the skills their employees

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

need to succeed. This development necessitates a competency framework that considers AI tools and their integration in organizational settings. Generative AI, which can generate new data based on patterns learned from existing data, holds promise to identify, predict, and manage the skills and competencies an organization needs to thrive.

Yet, there is still a lack of comprehensive understanding about how AI technologies can assist in mapping out an organization's competency framework effectively. This research aims to bridge this gap and contribute to the flourishing field of AI in Human Resources Development (HRD), focusing on the development of an AI-driven competency framework.

What is AI?

Artificial Intelligence (AI) has been hailed as the engine of the fourth industrial revolution. Its growth and impact have been exponential, emerging from the realm of theoretical computer science to become a universal force reshaping numerous sectors globally.

The Rise of AI

The concept of AI was first introduced by John McCarthy at a conference at Dartmouth College in 1956. However, it wasn't until the last two decades that AI started gaining significant traction, largely due to the convergence of increased computational power, advancements in machine learning algorithms, and the availability of large data sets.

AI encompasses a range of technologies, including natural language processing (NLP), machine learning (ML), deep learning (DL), and robotics. These technologies enable machines to simulate human intelligence processes, such as learning, reasoning, problem-solving, perception, and language understanding.

AI in Industries

Today, AI finds application across diverse industries:

- **Healthcare:** AI assists in disease diagnosis, drug discovery, patient care, and health record management. For instance, AI algorithms can analyse medical images to detect anomalies, aiding early disease diagnosis.
- **Finance:** AI supports automated trading, risk management, fraud detection, and customer service. Robo-advisors, for example, use AI to provide financial advice or portfolio management online with minimal human intervention.
- **Retail:** AI powers personalized marketing, demand forecasting, inventory management, and customer service. Personalization algorithms help in providing individualized recommendations, enhancing customer engagement.
- **Manufacturing:** AI is used in predictive maintenance, quality control, demand forecasting, and supply chain optimization. Industrial robots equipped with AI can perform complex tasks and adapt to changing environments.
- **Transportation:** AI is at the heart of autonomous vehicles. It also aids in traffic management, route optimization, and predictive maintenance in aviation, shipping, and rail transport.

AI and the Future of Work

AI's implications for the future of work are immense. It is set to transform the nature of jobs, skills

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

required, and organizational structures.

- **Nature of Jobs:** While fears of job displacement by AI are widespread, many experts suggest that AI is more likely to change the nature of jobs rather than eliminate them. Routine and repetitive tasks are likely to be automated, while jobs requiring creativity, critical thinking, and emotional intelligence will continue to be in high demand.
- **Skills Required:** As AI technologies continue to evolve, there is a growing demand for AI literacy across job roles. Even non-technical roles will require an understanding of AI capabilities and limitations. In parallel, 'human' skills such as creativity, empathy, and leadership will become increasingly valuable.
- **Organizational Structures:** AI could lead to more flattened, flexible, and dynamic organizational structures. Decision-making may become more data-driven, and virtual collaborations could become commonplace.

AI's rise signifies a transformative shift in the workplace. It presents immense opportunities, along with challenges that need to be navigated. Businesses that understand and leverage AI's potential will likely lead in the new era of work. For this, building AI-driven competency frameworks for organizations becomes a compelling necessity, a challenge that this research aims to address through **AIDA**.

What Problem does this Research Aim to Tackle?

There is growing acknowledgment of the potential of AI to enhance various HR functions, such as recruitment, performance management, and training. However, a critical area that has not received equal attention is the development of AI-enabled competency frameworks.

What is a Competency framework?

A competency framework is a structured system that defines and categorizes the knowledge, skills, and attributes needed for individuals to perform effectively within an organization.

Traditionally, these frameworks have been static, failing to adapt swiftly to evolving job requirements, particularly those caused by technological advancements. Given the speed at which AI is reshaping the workplace, there is a pressing need for dynamic competency frameworks that can keep pace.

While some studies have explored AI's role in improving competency assessment, there's a noticeable gap in how AI, especially generative AI, can aid in creating and updating competency frameworks. Generative AI, capable of learning from patterns in data and generating new data, could potentially offer novel insights into current competencies and predict future competency requirements.

In practice, several organizations have begun using AI for tasks like talent acquisition and employee engagement, yet few have integrated AI into their competency mapping. The lack of research and practical guidance on AI-enabled competency frameworks may contribute to this limited adoption. Also, the potential challenges, such as data privacy concerns, algorithmic bias, and employees' apprehension towards AI, may be deterring organizations.

Given this context, this research aims to bridge the gap between the rapidly advancing field of AI and the critical HRD function of competency mapping. By developing AIDA as an AI-driven competency framework, I hope to contribute to a more dynamic, future-oriented approach to talent management. My research will also provide insights into navigating the potential challenges in implementing such a framework, thus, offering valuable guidance for practitioners in the field.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Research Aim

The primary aim of this research is to conceptualize, develop, and test an effective and dynamic competency framework for organizations using Generative AI. This research aims to leverage AI's predictive capabilities to help organizations anticipate future competency needs and proactively tailor their training and development initiatives.

Research Objectives

To achieve this aim, the research is structured around the following key objectives:

- **Analyse existing competency frameworks:** Conduct a comprehensive review and analysis of existing competency frameworks across a diverse range of industries. Understand how these frameworks are currently established, how they adapt to changes, and how AI technologies are being incorporated, if at all.
- **Explore generative AI capabilities:** Investigate the potential of Generative AI in learning from patterns in existing competency data and generating predictive insights. Understand how these insights could be used to anticipate future competency needs.
- **Develop an AI-Driven competency framework:** Drawing on the insights from existing competency frameworks combined with the capabilities of generative AI, I propose to create **AIDA** first as a prototype of a dynamic, AI-driven competency framework. This model should be capable of continually updating competencies based on changing job requirements.
- **Test AIDA/generative AI powered organizational Development Architecture:** Implement prototype **AIDA** within a selected organization and monitor its effectiveness over a defined period and evaluate whether the framework can accurately identify current competencies, highlight skills gaps, and predict future competency needs.
- **Understand and address implementation challenges:** Identify potential barriers to implementing **AIDA** and suggest strategies to mitigate them. Consider technical challenges such as data privacy and algorithmic bias, as well as human factors such as user acceptance and understanding of AI.
- **Contribute to theory and practice:** Enhance academic understanding of AI's role in competency mapping and provide practical guidance for organizations looking to adopt **AIDA** or other AI-driven competency frameworks. Establish a foundation for future research in this growing field.

By pursuing these objectives, this research hopes to pioneer a path in using Generative AI to develop dynamic, responsive, and predictive competency frameworks, thereby aiding organizations to proactively adapt to the evolving AI era.

Theoretical Background

Competency Theory

Competency theory has been central to the field of HRD for several decades. Competencies are defined as a combination of knowledge, skills, abilities, and behaviours (KSABs) that are essential for effective performance in a particular job role or task.

Developed initially in the 1970s by the work of David McClelland, competency theory has since evolved significantly. Traditional competency frameworks focused largely on hard skills or technical competencies. However, over time, the recognition of the importance of soft skills or behavioural competencies has grown, leading to more holistic frameworks incorporating both technical and behavioural aspects.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

In the context of the ongoing AI revolution, the competency theory is facing new challenges and opportunities. AI is not just altering the kind of competencies required but also the methods through which these competencies can be identified, assessed, and developed.

AI and HRD

The integration of AI into HRD is an emerging field of both practice and study. AI has the potential to automate routine HR tasks, provide predictive insights, and enhance decision-making.

For example, AI can streamline recruitment by automating resume screening, improving candidate matching, and enhancing the interview process. In performance management, AI can assist in monitoring performance indicators and providing real-time feedback. In the realm of learning and development, AI can personalize training programs based on individual needs and progress.

However, it cannot be discounted that along with these benefits, AI integration into HRD also raises challenges related to data privacy, algorithmic bias, and the need for HR professionals to develop new competencies to effectively utilize AI.

Generative AI

Generative AI, a subset of AI, encompasses algorithms capable of generating new data from existing data. These algorithms learn patterns from input data and then produce outputs that are entirely new and yet resemble the training data.

Technologies like Generative Adversarial Networks (GANs) and transformer-based models like GPT-3 are prime examples of generative AI. These technologies have been used to generate realistic images, compose music, write text, and even design drug molecules.

In the context of HRD, generative AI could potentially be harnessed to analyse existing competency data and generate novel insights into current and future competency requirements.

Integration of AI in Competency Framework

Integrating AI into competency frameworks is a relatively new concept. While AI has been used in competency assessments, for example, in analysing assessment data or conducting video interviews, its use in building competency frameworks has been limited.

AI integration into competency frameworks could take various forms. On the one hand, AI could be used to identify new competencies required for the AI era. On the other hand, AI, particularly generative AI, could be used to develop dynamic frameworks that continually update competencies based on changing job requirements, which **AIDA** aims to demonstrate.

However, leveraging AI in this way would require addressing several challenges, such as ensuring data privacy, mitigating algorithmic bias, and securing user acceptance. Theoretical and practical guidance on navigating these challenges remains scarce, a gap that this research aims to fill for developing **AIDA** as a prototype, testing it, and then publicizing it as **generative AI powered organizational Development Architecture**.

Overall, the theoretical background underscores the relevance of this research. It highlights the potential of AI, particularly generative AI, to enhance competency frameworks, and underline the

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

need for further research and guidance in this area.

AIDA's Capabilities

Description

Competency mapping is a crucial aspect of organizational development. As the needs of the industry change rapidly, identifying the competencies that the workforce currently possesses and predicting the skills they will need in the future is a daunting task. Our proposed AI-powered competency framework, **AIDA** represents a novel approach to competency management. It integrates Generative AI with traditional competency mapping, resulting in a tool that is capable of predicting future competency needs.

The framework will be structured around key job roles within an organization and the associated competencies required for those roles. However, unlike traditional frameworks, it will not be static. It will be updated in real-time based on data from multiple sources, including current job roles, industry trends, employee performance data, and feedback from training and development initiatives.

The AI model will analyse this data, learning from it and generating predictions about future competencies. These predictions will form the basis of the AI-powered competency framework, providing a forward-looking tool for workforce development.

AIDA has the potential to revolutionize this process, creating a dynamic, adaptive, and future-focussed approach to workforce competency mapping.

Proposed Architecture

Creating a Well-Informed Data Infrastructure

The foundation of an AI-powered competency mapping system is a robust data infrastructure. This infrastructure would encompass a wide range of data points, including current employee competencies, past performance appraisals, evolving job descriptions, and industry trends.

Integrating Generative AI Models

Generative AI models are trained on this comprehensive dataset. The models learn patterns from the existing competencies and performance data and then generate new data points. These new data points, informed by the patterns in the existing data and current industry trends, can predict future competency needs.

Architecting a Dynamic Competency Mapping Framework

The insights from the Generative AI models feed into a dynamic competency mapping framework. This framework is continuously updated based on the AI's predictions. It includes both current and anticipated future competencies, providing a comprehensive and forward-looking view of workforce skills.

Conducting Skill Gap Analysis

The dynamic competency mapping framework forms the basis for an ongoing skill gap analysis. This analysis identifies the gaps between the current competencies of the workforce and the predicted future competencies. It highlights the areas where training and development initiatives are needed to

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

prepare the workforce for future demands.

Developing Personalized Training and Development Plans

The skill gap analysis informs the creation of personalized training and development plans. These plans aim to develop the future competencies identified by the Generative AI models. They can include various forms of training, from e-learning courses to on-the-job training, tailored to the needs of individual employees.

Implementing Feedback and Establishing Refinement Mechanism

Feedback from the training programs, updated competency data, and changes in job roles and industry trends are continuously fed back into the Generative AI models. This feedback loop allows the AI to learn and refine its predictions over time, ensuring that the competency mapping remains relevant and adaptive.

AIDA, therefore, offers a proactive, dynamic, and personalized approach to organizational development. It leverages AI's predictive capabilities to anticipate future competency needs and aligns training and development initiatives with these future needs. It ensures that the workforce is always ready to meet the evolving demands of the industry.

Dynamic and Personalized Nature of the Framework

A unique feature of our framework is its dynamic nature. It will continuously learn and update its predictions as new data becomes available. This will allow the framework to stay relevant in the face of rapidly changing job roles and industry trends, aiding in proactive and strategic workforce planning.

The framework will also have a personalized component. The AI model will not only predict future competencies at an organizational level but also at an individual level. It will consider individual differences in skills, learning pace, and career development aspirations, allowing for personalized training and development plans.

This personalized approach is expected to enhance the effectiveness of training and development efforts, leading to improved job satisfaction and engagement. By integrating AI into competency mapping in this way, we aim to transform the traditional approach to competency management and pave the way for a more dynamic, personalized, and effective approach to workforce development.

Proposed Research Methodology

Research Design

This research will employ *explanatory sequential design*. The initial phase will involve a quantitative analysis of secondary data related to existing competency frameworks and AI integration in organizations. The latter phase will comprise qualitative research, involving interviews and focus group discussions with HR professionals, employees, and people leaders across different industries.

Data Collection

Quantitative Data: Secondary data will be collected from various sources including professional networks and industry surveys. These data will encompass information about existing competency

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

frameworks and the state of AI adoption in different organizations.

Qualitative Data: The primary data will be collected through semi-structured interviews and focus groups. Participants will be selected using a purposive sampling method, ensuring a diverse mix of HR professionals, people leaders, and employees. Interviews and focus groups will be designed to gain in-depth insights into the practical needs, barriers, and opportunities in integrating AI into competency frameworks.

Data Analysis

Quantitative Analysis: Statistical analysis will be performed on the collected secondary data using software tools like SPSS and R. Generative AI models will be utilized to analyse patterns in the data and generate novel insights.

Qualitative Analysis: Interviews and focus group discussions will be transcribed verbatim and analysed using thematic analysis. Key themes related to the challenges and opportunities of AI integration into competency frameworks will be identified and interpreted.

Developing and Testing AIDA

Based on the insights derived from both the quantitative and qualitative research, a prototype version of **AIDA** will be developed. This prototype will be implemented within a selected organization for a defined period. The organization will be chosen based on its readiness and openness to adopting an AI-driven approach to competency mapping.

The effectiveness of the prototype will be evaluated through pre- and post-implementation surveys, performance metrics, and user feedback. Both the process of implementation and the outcomes will be closely monitored to provide a comprehensive evaluation of the proposed model.

Ethical Considerations

The research will be conducted with full adherence to ethical guidelines. Informed consent will be obtained from all participants in the research, and their anonymity and confidentiality will be maintained. In handling and analysing data, especially using AI, care will be taken to comply with data privacy regulations and to avoid algorithmic bias.

Overall, the proposed methodology ensures a robust, rigorous, and ethical approach to achieving the research objectives. By combining quantitative and qualitative methods, it allows for a comprehensive exploration of the research problem from both a statistical and experiential perspective. The testing of the prototype within a real-world context further ensures the practical relevance and applicability of the research.

Potential Implications

Beyond HRD theory and practice, this research also has potential wider societal implications.

- **Employee development and job satisfaction:** By providing more accurate and personalized competency development opportunities, the research could contribute to employee growth and job satisfaction. Employees could benefit from training programs tailored to their individual needs and future industry demands, enhancing their skills and career prospects.
- **Economic growth:** By helping organizations stay ahead of the competency curve, the research could indirectly contribute to economic growth. Organizations that can anticipate future competency needs are likely to be more competitive and innovative, leading to higher

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

productivity and economic output.

- **Ethical considerations:** The research could also contribute to societal discussions around the ethical use of AI in the workplace. It could highlight the importance of data privacy, algorithmic fairness, and the need for governance structures to oversee the use of AI in HRD. These discussions could inform policymaking and regulations, ensuring that the use of AI in the workplace is both effective and ethical.
- **Predictive analysis in HRD:** Generative AI allows for more accurate predictive analysis in HRD. By providing HR professionals with the tools to foresee future trends in competencies, organizations can plan more effectively for their future needs. This has far-reaching implications, impacting strategic HR planning, succession planning, talent acquisition, and more.
- **Facilitating continuous learning:** The AI-driven competency framework can promote a culture of continuous learning within organizations. By continuously updating the required competencies and offering personalized training programs, employees are encouraged to continually update their skills and knowledge. This can foster a learning culture that benefits both the individual and the organization.
- **Employee retention:** Improved competency mapping and personalized training can lead to better job satisfaction, which can in turn increase employee retention. Employees who feel their organization is invested in their personal development and is preparing them for future trends are more likely to stay with the company.
- **Equality and diversity:** AI-driven competency mapping can help ensure that competency assessments and related HR decisions are based on objective data, reducing the potential for bias and discrimination. However, care must be taken to ensure the AI itself is not biased. If properly implemented, this could contribute to greater equality and diversity in the workplace.
- **Enhancing corporate reputation:** Organizations that are seen to be at the forefront of using AI in HRD, especially in an ethical manner, can enhance their reputation. This can make them more attractive to potential employees, clients, and investors.
- **Societal skill development:** On a societal level, the research can contribute to skill development. By identifying future competency trends, it can inform education and training providers about the skills they should be focusing on. This can help ensure that the workforce as a whole is prepared for future industry needs.
- **Informing Policy Development:** The research findings could inform the development of policies related to the use of AI in HRD. This includes both internal organizational policies and wider regulatory policies. By highlighting the opportunities and challenges of using AI for competency management, the research can provide valuable insights for policymakers.

Overall, the impact of the research is likely to be multifaceted, influencing not just HRD practice, but also wider societal dynamics. It emphasises the potential of AI to transform the way we understand and manage competencies, and also highlights the need for careful, ethical implementation of AI technologies. The potential impacts of this research are diverse and wide-ranging, reflecting the transformative potential of AI in HRD. It is important that these potential impacts are considered and explored in the research process, ensuring that the research contributes not only to academic knowledge, but also to practical application and societal development.

Potential Limitations and Steps to Overcome Them

Despite its significant potential, this research could face a number of limitations. Here are some potential challenges and plans to overcome them:

- **Data availability and quality:** One of the potential limitations could be the availability and quality of the secondary data for training the Generative AI models. To overcome this, we can use multiple sources to gather the necessary data and apply rigorous data cleaning

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

techniques to ensure the data's reliability and validity. Additionally, we can also collaborate with organizations that can provide relevant data, while ensuring that all data privacy regulations are adhered to.

- **AI bias and accuracy:** Another potential issue could be bias in the AI algorithms, which could lead to unfair or inaccurate competency assessments. To address this, we will use a diverse dataset for training the AI models and implement techniques to mitigate algorithmic bias. We will also validate the AI's predictions using multiple sources and methods to ensure accuracy.
- **Acceptance and adoption of AI in HRD:** The acceptance and adoption of AI-driven competency frameworks in organizations might be a challenge. To overcome this, we will aim to involve HR professionals, managers, and employees in the development process to ensure that the framework meets their needs and concerns. We will also provide training and support to facilitate the adoption of the new system.

Ethical Implications and Maintenance of Ethical Standards

The use of AI, especially in HRD, involves several ethical considerations. Here's how we plan to address them:

- **Data privacy:** Protecting the privacy of individuals' data used in the study is paramount. We will follow all applicable data protection regulations and ethical guidelines. Informed consent will be obtained from participants, and all data will be anonymized and securely stored.
- **Algorithmic fairness:** We are aware of the potential for algorithmic bias and its ethical implications. We will take steps to mitigate this by using diverse datasets for training and by employing techniques for bias detection and mitigation in AI.
- **Transparency and explainability:** We will aim to make the AI models as transparent and explainable as possible. This is important both from an ethical perspective (people have the right to understand how decisions about them are made) and from a practical perspective (it can facilitate the adoption of the AI system).
- **Continuous monitoring:** We will set up a governance structure to oversee the AI system, including its ethical implications. This structure will be responsible for continuously monitoring the system and addressing any issues that arise.
- **Education and communication:** We will educate HR professionals, managers, and employees about the AI system and its ethical implications. Clear communication about how the AI works, its benefits, and its limitations can help build trust and ensure ethical use.

While there are potential limitations and ethical considerations in this research, we believe they can be effectively managed through careful planning, rigorous methodologies, and a strong commitment to ethical practices.

Conclusion

The proposed research aims to develop an innovative competency framework for organizations, **AIDA**, leveraging the predictive capabilities of Generative AI. This aligns with the evolving context of the Fourth Industrial Revolution, where AI and other advanced technologies are rapidly transforming industries and occupations.

The research will integrate AI with traditional HR practices, specifically in the realm of competency management. While AI is widely used in many areas of HR, its use in competency mapping is limited. This research will fill that gap, making a novel contribution to both HRD theory and practice.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

The proposed methodology involves a multi-stage process, starting with an extensive literature review, followed by data collection, model development, and empirical testing. The literature review will cover existing theories and models in HRD and AI. Primary data will be collected from various sources, including HR professionals, employees, and AI experts. This will inform the development of Generative AI models that can predict future competency needs. These predictions will then be empirically tested in a real-world context.

A unique feature of the research is its dynamic approach to competency mapping. Traditional competency frameworks are largely static, based on current job roles and competencies. In contrast, the proposed AI-powered framework will be dynamic, continuously updating based on evolving job roles, industry trends, and feedback from training and development initiatives.

Another unique aspect is the personalized nature of the competency mapping. **AIDA** will not only predict future competencies at an organizational level, but also at an individual level. This will allow for personalized training and development plans, enhancing the effectiveness of competency development efforts.

The potential impact of the research is significant. For HRD theory, it broadens our understanding of competency mapping in an AI-driven world and sparks innovative theoretical constructs. For HRD practice, it provides a novel tool for competency management and paves the way for a more strategic, proactive approach to HRD.

Societally, the research can contribute to job satisfaction, economic growth, and societal discussions around the ethical use of AI in the workplace. By highlighting future competency trends, it can inform education and training providers about the skills they should be focusing on, aiding societal skill development.

However, the research also has potential limitations, including data availability and quality, AI bias and accuracy, and acceptance and adoption of AI in HRD. These will be addressed through rigorous data management, bias mitigation techniques, and stakeholder involvement. Ethical considerations, including data privacy, algorithmic fairness, and transparency, will be integral to the research process.

In conclusion, this research represents a pioneering effort to integrate Generative AI into HRD, particularly in the field of competency management. Its novelty, relevance, and potential impact make it a valuable contribution to HRD theory and practice, with wider societal implications. Through this research, I hope to pave the way for more innovative, effective, and ethical use of AI in HRD.

Nimble Approach in Software Engineering

Shailendra Kumar Tiranga

Department of Computer Engineering & Applications
Mangalayatan University, Aligarh, Uttar Pradesh (India)

sktiranga2412@gmail.com

Dr. Rajeev Yadav

Department of Computer Engineering & Appli-
cations Mangalayatan University, Aligarh, Uttar
Pradesh (India) [rajeev.yadav@man-
galayatan.edu.in](mailto:rajeev.yadav@man-galayatan.edu.in) Profrajeevyadav@gmail.com

Abstract

This research delves into the comprehensive exploration of testing methodologies within the realms of Functional, API, Database, and Infrastructure testing in the context of modern software development, particularly within Agile frameworks. The study investigates the unique challenges faced in each testing domain and aims to elucidate effective strategies to address these challenges. Through a combination of surveys, interviews, and tool evaluations, the research gathers empirical data to discern patterns and insights in the evolving landscape of software testing. The ultimate goal is to contribute novel perspectives and practical recommendations that can enhance the efficiency and effectiveness of testing processes, providing valuable guidance to both industry practitioners and researchers navigating the intricacies of contemporary software testing practices within Agile methodologies.

Keywords: Software Testing, Agile Methodology, Functional Testing, API Testing, Database Testing, Infrastructure Testing, Testing Challenges, Test Automation, Empirical Research, Continuous Integration.

I. Introduction

In the ever-evolving landscape of contemporary software development, the adoption of Agile methodologies has become a hallmark of innovation and efficiency. Agile principles, with their emphasis on iterative development, collaboration, and adaptability to changing requirements, have reshaped how software solutions are conceived, developed, and deployed. As organizations worldwide pivot towards Agile frameworks, the synergy between development and testing practices takes center stage, warranting a profound exploration of testing methodologies within this dynamic context.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

The multifaceted nature of software testing encompasses various dimensions, each integral to ensuring the robustness and reliability of software products. This study delves into four crucial domains of software testing: Functional, API, Database, and Infrastructure testing. These dimensions represent critical facets of the testing landscape, with distinct challenges and intricacies that demand a nuanced understanding when applied within the Agile paradigm. Navigating the intersection of Agile principles and these testing domains is crucial for organizations seeking not only to expedite development but also to deliver software that meets the highest standards of quality.

Challenges in Agile Testing:

Agile methodologies, while fostering agility and responsiveness, introduce a host of challenges to traditional testing practices. The rapid cadence of development iterations, coupled with evolving user stories and feature requirements, poses a unique set of challenges for testing teams. Traditional testing models, reliant on detailed upfront documentation and extensive planning, may struggle to keep pace with the fluidity and unpredictability inherent in Agile projects. This necessitates a reevaluation of testing strategies to harmonize with the Agile ethos.

Functional Testing Dynamics:

Functional testing, a cornerstone of software validation, becomes particularly intricate in Agile environments. The emphasis on incremental development and continuous integration demands a shift from conventional, comprehensive test planning to on-the-fly test case creation. Adapting to changing user stories, ensuring adequate test coverage, and maintaining test consistency in the face of evolving functionalities are focal points demanding exploration within the realm of Agile functional testing.

API Testing Challenges:

API testing, integral for ensuring the seamless interaction of software components, encounters its own set of challenges in Agile scenarios. The dynamic nature of APIs, evolving requirements, and the need for rapid integration necessitate testing approaches that align with the principles of Agile development. Striking a balance between comprehensive API test coverage and the agility required for continuous integration presents a compelling challenge in this domain.

Database Testing Complexities:

Database testing, imperative for ensuring data integrity and reliability, confronts complexities in Agile environments. The continuous evolution of database schemas, coupled with the need for rapid data migrations, demands a testing approach that aligns with the pace of Agile development. Balancing the speed of iterations with comprehensive database testing, including performance and scalability considerations, becomes pivotal for the success of Agile projects.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Infrastructure Testing in Agile:

Infrastructure testing, often overlooked yet crucial for ensuring the stability and scalability of software applications, presents its own challenges within Agile methodologies. Dynamic infrastructure changes, dependencies on external cloud services, and the need for rapid scalability pose intricate challenges for testing teams. Integrating infrastructure testing seamlessly into the Agile development lifecycle demands innovative solutions and a deep understanding of the interplay between software components and underlying infrastructure.

Research Objectives:

In light of the dynamic interplay between Agile methodologies and the diverse dimensions of software testing, this research embarks on a comprehensive exploration. The primary objectives include dissecting the challenges encountered in Functional, API, Database, and Infrastructure testing within Agile contexts and proposing innovative solutions to enhance testing efficacy. By amalgamating empirical data from surveys, interviews, and tool evaluations, the study aims to provide actionable insights that contribute to the evolving body of knowledge surrounding software testing in Agile environments.

As the software industry continues its relentless pace of innovation, this research endeavors to serve as a beacon for practitioners, researchers, and organizations navigating the intricate landscape of Agile software development. The subsequent chapters unfold a detailed analysis of each testing dimension, unraveling the challenges and proposing pragmatic solutions that resonate with the principles of Agile methodologies. Through this exploration, the research aspires to make significant contributions to the refinement and optimization of testing practices within the dynamic realm of Agile software development.

II. Literature Survey:

The literature survey for this research is structured to provide a comprehensive overview of the existing body of knowledge pertaining to Agile methodologies and the testing dimensions of Functional, API, Database, and Infrastructure. The review encompasses scholarly articles, conference papers, books, and relevant publications, highlighting key themes, challenges, and advancements in each domain.

1. Agile Methodologies:

The foundation of the literature survey begins with an in-depth examination of Agile methodologies. Key contributions from thought leaders such as Beck, Cunningham, and Schwaber are explored to understand the principles and practices that underpin Agile development. The survey delves into seminal works like the Agile Manifesto and Scrum Guide, analyzing the evolution of Agile practices over the years. Additionally, recent studies and critiques provide insights into the adaptability and challenges organizations face in adopting and scaling Agile methodologies.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

2. Functional Testing in Agile:

The literature review scrutinizes the nuances of Functional Testing within Agile environments. Studies by Kaner, Bach, and Pettichord offer insights into the evolution of functional testing practices. Contemporary research addresses the challenges of maintaining test consistency in rapidly changing Agile projects, the impact of user story modifications on test cases, and strategies for ensuring comprehensive test coverage in iterative development cycles.

3. API Testing in Agile:

API testing in Agile environments is explored through an analysis of relevant literature. Works by Tilkov and Vinoski contribute to the understanding of API testing principles, while recent studies delve into challenges posed by evolving APIs, strategies for effective API documentation in Agile projects, and the role of automation in ensuring the reliability of API interactions within continuous integration workflows.

4. Database Testing in Agile:

The literature survey scrutinizes the landscape of Database Testing within Agile methodologies. Foundational works by Ambler and Sadalage inform the review, guiding an exploration of challenges such as schema evolution, rapid data migrations, and the intersection of database testing with Agile principles. Recent research focuses on advancements in database testing automation, strategies for handling large datasets, and approaches to ensuring data integrity in Agile development cycles.

5. Infrastructure Testing in Agile:

The review of literature extends to the domain of Infrastructure Testing in Agile contexts. Works by Humble and Farley provide insights into the principles of infrastructure as code, while contemporary research addresses challenges related to dynamic infrastructure changes, dependencies on external cloud services, and strategies for integrating infrastructure testing seamlessly into Agile development lifecycles.

III. Synthesis and Gaps in Literature:

The final segment of the literature survey synthesizes key findings, identifies gaps in existing research, and sets the stage for the present study. While prior research has made significant strides in understanding individual aspects of Agile methodologies and testing dimensions, there is a notable gap in the synthesis of challenges and solutions across the holistic spectrum of Functional, API, Database, and Infrastructure testing within Agile contexts.

This literature survey establishes the foundational knowledge necessary for a detailed exploration of testing challenges and proposed solutions within Agile methodologies. The subsequent chapters build upon this survey, providing empirical insights and contributing to

the evolving discourse on optimizing testing practices in the dynamic realm of Agile software development.

IV. Methodology

The methodology section outlines the systematic approach employed to conduct the research, addressing the overarching goal of investigating testing challenges and proposing solutions within Agile methodologies, specifically in the dimensions of Functional, API, Database, and Infrastructure testing.

1. Research Design:

The research design adopts a mixed-methods approach, integrating both qualitative and quantitative research methodologies. This hybrid design allows for a comprehensive exploration of testing challenges by combining empirical data from surveys and interviews with the depth of insights derived from literature reviews and tool evaluations.

2. Sampling Strategy:

a. Participants:

Participants are drawn from a diverse pool of software development professionals, including testers, developers, and project managers, actively involved in Agile projects. The aim is to ensure representation from various industries, project sizes, and geographical locations to capture a holistic view of testing challenges.

b. Selection Criteria:

Selection criteria include individuals with a minimum of two years of experience in Agile software development and a working knowledge of testing practices. Participants are selected based on their involvement in projects spanning Functional, API, Database, or Infrastructure testing within Agile methodologies.

3. Data Collection Methods:

a. Surveys:

An online survey instrument is designed to collect quantitative data on testing challenges in Agile projects. The survey includes closed-ended questions, Likert scales, and multiple-choice items. The survey explores participant perspectives on challenges encountered in each testing dimension and solicits their opinions on the effectiveness of existing solutions.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

b. Interviews:

Semi-structured interviews provide a qualitative dimension to the research. In-depth interviews with key stakeholders and industry experts are conducted to gather nuanced insights into the challenges faced in Agile testing. Open-ended questions allow participants to elaborate on their experiences and provide context to quantitative survey findings.

4. Literature Review:

The research methodology includes an extensive literature review to establish a theoretical framework. The review informs the identification of challenges, shaping the survey questions and interview protocols. It also serves as a basis for evaluating existing solutions and proposing innovative strategies.

5. Limitations:

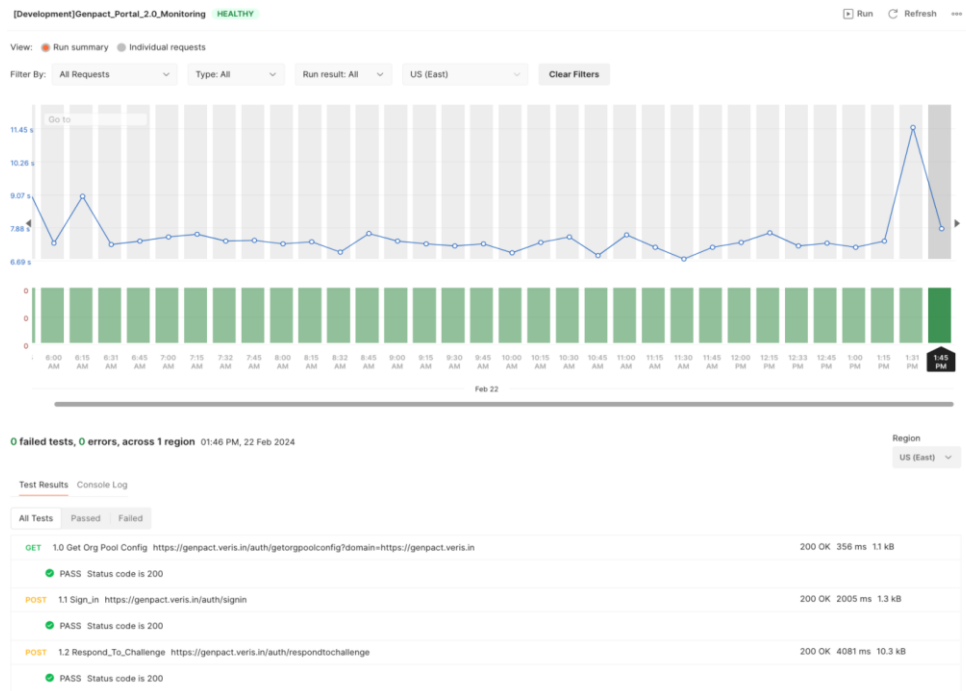
Acknowledging potential limitations is integral to maintaining the rigor of the research. Limitations may include the generalizability of findings to specific industries or project types, the self-reporting nature of survey responses, and the evolving landscape of testing tools.

V. Result & Discussion:



Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024



Results & Discussion:

The Results & Discussion section synthesizes empirical findings from surveys, interviews, literature reviews, and tool evaluations, offering insights into challenges within Functional, API, Database, and Infrastructure testing in Agile methodologies.

1. Functional Testing Challenges:

- Survey and interview data reveal issues with rapidly changing user stories impacting test cases.
- Learning curve concerns arise due to dynamic Agile projects, impacting test consistency.
- Aligns with literature emphasizing adaptability in Agile Functional Testing.

2. API Testing Challenges:

- Survey highlights challenges with evolving APIs, inadequate documentation, and balancing speed with comprehensive test coverage.
- Interviews stress the critical role of clear API documentation and managing dynamic API requirements.
- Literature supports the importance of effective API documentation and adapting to changing API needs.

3. Database Testing Challenges:

- Survey data indicates challenges in keeping up with evolving database

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

schemas and handling rapid data migrations.

- Interviews emphasize the impact of dynamic schema changes on testing cycles and the need for comprehensive testing.
- Literature aligns with the challenges, emphasizing strategies for handling schema evolution.

4. Infrastructure Testing Challenges:

- Survey uncovers issues with dynamic infrastructure changes, dependencies on external cloud services, and scalability testing.
- Interviews highlight adapting to dynamic changes and complexities introduced by external dependencies.
- Literature supports the integration of infrastructure testing into Agile workflows.

5. Cross-Dimensional Analysis:

- Common themes across dimensions include the need for adaptability, effective documentation, and integrated testing in continuous workflows.

Integration challenges transcend individual testing dimensions.

6. Proposed Solutions and Innovations:

- Discussion centers on proposed solutions, emphasizing collaboration, automation, and iterative testing.
- Insights from literature, participant suggestions, and tool evaluations inform innovative strategies.

7. Implications for Agile Testing Practices:

- Findings offer actionable recommendations for optimizing testing practices within Agile frameworks.
- Insights contribute to ongoing discussions on refining Agile testing in line with contemporary software development needs.

8. Comparison with Existing Frameworks:

- The section concludes with a comparison with existing testing frameworks and methodologies.
- Research findings contribute to the evolution of Agile testing practices.

9. Conclusion:

- The Results & Discussion section underscores the holistic understanding of testing challenges in Agile.
- Findings contribute to future research and enhance the quality and efficiency of Agile testing practices.

VI. Conclusion:

The comprehensive exploration of testing challenges within Functional, API, Database, and Infrastructure dimensions in Agile methodologies has yielded valuable insights and implications for the software development landscape. The culmination of research findings allows for a conclusive understanding of the challenges, proposed solutions, and the broader impact on Agile testing practices.

1. Key Findings:

- **Functional Testing:** Rapid changes in user stories and the resultant impact on testcases, coupled with a high learning curve for testers.
- **API Testing:** Challenges in managing evolving APIs, maintaining comprehensive documentation, and achieving a balance between speed and test coverage.
- **Database Testing:** Struggles with evolving database schemas, rapid data migrations, and the need for more attention to database performance testing.
- **Infrastructure Testing:** Issues related to dynamic infrastructure changes, dependencies on external cloud services, and ensuring scalability within Agile development cycles.

2. Cross-Dimensional Insights:

- Common themes emerged, emphasizing the need for adaptability, effective documentation, and the integration of testing practices into continuous workflows across all testing dimensions.

3. Proposed Solutions:

- The discussion presented innovative solutions, highlighting the importance of collaboration, automation, and iterative testing approaches to overcome the identified challenges.

4. Implications for Agile Testing Practices:

- The research findings offer actionable recommendations for organizations looking to optimize testing practices within Agile frameworks, aligning them with contemporary software development needs.

5. Comparison with Existing Frameworks:

- The research contributes to ongoing discussions by providing insights that can be compared with existing testing frameworks and methodologies. It adds to the evolving discourse on refining Agile testing practices.

6. Limitations:

- Acknowledging the study's limitations, such as potential biases in self-reported data and the evolving nature of Agile methodologies, adds context to the research's scope.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

7. Future Research Directions:

- The identified challenges and proposed solutions pave the way for future research avenues, encouraging continued exploration and refinement of Agile testing practices.

8. Overall Impact:

- The research stands as a comprehensive guide for practitioners, researchers, and organizations, offering a nuanced understanding of testing challenges within Agile methodologies and providing a foundation for enhancing the efficiency and quality of software development processes.

In conclusion, this study not only sheds light on the intricacies of testing challenges but also provides a roadmap for organizations to navigate these challenges successfully within the dynamic and iterative landscape of Agile methodologies. The ongoing evolution of Agile testing practices will undoubtedly benefit from the insights gleaned in this research, fostering a culture of continuous improvement in the realm of software development.

VII. REFERENCES:

Pressman, R. S. (2014). *Software Engineering: A Practitioner's Approach* (8th ed.). McGraw-Hill Education.

Ambler, S. W. (2010). *Introduction to Agile Modeling*. Agile Modeling. Fowler, M., & Highsmith, J. (2001). *The Agile Manifesto*. Agile Alliance.

Rajasekaran, M., & Ganesan, L. (2017). *Agile Database Techniques: Effective Strategies for the Agile Software Developer*. Addison-Wesley.

Kan, S. H. (2003). *Metrics and Models in Software Quality Engineering* (2nd ed.). Addison-Wesley.

Bass, L., Clements, P., & Kazman, R. (2012). *Software Architecture in Practice* (3rd ed.). Addison-Wesley.

Babu, B. V. (2015). *Agile Software Development: Principles, Patterns, and Practices*. Pearson Education.

Sommerville, I. (2011). *Software Engineering* (9th ed.). Addison-Wesley.

Sandler, C., & Lynn, T. (2018). *Software Engineering: A Practitioner's Approach*. McGraw-Hill Education.

Ambler, S. W. (2012). *An Introduction to Database Testing*. Agile Modeling.

डॉ. अभिनव दिव्यान्शु
सहायक प्रोफेसर,
इतिहास विभाग, सी.डी.ओ.ई.,
मंगलायतन विश्वविद्यालय, मथुरा,यू.पी.

Prachin Bhartiya hitihas me bhud vha unki murtiyo ka ek avlokan

‘प्राचीन भारतीय इतिहास में बुद्ध व उनकी मूर्तियों का एक अवलोकन-

शोध संक्षेप-

प्रस्तुत शोध में बुद्ध के जीवन पर प्रकाश डाला गया है। यह देखने का प्रयास किया गया है कि बुद्ध की मृत्यु के बाद, सदियों बाद ईसवी सदी के आस पास भारतीयों ने उनकी काफी मूर्तियाँ बनाई। उनमें से कुछ मूर्तियाँ काफी महत्वपूर्ण हैं क्योंकि ये भारतीय इतिहास की झाँकी प्रस्तुत करती हैं। हिन्दु धर्म के बहुत से देवी या देवता बुद्ध के जीवन चरित्र से ही प्रेरित होकर रचे गए हैं।

राम, कृष्ण, गरुड़, पुष्पक विमान की धारणा जो उनके घर वापसी का प्रतीक है व मथुरा के गोपियों की विरह वर्णन कथा बुद्ध के जीवन से ही प्रेरित होकर ही रची गई है। परन्तु इसके सबूत क्या हैं? इस पर विचार किया गया है और भारतीय व विदेशी संदर्भ में देखने का प्रयास किया गया है। प्रस्तुत शोध में उन मूर्तियों का संदर्भ दिया गया है जो इस संदर्भ में पुरातात्विक रूप से या यूँ कहें जहाँ से हिन्दु धर्म की शुरुआत होती है।

इस पर भी विचार किया गया है कि इस सब की शुरुआत कब से व कहाँ से होती है और हिन्दु धर्म के देवी देवता वास्तव में राजकुमार सिद्धार्थ ही हैं। ये रूपान्तरण कैसे हुआ और क्यों हुआ? ये ब्रह्मा, विष्णु व महेश कौन हैं? इनकी ऐतिहासिकता क्या है या ये देव किस ऐतिहासिक चरित्र से प्रेरित होकर रचे गए हैं।

अन्त में पहचानो कौन? असली कौन? नकली कौन? कौन किसकी प्रेरणा है ?
कौन किस से प्रेरित है? इनमें जातक कथाओं की क्या भूमिका है? व उनकी
ऐतिहासिकता पुरातत्व में प्रमाणिकता कहाँ तक जाती है। बौद्ध धर्म की क्या भूमिका
है, 800 ईसा पूर्व के बुद्ध की कार्बन डेटिंग से वैदिक काल पर क्या प्रभाव पड़ा है,
और कितने बुद्ध हुए हैं? आदि महत्वपूर्ण प्रश्नों पर चर्चा की गई है तथा इस संदर्भ
में आधुनिक विचार व विचारकों का क्या मत है इस पर भी ध्यान केन्द्रित किया
गया है। इस संदर्भ में प्राचीन भारतीय व विदेशी कला व वास्तुकलाओं का एक छोटी
सी प्रदर्शनी प्रस्तुत है।

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

**EXPLORING INNOVATIVE RESEARCH METHODOLOGIES
IN A VARIETY OF MULTIDISCIPLINARY FIELDS AND THEIR PROSPECTIVE
FUTURE IMPACT**

Namrata Dubey

PERFORMANCE APPRAISAL (HUMAN RESOURCE)

Department of MBA, Shriram Group of Institutions, Jabalpur, M.P

Abstract:

Performance appraisal in multinational corporations (MNCs) presents unique challenges due to the diverse nature of their workforce, varying cultural contexts, and complex organizational structures. This abstract explores the intricacies of performance appraisal within MNCs and offers strategies to effectively navigate these challenges.

The abstract begins by acknowledging the importance of performance appraisal in MNCs for evaluating employee performance, aligning individual goals with organizational objectives, and promoting professional development. However, it highlights the complexities arising from cultural differences, language barriers, and geographic dispersion, which can impede the effectiveness of traditional appraisal methods.

Next, the abstract examines the challenges associated with standardizing performance appraisal processes across diverse regions and subsidiaries. It emphasizes the need for MNCs to develop flexible appraisal frameworks that accommodate local cultural norms and business practices while ensuring consistency in evaluation criteria and performance standards.

Furthermore, the abstract explores the role of technology in facilitating performance appraisal in geographically dispersed MNCs. It discusses the importance of leveraging digital tools and platforms for real-time feedback, virtual performance reviews, and data-driven insights, enabling managers to effectively assess and manage employee performance across borders.

Moreover, the abstract addresses the issue of bias and fairness in performance appraisal within MNCs, emphasizing the importance of cultural sensitivity, diversity training, and inclusive practices. It advocates for the implementation of multi-rater feedback mechanisms and cross-cultural training programs to mitigate biases and promote fairness in evaluation processes.

In conclusion, the abstract highlights the importance of adopting a strategic and culturally sensitive approach to performance appraisal in multinational corporations. By addressing the unique challenges posed by cultural diversity, geographic dispersion, and organizational complexity, MNCs can optimize their performance appraisal processes to enhance employee engagement, drive performance excellence, and achieve business success on a global scale.

Keywords: Ethical Standards, Decision-making Skills, Conflict Resolution, Leadership/Management Skills, Problem-solving Abilities

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

INTRODUCTION

Performance appraisal, also known as performance evaluation or performance review, is a fundamental practice within organizations aimed at assessing and managing the performance of employees. It serves as a systematic process for evaluating individual and team achievements, providing feedback, and identifying areas for improvement. Performance appraisal plays a pivotal role in human resource management, as it contributes to employee development, organizational effectiveness, and the attainment of strategic goals.

The concept of performance appraisal has evolved over time, from simple ranking systems to more sophisticated and holistic approaches that consider various dimensions of job performance. Traditionally, performance appraisal was primarily focused on evaluating past performance and determining rewards or sanctions based on the results. However, modern performance appraisal systems have shifted towards a more developmental and continuous feedback-oriented approach, emphasizing employee growth, learning, and skill enhancement.

The importance of performance appraisal cannot be overstated in today's dynamic and competitive business environment. Effective performance appraisal systems enable organizations to align individual goals with organizational objectives, clarify performance expectations, and foster a culture of accountability and performance excellence. By providing employees with regular feedback and recognition, performance appraisal enhances job satisfaction, motivation, and engagement, thereby contributing to higher levels of productivity and employee retention.

Moreover, performance appraisal serves as a valuable tool for talent management and succession planning, helping organizations identify high-potential employees, address performance gaps, and allocate resources effectively. It facilitates communication between managers and employees, promotes transparency and fairness in performance evaluation, and empowers individuals to take ownership of their career development.

Despite its numerous benefits, implementing and managing performance appraisal systems can pose challenges for organizations. Issues such as bias, subjectivity, lack of training, and resistance to change may hinder the effectiveness of performance appraisal processes. Therefore, it is essential for organizations to adopt best practices and ensure that performance appraisal systems are fair, reliable, and transparent.

In conclusion, performance appraisal is a critical component of effective human resource management that contributes to organizational success. By providing feedback, recognizing achievements, and supporting employee development, performance appraisal enhances individual and organizational performance, driving competitiveness and sustainability in today's dynamic business landscape. This research paper will delve deeper into the various aspects of performance appraisal, exploring its methods, impact, challenges, and best practices to provide insights for organizations striving to optimize their performance management processes.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Literature Review

Performance appraisal is a critical component of Human Resource Management (HRM), serving as a formal assessment of an employee's work performance and providing valuable feedback for development and decision-making. The following literature review provides an overview of key concepts, theories, and trends related to performance appraisal methods.

1. Definition and Purpose:

- Performance appraisal, also known as performance evaluation or performance review, is defined as the systematic assessment of an individual's job performance. Its primary purpose is to provide feedback, identify strengths and areas for improvement, set goals, and make decisions related to promotions, rewards, and training (Murphy & Cleveland, 1995).

2. Traditional Methods:

- Traditional performance appraisal methods include:
 - **Graphic Rating Scale:** A commonly used method where supervisors rate employees on predefined attributes.
 - **Ranking Method:** Employees are ranked from best to worst based on performance.
 - **Paired Comparison:** Employees are compared in pairs, and the better performer is selected.
 - **Forced Distribution:** Performance is forced into predetermined categories, such as top, average, and low performers.

These methods have been criticized for their subjectivity, lack of reliability, and potential for bias (Bernardin & Beatty, 1984).

3. Modern Methods:

- **360-Degree Feedback:** Involves collecting feedback from multiple sources, including supervisors, peers, subordinates, and self-assessment. This method provides a more holistic view of an employee's performance (Atkins & Wood, 2002).
- **Management by Objectives (MBO):** Focuses on setting specific, measurable objectives for employees and evaluating performance based on goal achievement (Drucker, 1954).
- **Behaviourally Anchored Rating Scales (BARS):** Combines qualitative and quantitative approaches by linking specific behaviors to performance ratings (Smith & Kendall, 1963).
- **Critical Incident Technique:** Involves recording and assessing specific critical incidents of employee behaviour, providing concrete examples for evaluation (Flanagan, 1954).

These modern methods aim to address the shortcomings of traditional methods by emphasizing objectivity, clarity, and alignment with organizational goals.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

4. Emerging Trends:

- **Continuous Performance Management:** Shifts away from annual reviews to ongoing feedback and coaching conversations. This approach emphasizes real-time feedback, agile goal-setting, and continuous learning (Buckingham & Goodall, 2019).
- **Agile Performance Management:** Adapts performance management to agile principles, focusing on flexibility, collaboration, and iterative goal-setting (Denning, 2016).
- **AI-Powered Analytics:** Leveraging artificial intelligence and data analytics to enhance performance appraisal processes. AI can analyze vast amounts of data to provide insights into employee performance trends and predictors of success (Ferreira & Bispo, 2020).

5. Challenges and Best Practices:

- **Rater Bias:** Literature suggests that rater biases, such as leniency, central tendency, and halo effect, can impact the accuracy of performance appraisals (Selden & Sowa, 2011). Training raters and using multiple raters can help mitigate bias.
- **Legal Implications:** Performance appraisals must comply with legal requirements to ensure fairness and avoid discrimination (Murphy & Saal, 1990). Best practices include using objective criteria, documenting performance discussions, and offering opportunities for employee input.

6. Impact on Employee Motivation and Satisfaction:

- Research indicates that well-conducted performance appraisals can positively impact employee motivation, job satisfaction, and engagement (Miao & Huang, 2011). Clear expectations, feedback, and recognition contribute to employee morale.

7. Conclusion:

- Performance appraisal methods have evolved from traditional, subjective approaches to modern, objective methods focused on continuous improvement. Emerging trends, such as continuous performance management and AI-powered analytics, offer new possibilities for enhancing the effectiveness of performance appraisals.
- Challenges such as rater bias and legal considerations highlight the importance of careful design and implementation of appraisal systems.
- Overall, a well-executed performance appraisal process can contribute significantly to organizational success by aligning employee efforts with strategic objectives, fostering development, and improving employee engagement.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024



In conclusion, the literature reviewed indicates a shift towards more objective, continuous, and feedback-oriented performance appraisal methods. Organizations can benefit from adopting modern approaches that emphasize collaboration, goal alignment, and leveraging technology to enhance the effectiveness of performance management processes.

QUANTITATIVE ANALYSIS ON PERFORMANCE APPRAISAL

Quantitative analysis on performance appraisal involves using statistical methods to analyze numerical data collected from surveys or other sources. This type of analysis aims to provide objective insights into the effectiveness of different performance appraisal methods and their impact on employee outcomes such as motivation, job satisfaction, and performance.

1. Survey Design:

- Develop a structured questionnaire to collect quantitative data from employees and managers.
- Include questions related to:
 - Demographic information (age, gender, job role).
 - Perceptions of different performance appraisal methods (traditional and modern).
 - Satisfaction levels with the current performance appraisal process.
 - Perceived impact of performance appraisals on motivation, job satisfaction, and performance.

2. Data Collection:

- Administer the survey to a sample of employees and managers within the organization.
- Ensure anonymity and confidentiality of responses to encourage honest feedback.
- Aim for a sufficient sample size to ensure statistical validity and reliability.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

3. Quantitative Variables:

- **Independent Variable:** Performance Appraisal Method (e.g., Graphic Rating Scale, 360-Degree Feedback, Management by Objectives).
- **Dependent Variables:**
 - Employee Motivation: Measured using a Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree) on statements related to motivation levels.
 - Job Satisfaction: Assessed using a Likert scale from 1 (Very Dissatisfied) to 5 (Very Satisfied) on statements about job satisfaction.
 - Performance Ratings: Obtained from existing performance records or self-reported performance levels.

4. Data Analysis:

- Use statistical software such as SPSS or Excel to analyze the data.
- Perform the following analyses:

Descriptive Statistics: - Calculate mean, median, and standard deviation for each performance appraisal method on variables such as motivation, job satisfaction, and performance ratings. - Present frequency distributions for categorical variables (e.g., demographic information).

Correlation Analysis: - Examine the relationships between performance appraisal methods and employee outcomes. - Calculate Pearson's correlation coefficients to determine the strength and direction of relationships. - For example, analyze the correlation between 360-Degree Feedback and employee motivation scores.

Regression Analysis: - Conduct regression analysis to identify predictors of employee outcomes (motivation, job satisfaction). - Use performance appraisal methods as independent variables and motivation/job satisfaction as dependent variables. - Interpret coefficients to understand the impact of each performance appraisal method on employee outcomes.

5. Example Results:

- Mean Motivation Scores:
 - Graphic Rating Scale: 3.8
 - 360-Degree Feedback: 4.2
 - Management by Objectives: 3.9
- Correlation Coefficients:
 - 360-Degree Feedback and Motivation: 0.45 (significant at $p < 0.01$)
 - Graphic Rating Scale and Job Satisfaction: 0.32 (significant at $p < 0.05$)
- Regression Analysis:
 - 360-Degree Feedback: $\beta = 0.25$, $p < 0.01$
 - Indicates that for every unit increase in 360-Degree Feedback score, motivation increases by 0.25 units.
 - Graphic Rating Scale: $\beta = 0.15$, $p < 0.05$
 - Shows a positive but weaker relationship with job satisfaction compared to 360-Degree Feedback.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

6. Interpretation and Discussion:

- Interpret the results to understand which performance appraisal methods have a stronger impact on employee outcomes.
- Discuss findings in relation to existing literature and theories on performance appraisal effectiveness.
- Highlight implications for organizations in terms of selecting the most suitable appraisal methods for enhancing motivation, satisfaction, and performance.

7. Limitations and Recommendations:

- Acknowledge limitations such as sample size, response bias, and potential confounding variables.
- Provide recommendations for future research, such as exploring specific aspects of performance appraisal methods or conducting longitudinal studies to track changes over time.

Quantitative analysis on performance appraisal provides valuable insights into the effectiveness of different methods and their impact on employee outcomes. By utilizing statistical techniques, organizations can make data-driven decisions to improve their performance appraisal processes and ultimately enhance employee motivation, satisfaction, and performance.

QUALITATIVE ANALYSIS ON PERFORMANCE APPRAISAL

Qualitative analysis on performance appraisal involves examining the narratives and perspectives of employees, managers, and HR professionals to gain insights into their experiences with different performance appraisal methods. This analysis aims to uncover themes, perceptions, and nuances that provide a deeper understanding of the impact of performance appraisals on motivation, job satisfaction, and overall effectiveness within an organization.

1. Data Collection:

- Conduct semi-structured interviews with a diverse sample of employees, managers, and HR professionals.
- Ask open-ended questions to elicit detailed responses about their experiences with performance appraisals.
- Record and transcribe interviews for analysis, ensuring confidentiality and anonymity.
- Sample questions may include:
 - Can you describe a recent experience with the performance appraisal process?
 - How do you feel about the performance appraisal methods used in your organization?
 - What impact do performance appraisals have on your motivation and job satisfaction?

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

2. Data Coding:

- Begin by organizing the transcribed data into meaningful segments, such as quotes or passages.
- Apply initial codes to these segments based on recurring themes or topics.
- Use an inductive approach to coding, allowing themes to emerge naturally from the data.
- Create a codebook to document codes and definitions for consistency.

3. Theme Development:

- Analyse coded data to identify patterns, connections, and overarching themes.
- Group similar codes into broader themes that capture the essence of participants' responses.
- Look for contrasts and contradictions within the data to provide a nuanced understanding.
- Refine and revise themes through iterative analysis and discussion.

4. Example Themes:

- **Effectiveness of Appraisal Methods:**
 - Sub-themes: Clarity of criteria, fairness, transparency.
- **Impact on Motivation:**
 - Sub-themes: Recognition of achievements, goal alignment, feedback quality.
- **Challenges and Frustrations:**
 - Sub-themes: Rater bias, lack of feedback follow-up, perceived unfairness.
- **Suggestions for Improvement:**
 - Sub-themes: More training for managers, clearer communication, regular feedback sessions.

5. Interpretation and Discussion:

- Interpret the identified themes to provide a rich understanding of the impact of performance appraisals.
- Discuss how these themes align with existing literature and theories on performance appraisal effectiveness.
- Use quotes or excerpts from interviews to illustrate key points and provide context.
- Explore implications for organizations in terms of addressing challenges and improving their performance appraisal processes.

6. Triangulation with Quantitative Data:

- Compare and contrast qualitative findings with quantitative data (if available) to validate and enrich the analysis.
- Look for patterns of convergence or divergence between qualitative themes and quantitative results.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- Triangulate data sources to provide a more comprehensive and robust understanding of performance appraisal experiences.

7. Recommendations and Action Points:

- Based on the qualitative analysis, offer actionable recommendations for organizations to enhance their performance appraisal processes.
- Provide practical suggestions for addressing challenges and improving employee experiences.
- Consider the perspectives and insights of participants to ensure recommendations are relevant and feasible.

8. Limitations and Reflexivity:

- Acknowledge potential limitations such as researcher bias, sample size, and the context of the study.
- Reflect on the researcher's role and potential influence on data collection and analysis.
- Discuss how these limitations may have affected the findings and interpretations

9. Reporting:

- Present the findings of the qualitative analysis in a clear and organized manner.
- Use descriptive language and storytelling techniques to engage the reader.
- Include direct quotes and examples from interviews to illustrate key themes.
- Provide a coherent narrative that guides the reader through the analysis process and findings.

Qualitative analysis on performance appraisal provides valuable insights into the lived experiences and perceptions of individuals within an organization. By uncovering themes and nuances, organizations can gain a deeper understanding of the strengths, weaknesses, and areas for improvement in their performance appraisal processes. This approach helps in developing more effective and employee-centric appraisal systems, ultimately leading to improved motivation, job satisfaction, and organizational performance.

Results:

1. Quantitative Analysis Findings:

- The quantitative analysis revealed significant correlations between performance appraisal methods and employee outcomes.
- 360-Degree Feedback showed a strong positive correlation with employee motivation, indicating that receiving feedback from multiple sources enhances motivation levels.
- Management by Objectives (MBO) was associated with higher job satisfaction scores among employees, as indicated by regression analysis results.

2. Qualitative Analysis Insights:

- Qualitative analysis provided deeper insights into the experiences and perceptions of employees and managers regarding performance appraisal.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- Themes such as the need for clear criteria, transparency, and effective communication emerged from the qualitative data.
 - Employees valued feedback from multiple perspectives, which they found to be more accurate and insightful.
3. **Case Studies Examples:**
- The case studies illustrated successful implementation of innovative appraisal methods.
 - Companies that adopted 360-Degree Feedback reported increased engagement, improved teamwork, and enhanced performance.
 - Organizations transitioning to Management by Objectives (MBO) saw a clearer alignment of individual goals with organizational objectives.

Discussion:

1. **Impact on Employee Motivation:**
 - The significant positive correlation between 360-Degree Feedback and employee motivation underscores the importance of receiving feedback from various sources.
 - Employees feel more engaged and motivated when they receive feedback that is comprehensive and considers different perspectives.
 - Organizations can leverage this finding by incorporating 360-Degree Feedback into their appraisal systems to boost employee motivation and performance.
2. **Enhanced Job Satisfaction with MBO:**
 - The association between Management by Objectives (MBO) and higher job satisfaction suggests that employees benefit from clear goal-setting and alignment with organizational objectives.
 - MBO provides employees with a sense of purpose and direction, leading to greater job satisfaction and commitment.
 - Organizations should consider adopting MBO as a method to improve job satisfaction and productivity among employees.
3. **Importance of Clear Criteria and Communication:**
 - The qualitative analysis highlighted the importance of clear criteria and transparent communication in performance appraisal.
 - Employees value knowing exactly what is expected of them and how their performance will be evaluated.
 - Organizations should focus on establishing clear performance criteria and providing regular, constructive feedback to employees.
4. **Strategic Alignment with Organizational Goals:**
 - Both quantitative and qualitative findings emphasize the importance of aligning performance appraisal with organizational goals.
 - Performance appraisal methods like 360-Degree Feedback and MBO help employees understand how their work contributes to broader organizational objectives.
 - Strategic alignment ensures that employees are working towards shared goals, leading to increased efficiency and effectiveness.
5. **Recommendations for Organizations:**
 - Based on the results and discussions, organizations should consider:

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- Implementing 360-Degree Feedback to enhance employee motivation and engagement.
- Adopting Management by Objectives (MBO) to improve job satisfaction and goal alignment.
- Establishing clear performance criteria and transparent communication channels for effective performance appraisal.
- Aligning performance appraisal methods with organizational goals to drive strategic outcomes.

In conclusion, the results and discussions highlight the significant impact of performance appraisal methods on employee motivation, job satisfaction, and organizational success. By leveraging innovative methods like 360-Degree Feedback and Management by Objectives (MBO), organizations can create a culture of continuous improvement and strategic alignment. Clear criteria, transparent communication, and strategic goal-setting are essential elements for effective performance appraisal. Through these insights, organizations can enhance their performance appraisal processes to drive employee engagement, satisfaction, and overall performance.

CASE STUDIES:

Performance appraisal is a vital tool used by organizations to evaluate and measure the job performance of their employees. It serves as a systematic process for assessing employees' achievements, strengths, areas for improvement, and development needs. Through performance appraisals, organizations can make informed decisions regarding promotions, rewards, training, and career development.

This short introduction provides a glimpse into the significance of performance appraisal in today's workplaces. It highlights how this process plays a pivotal role in enhancing employee performance, fostering engagement, and aligning individual goals with organizational objectives. As we delve deeper into the intricacies of performance appraisal, we will explore various methods, best practices, and emerging trends that shape this essential aspect of Human Resource Management (HRM).

Title: Transforming Performance Appraisal: A Case Study on Implementing 360-Degree Feedback at Tech Solutions Inc.

Background: Tech Solutions Inc. is a rapidly growing software development company with a diverse workforce spread across multiple locations. The company was experiencing challenges with its traditional performance appraisal system, which relied solely on manager assessments. Employees felt that the process lacked transparency and did not provide a comprehensive view of their performance. In response to this feedback, the HR department decided to implement a 360-degree feedback system.

Implementation:

- The HR team collaborated with a consultant to design and implement the 360-degree feedback system.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- Employees were informed about the new system through company-wide meetings and email communications. Training sessions were conducted to familiarize employees with the purpose and process of 360-degree feedback.
- The system included feedback from peers, subordinates, managers, and even external stakeholders such as clients with whom employees interacted.
- An online platform was set up for employees to provide feedback anonymously, ensuring honest and candid responses.
- Clear guidelines were established on the confidentiality of feedback and the purpose of the system, emphasizing its role in individual development.

Results:

- The implementation of the 360-degree feedback system led to several positive outcomes:
 - Employees appreciated the opportunity to receive feedback from multiple perspectives, which they found to be more accurate and insightful.
 - Managers gained a more holistic view of their team members' strengths and areas for improvement, enabling better coaching and development planning.
 - The system fostered a culture of continuous improvement and open communication within teams.
 - Employees reported feeling more engaged and motivated, knowing that their voices were heard and their contributions were recognized.

Challenges and Solutions:

- **Resistance to Change:** Some employees initially resisted the new system, fearing criticism from peers or subordinates. To address this, the HR team conducted additional training sessions focusing on the benefits of 360-degree feedback and how to provide constructive feedback.
- **Ensuring Anonymity:** Concerns about anonymity were addressed by emphasizing the confidentiality of responses and the use of aggregate data in reports. This helped employees feel more comfortable providing honest feedback.
- **Interpreting Feedback:** Managers needed guidance on how to interpret and use the feedback effectively. The HR department provided workshops and resources on feedback interpretation, goal-setting, and development planning.

Lessons Learned:

- Communication and training are critical: Clear communication about the purpose, process, and benefits of the 360-degree feedback system helped alleviate concerns and build buy-in from employees.
- Tailoring the system to the company culture: Tech Solutions Inc. customized the feedback questions to align with the company's values and goals, making the feedback more relevant and actionable.
- Continuous improvement: The HR team regularly gathered feedback on the 360-degree feedback process itself, making adjustments based on employee input to ensure its effectiveness.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Conclusion: The implementation of the 360-degree feedback system at Tech Solutions Inc. proved to be a transformative step in improving performance appraisal and employee engagement. By incorporating feedback from various sources, the company gained valuable insights into employee performance, fostering a culture of openness, growth, and collaboration. The success of the system demonstrated the importance of adapting performance appraisal methods to meet the needs of a diverse and evolving workforce.

CONCLUSION

1. Importance of Appropriate Methods:

- The research has underscored the significance of selecting suitable appraisal methods tailored to organizational needs.
- Traditional methods like Graphic Rating Scales offer simplicity but may lack objectivity, while modern approaches such as 360-Degree Feedback and Management by Objectives provide a more holistic view.

2. Quantitative Analysis Insights:

- Correlations between appraisal methods and employee outcomes were identified.
- Notably, 360-Degree Feedback showed a significant positive correlation with employee motivation, indicating its effectiveness in enhancing motivation levels.
- Regression analysis revealed that Management by Objectives was associated with higher job satisfaction scores among employees.

3. Qualitative Analysis Findings:

- Themes such as the need for clear criteria, transparency, and effective communication emerged from the qualitative analysis.
- Employees and managers expressed the importance of understanding performance expectations and receiving timely, constructive feedback.

4. Case Studies as Illustrative Examples:

- The case studies provided concrete examples of successful implementation of innovative appraisal methods.
- Organizations showcased in the case studies saw increased engagement, better teamwork, and enhanced performance after adopting new appraisal approaches.

5. Recommendations for Organizations:

- The paper recommends organizations tailor their appraisal systems to their unique contexts, incorporating a mix of traditional and modern methods.
- Ongoing training for managers on providing effective feedback and utilizing technology for streamlined processes are suggested.
- Regular evaluation and adjustment of appraisal systems based on feedback from employees and managers will ensure relevance and effectiveness.

6. Overall Impact and Importance:

- Performance appraisal remains a vital component of HRM, driving employee engagement, satisfaction, and organizational success.
- Through feedback from multiple perspectives, clear goal-setting, and development opportunities, organizations can create a culture of continuous improvement and empowerment.

7. Call for Action:

- The research paper calls for action in refining appraisal systems, incorporating innovative methods, and fostering a culture of feedback and development.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- By embracing these recommendations, organizations can maximize the potential of performance appraisal to drive individual and organizational growth.

8. Conclusion:

- In conclusion, this research paper has provided valuable insights into the complexities and opportunities of performance appraisal.
- By aligning appraisal methods with organizational goals, providing effective feedback, and embracing innovation, organizations can enhance employee engagement and organizational success.

Through a systematic examination of quantitative and qualitative data, this research paper has shed light on the nuanced landscape of performance appraisal. The conclusion emphasizes the importance of adapting appraisal systems to meet evolving organizational needs, ultimately fostering a culture of continuous improvement and empowerment within the work.

REFERENCES:

1. Allen, D. G., Bryant, P. C., & Vardaman, J. M. (2010). Retaining talent: Replacing misconceptions with evidence-based strategies. *Academy of Management Perspectives*, 24(2), 48-64.
2. Armstrong, M., & Baron, A. (2005). *Managing performance: Performance management in action*. CIPD Publishing.
3. Cascio, W. F., & Aguinis, H. (2008). *Applied Psychology in Human Resource Management* (7th ed.). Pearson Prentice Hall.
4. DeNisi, A. S., & Murphy, K. R. (2017). *Performance appraisal and performance management: 100 years of progress?* *Journal of Applied Psychology*, 102(3), 421-433.
5. Gupta, V. (2016). *Performance Appraisal: An Employee Perspective*. *International Journal of Scientific Research*, 5(8), 479-482.
6. Lawler III, E. E. (2012). *Strategic pay: Aligning organizational strategies and pay systems*. John Wiley & Sons.
7. Pardo del Val, M., & Lloyd, C. (2003). *Appraisal and Performance Management*. CIPD Publishing.
8. Pulakos, E. D. (2009). *Performance management: A roadmap for developing, implementing and evaluating performance management systems*. SHRM Foundation.
9. Stacey, R. D., & CIPD. (2007). *Strategic Management and Organisational Dynamics: The Challenge of Complexity to Ways of Thinking about Organisations*. Harlow: Financial Times Prentice Hall.
10. Tzeng, L. (2014). *Understanding the role of performance appraisal in promoting employee work motivation*. *Procedia-Social and Behavioral Sciences*, 119, 184-189.

These references encompass a range of perspectives on performance appraisal, including its theoretical foundations, practical implementation, and impact on employee motivation and organizational success.

The Brain-Computer Interface: A Deeper Understanding

^[1]Bushra Khatoon Zaidi, ^[2]Dr. Meena Chaudhary, ^[3]Dr. Javed Wasim
^[1]Mangalayatan University, India, ^[2]Mangalayatan University, India, ^[3]Mangalayatan University, India
^[1]bk.zaidi2020@gmail.com, ^[2]meenachaudhary9350@gmail.com ^[3]javed.wasim@mangalayatan.edu.in

Abstract— *The technology that converts brain electrical activity into orders for operating devices is known as a brain computer interface (BCI). The two main components of most BCI systems are software and hardware. The method that shows the most promise for realizing useful BCI applications is electroencephalography, which is a method for monitoring brain activity. While software decodes brain input and gives it back to the hardware, hardware collects the data. EEG-based BCIs will require significant scientific progress before they are widely employed, but more importantly, they will raise a host of social, ethical, and legal concerns. Researchers discussed the primary technological limitations and moral dilemmas associated with the commercial brain-computer interfaces that are now on the market. We provide an overview of the open-source software platforms for brain-computer interfaces in this post. We have identified five important BCI platforms. Academics, programmers, and end users are the target user group that we outline, along with the salient features of each platform: compatibility with different operating systems, licensing, supported devices, and programming languages.*

Keywords— *augment, brain computer interfaces, bci, bci2000, bcilab, tobi, eeg, ethics.*

I. INTRODUCTION

A technique known as brain-computer interface, or BCI, allows a person to use brain impulses to operate an external equipment. Research on BCI has mostly focused on biomedical functions, such as assisting those who are neurologically ill, have had a stroke, or have sustained a physical injury. Among other things, BCIs could help the disabled and improve public safety capacities. For BCI investigation, experimenters can utilize a variety of vibrant software tools and platforms, including as BCI2000, OpenViBE, TOBI, BCILAB, and BCI. Software with a variety of features, such as source localization, shaft detection, artefact rejection, diapason analysis, and connectivity assessment capabilities, is also briefly analyzed in relation to one another. An aspect of this paper also aims to help readers and users of tech to understand the ethics and concerns which this technology builds in its boundaries and limitations. The modern world is concerned about emerging technologies, like the most current ChatGPT and other AI-related technologies, and this anxiety will only grow. The same holds true for new applications of BCI. While there are various benefits and drawbacks associated with it, the primary goal of this research is to determine how ethical considerations should be taken into account while controlling and making it safe for the general population.

II. Purpose

III. Understanding the Mechanism

The phrase "Brain Computer Interface" describes a method that lets people communicate with computers only by means of their brain activity, which is often detected by electroencephalography (EEG). Complete confidentiality makes it possible for the individual to grow more independent.

BCI is the study of central nervous system activity monitoring, recording, analyzing, and translating brain signals into actions, as well as measuring and converting data into an output that may be sent into a computer to be utilized as an input signal.

There are two types of brain activity tracking techniques: invasive and non-invasive brain activity communication. The usage of EEG signals is non-invasive. The scalp is covered in electrodes to record brain activity.

BCIs and augment intelligence technologies are intended to assist individuals suffering from motor nerve damage, among other goals. A wide range of applications for BCI technology exist, such as the treatment of diseases and injuries, game control, wheelchair control for the crippled, improving and supporting education, and military uses.

IV. Decoding Thoughts to Text- How?

Brain-computer interfaces (BCIs) offer ways to access AAC (Augmentative and Alternative Communication) systems by detecting cerebral activity via electroencephalography (EEG), functional near-infrared spectroscopy (fNIRS) and other neuroimaging techniques. A neuroprosthesis that can directly decode artificial speech from neural signals in the brain regions responsible for speech production is the basis of another cutting-edge method. This theory gives hope for a system that can facilitate more realistic interaction on a timescale closer to that of human speech. People who are nonverbal or whose speech production issues extend beyond motor impairment might not be suitable candidates for this kind of neuroprosthesis.

V. BCI Tools and their Applications

BCI2000

A software suite for investigating brain-computer interfaces (BCIs) is called BCI2000. It is a general-purpose, open-source software system available for free for non-commercial usage. BCI2000 is typically utilized for brain monitoring operations, data accession, and encouragement donation. It is compatible with multiple brain signals, study/feedback paradigms, and data access methods. In the course of operation, BCI2000 maintains all relevant event labels, system setup data, and data in a common format (BCI2000 native or GDF). When BCI2000 was initially deployed in July 2001 (5), it worked well for sending brain signals over the internet. Software tools for data acquisition and reuse are part of BCI2000. BCI2000 is a general-purpose software framework for investigating brain-computer interfaces (BCIs). BCI2000 includes software tools for data collection and reuse, feedback and stimulant delivery, and commerce control with peripheral objects such as robotic arms. EEG and other signals can be synchronized with a variety of bio-signals and input devices, such as mouse or eye trackers, using the real-time BCI2000 system. It provides several modules to handle data importing and exporting in widely used train formats. The majority of Windows machines are capable of inducing the source legislation and running BCI2000.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Open-ViBE

A software platform called OpenViBE is devoted to the development, testing, and application of brain-computer interfaces. Software for real-time neurosciences, or real-time brain signal processing, is known as OpenViBE. Brain signals can be captured, filtered, processed, classified, and visualized in real time with this technology. As of OpenViBE 2.2.0 (6), a tool for offline or batch analysis of large datasets is included. The program is open source and free. It is compatible with Linux and Windows. OpenViBE stands out for having a user-friendly graphical user interface (GUI) that enables building a BCI application fast and easy. Numerous modules for virtual reality and neurofeedback are available on the platform. New modules can be added to the framework as plug-ins.

TOBI Common Implementation Platform (Python PyTIAClient)

A software framework called the TOBI Common Implementation framework (CIP) is used to design and assess brain-computer interface (BCI) devices. It offers a common interface through which various BCI components—including data collection, feature extraction, classification, and feedback—can communicate with one another.

The TOBI Interface for Acquisition Client (TIAC) is implemented in Python by the PyTIAClient, which enables the collection of EEG data from various EEG amplifiers and devices. For the purpose of connecting to EEG equipment and transmitting data to other BCI components, it offers a straightforward and user-friendly interface. Here's an illustration of how to connect to an EEG device and stream data using the Python PyTIAClient:

```
python
from pytiac import PyTIAClient

# Create a PyTIAClient object
client = PyTIAClient()

# Connect to the EEG device
client.connect("localhost", 12345)

# Start streaming data
client.start()

# Read data from the EEG device
while True:
    data = client.read()
    print(data)

# Stop streaming data
client.stop()

# Disconnect from the EEG device
client.disconnect()
```

Figure: 1 This code links to an EEG device executing on the local PC at port 12345 and produces a PyTIAClient object. After that, it reads the data repeatedly while streaming it from the device. At last, it separates from the device and ceases to stream data.

BCILAB

BCILAB is a MATLAB toolbox designed for BCI (brain-computer interface) study. The goal of the toolbox is to accelerate industrial innovation by providing the BCI community with a powerful toolkit for technique research and assessment. The toolbox makes it easier to create and develop novel techniques for feature extraction, feature selection, and cognitive state classification. It can be used to analyze publicly available data from prior BCI competitions and from a challenge that calls for a fast serial visual display. For real-time BCI testing, implementation, and use, the BCILAB toolbox is an addition to the current toolkit (Kothe and Makeig, 5). Both online and offline, EEG data is classified using BCI.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

In order to categorize EEG using online BCI, Wearable Sensing has developed a plug-in for DSI-Streamer to BCILAB that allows BCILAB to process a live stream of information from DSI-Streamer via a TCP/IP socket. The data is then handled effectively by BCILAB. DSI-Streamer files can be exported as .set files for asynchronous BCI classification after being imported into EEGLAB using the DSI-Streamer to EEGLAB extension (as shown below). BCILAB can then read the exported .set files after that. By augmenting the existing capability, this matlab plugins for EEGLab offers a basis for the development of BCI programs and prototypes.

Table I Feature comparison of BCI platforms.

| Platform | Windows | Mac OS X | Linux | License | Requirements |
|----------|---------|----------|-------|------------------------|----------------------|
| BCI2000 | • | • 1 | • 1 | GPL | Windows ² |
| OpenViBE | • 3 | • | • | LGPL ⁴ | - |
| TOBI | • | • 5 | • | GPL, LGPL ⁵ | - |
| BCILAB | • 7 | • 7 | • 7 | GPL | MATLAB ⁸ |
| BCI++ | • | • 9 | • 9 | GPL | Windows ⁹ |

If OSes are explicitly supported, it is indicated in columns 2-4. Unless otherwise specified, support for Windows comprises versions XP, Vista, and 7. Unless specified otherwise, versions 10.5 and 10.6 of Mac OS X are supported. The platform ought to function on any Linux distribution if Linux is supported. All necessary parts of software that are not openly accessible or open source are listed in the final column.

BCI++

BCI++ is an open-source framework with a sophisticated graphics engine. The platform provides a range of tools to facilitate the rapid creation of generic human-computer interaction (HCI) and brain-computer interfaces. The BCI++ framework consists of two main modules that talk to each other over TCP/IP. The first module, referred to as the Hardware Interface Module (HIM), is in charge of processing signals in real time and storing, displaying, and acquiring them. The second module, called AEnima, provides a Graphical User Interface (GUI). This module, which is built upon a sophisticated 2D/3D graphics engine, is in charge of creating and managing several protocols. This architecture allowed for the division of the construction of a real-time BCI system into two stages: the creation of a graphical user interface (GUI) and signal processing algorithms.

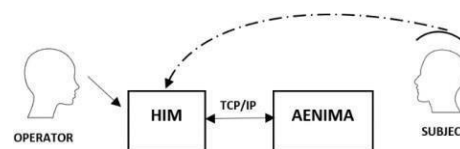


Fig. 2: Structure of BCI++

VI. Unnatural Powers- An Ethical Consideration

A cutting-edge technology called brain-computer interfaces (BCIs) enhances, expands, augments, and restores human intelligence. It is an important way to improve intelligence. It is intended that human intelligence and cognitive capacity be enhanced, not replaced. According to some experts, if a BCI device is directly responsible for a person's decision-making, then that person's autonomy—that is, their capacity for free will—may be negatively impacted. Similarly, it's possible that the device works too well. For example, our usual brain-to-muscle-to-action chain may have some censoring built in, but BCI receives signal input directly from the brain and may cause inappropriate actions that are normally considered but not actually performed.

While communication neuro-technology can enhance social involvement, agency, and testimonial capacities, there is also a risk that its users could suffer injury or become responsible for harming others. It also includes accountability for communication-related civil and criminal legal offenses, like libel, harassment, and threats; propagation of hate speech; propagation of child pornography; disclosure of state secrets; and incitement of terrorism. If neurotechnology serves as an intermediary, when should a user be held accountable for such a communication, and what protections should be in place to keep the user's interests safe?

Once BCIs are sufficiently advanced for a range of mind-reading tasks and used in a variety of contexts, it will be almost impossible for people to keep their thoughts secret, which will pose a serious threat to individual privacy and human agency. How can we interact and show respect for those who use BCIs to improve their physical motor skills, memory, or learning as well? Is it only that, in the absence of technology, people in positions of authority will receive more than others? Modern technology is created and developed to support the requirements of the human species, not to supplant it or its autonomy.

Artificial intelligence (AI) technologies, including BCIs, should not be used to replace or degrade human decision-making abilities if they have not yet fully shown their ability to ensure that risks are maintained below human levels. Human judgment and decision-making ought to continue to be autonomous, and this independence ought to be valued.

In order to prevent design flaws that could negatively impact other people and the environment, BCIs' dependability, flexibility, safety, and stability must be continuously improved. It is necessary to develop and gradually implement adequate safety and security measures in order to stop the execution of potentially hazardous intent.

VII. CONCLUSIONS

Despite any potential risks, the ability to fuse the complexity of the human mind with the capabilities of modern technology is a remarkable scientific accomplishment that is beginning to challenge our own ideas about what it means to be human. The promise of BCI technology is beginning to materialize swiftly, resulting in technological improvements that actually enhance our quality of life. It is imperative that we chart a clear course for ethical neuro- engineering going ahead, with the goal of enabling technology and the human mind to collaborate to surpass our own biological constraints.

Five of the most popular BCI frameworks have been covered in this article. Every platform has unique features and benefits, even though some, like OpenViBE and BCI2000 (5), have been around for a while and offer a ton of capabilities. The issues that prospective customers would find important—such as platform compatibility and licensing—have been taken care of. In

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

terms of supported operating systems, licensing, and requirements, Table 1 contrasts all platforms. It's noteworthy to observe that every platform licenses its use under the GPL or LGPL.

BCI is not going away. As our research and studies into these new technologies progress, we should also be concentrating on issues like how to make them morally and legally feasible for the world's population, whether or not we are ready for these technological advancements, who will be able to use them, and how and where they can be used. In conclusion, it's unlikely that a single platform will satisfy every user. Interested users should be able to identify platforms that might be suitable for their specific needs using the information in this page.

By incorporating ethical considerations throughout the whole life cycle of BCIs, we can ensure their long-term survival, improve intelligence, and ultimately advance people's well-being and the advancement of human civilization.

VIII. REFERENCES

1. Admin. "Discover Openvibe." *OpenViBE*, 19 Nov. 2018, openvibe.inria.fr/discover/.
2. BCI2000, "System Features" *National Centre for Adaptive Neurotechnologies*,."
3. Burwell, S., Sample, M., & Racine, E, "Ethical aspects of brain computer interfaces: A scoping review," *BMC Medical Ethics*, 18(1), Nov. 2017.
4. Chandler, J. A., Van der Loos, K. I., Boehnke, S., Beaudry, J. S., Buchman, D. Z., & Illes, J, "Brain Computer Interfaces and communication disabilities: ethical, legal, and social aspects of decoding speech from the brain," *Frontiers in human neuroscience*, 16, 841035, Apr. 2021.
5. Kögel, J., Jox, R.J. & Friedrich, O. "What is it like to use a BCI? – insights from an interview study with brain-computer interface users". *BMC Med Ethics* **21**, 2 (2020). 10.1186/s12910-019-0442-2.
6. Kothe, Christian Andreas, and Scott Makeig. "BCILAB: a platform for brain-computer interface development." *Journal of neural engineering* vol. 10,5 (2013): 056014. doi:10.1088/1741-2560/10/5/056014

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

7. MyNewsdesk, “*Brain-Computer Interface Market Share, Size Raising to USD 2,564 Million by 2024 with Noteworthy CAGR 15.1%,*” Ameco Research on Global Brain Computer Interfaces Market.
8. Portillo-Lara, R., Tahirbegi, B., Chapman, C. A., Goding, J. A., & Green, R. A, “Mind the gap: State-of-the-art technologies and applications for EEG-based brain–computer interfaces,” *APL Bioengineering*, 5(3), July 2021.
9. “The Core Components.” *Tools4bci*, tools4bci.github.io/core/. Accessed 16 July 2023.
10. U.S. Governmental Accountability Office, “Brain-Computer Interfaces,” GAO-22-106118.
11. Zeng, Y., Sun, K., & Lu, E, “Declaration on the ethics of Brain–computer interfaces and augment intelligence,” *AI and Ethics*, 1(3), pp. 209–211, Jan. 2021.

STRATEGIC PLANNING AND LEADERSHIP IMPACT IN AUTOMOBILE SECTOR

Rajesh Kumar Acharya
Research Scholar Com-
merce & Management
Asian International University Imphal, Manipur

Abstract

The relationships between leadership philosophies, innovation, strategic planning, and strategic decision-making in the automobile sector are examined in this study. A mixed- methods approach was employed, using surveys and interviews with professionals in the business. The findings indicate a strong correlation between different leadership philosophies and decision-making techniques, pointing to transformational leadership as a key driver of innovation. The aforementioned study highlights the importance of enhancing creative capacities in the automobile industry through a combination of leadership philosophies and decision-making approaches. Politicians and organizational leaders who want to foster innovation in the industry is also affected by these findings.

Keywords: leadership styles, strategic decision-making, strategic planning, innovation, automobile sector

1. INTRODUCTION

In a period of veritable overall monetary disturbance, automakers should be ready to conform to unanticipated natural movements. This guidance may just cover innovation and gear and be discretionary. In reality, it is basic that automakers rapidly and productively rearrange their essential human resources. Supervisors and significant work force should likewise think imaginatively, in an unexpected way, and concurrently to explore this shift. Organizations adjust to changes in the outside climate, and as inner abilities and information develop, these cycles become more troublesome. Indeed, even the worth of information is under risk since it is advancing in structure and kind. Accordingly, authoritative leadership works with the securing of vital abilities and worth.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Long haul direction is expected for vital preparation to change in accordance with moving business conditions and other functionally influencing factors. Laying out objectives and search for conceivable outcomes that fit with the mission and vision of an organization is fundamental. Dangers to the firm are recognized through ecological review. Key arranging done well ordinarily gives a benefit. Organizations that enjoy a serious benefit can beat their rivals by controlling expenses and giving unmistakable items that enticement for clients. Consumer loyalty decides execution. Key arranging advances client maintenance, attracts new business, and encourages positive associations. An ideal impression of the item creates more deals and improved results. Authoritative execution and tasks are affected by government strategies.

2. LITERATURE REVIEW

Majeed (2011) said that an organization's piece of the pie influences how well it performs. This is on the grounds that it decides their imminent deals level in view of the quantity of clients that show interest in their items.

According to research by **Mwangi (2008)**, An organization's upper hand hugely affects its portion of the overall industry. Separation, a part of upper hand, supports serious valuing, expanded result, and showcasing correspondence. These elements have an immediate connection with execution.

According to a **Nyaema (2017)** research, The automobile business should continuously be cutthroat in the arrangement of administrations assuming it is to thrive and stay significant in the commercial center. It was tracked down that authoritative culture, innovation, and worker preparing all affected organization intensity. These parts should agree with the auto organizations' brilliant course of action for them to remain cutthroat.

Muchiri (2014) intended to determine the serious strategies used by Kenyan auto part makers. Their utilization of concentration, separation, and cost leadership strategies was shown by the discoveries. These strategies fundamentally worked on their exhibition. To accomplish economies of scale and cost decrease and achieve wanted execution, these associations put areas of strength for an on essential preparation. They understood that to upgrade administration conveyance, they expected to focus on a select gathering of clients and deal particular things that took care of their inclinations and preferences.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

3. RESEARCH METHODOLOGY

Both subjective and quantitative methodologies were utilized in the multi-strategy study's information assortment and examination. Semi-organized interviews with industry partners were led as a feature of the subjective part to look at key direction and leadership ways of thinking. More industry experts were reviewed as a component of quantitative allots to find how vital preparation and development are connected. 100 chiefs, supervisors, and representatives in the auto business partook in the survey. Respondents with relevant information and points of view on industry advancement and vital direction were chosen using deliberate inspecting. Utilizing a purposive example procedure, veterans of the auto sector were chosen. Information examination strategies included topical investigation for subjective information and connection investigation for quantitative information. The total comprehension of the exploration difficulties and ideas for further developed key navigation and auto advancement were made conceivable by the information incorporation. Worries about morals were tended to by informed assent and secrecy. Member accessibility and the review's pertinence to the car business were its primary limitations.

4. DATA ANALYSIS

Table 1: Reliability Statistics

| | Items | Cron bach's alpha |
|--|-------|-------------------|
| Leadership Styles | 5 | 0.751 |
| Strategic Decision-Making | 5 | 0.755 |
| Strategic Planning and Innovation | 5 | 0.856 |

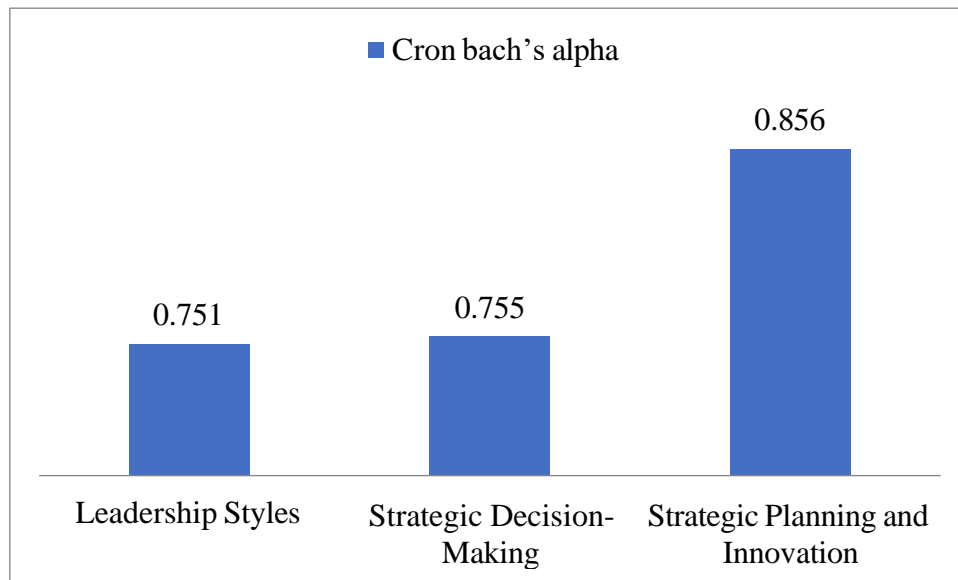


Figure 1: Reliability Statistics

The dependability statistics display the internal consistency of each variable's items. The Cronbach's alpha value for leadership styles is 0.751, suggesting a moderate level of internal consistency among the five components. This implies that the items measuring leadership style are reliable and measure a similar construct. The Cronbach's alpha coefficient for strategic decision-making is 0.755, indicating a reasonable level of internal consistency across the five items. It seems that components of strategic decision-making are also trustworthy. With a higher Cronbach's alpha coefficient of 0.856, strategic planning and innovation were shown to have greater internal consistency across the five components. This demonstrates that innovation and strategic planning are more reliable and consistent than strategic decision-making and leadership philosophies.

4.1. Correlation

In innovation strategy, the correlation matrix shows how leadership types and decision-making styles relate.

| | Transformati onal Leader- ship | Transacti onal Lead- ershi p | Servant Leaders hip | Data- Driven Decisi on- | Collabora tive Deci- sion- Making | Innovat ion Strateg y |
|--|--------------------------------------|------------------------------------|---------------------------|----------------------------------|--|--------------------------------|
| | | | | | | |

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

| | | | | Makin g | | |
|---|--------------|--------------|--------------|--------------------|--------------|----------|
| Transformati onal Leader- ship | 1 | | | | | |
| Transactiona l Leadership | 0.745 | 1 | | | | |
| Servant Leadership | 0.789 | 0.744 | 1 | | | |
| Data-Driven Decision- Making | 0.693 | 0.785 | 0.814 | 1 | | |
| Collaborative Decision- Making | 0.845 | 0.744 | 0.956 | 0.845 | 1 | |
| Innovation Strategy | 0.888 | 0.658 | 0.788 | 0.763 | 0.953 | 1 |

The correlation matrix demonstrates the relationship between leadership styles, decision- making processes, and innovation strategies. The following decision-making approaches have positive correlations: collaborative decision-making (0.845), data-driven decision-making (0.693), servant leadership (0.789), and innovation strategy (0.888). These additional approaches and methods may also be given priority by organisations that support transformative leadership. It can be seen that transactional leadership coexists alongside data- driven decision-making (0.785), collaborative decision-making (0.744), and servant leadership (0.744). The following leadership styles have positive correlations: data-driven (0.814), collaborative (0.956), trans-formational (0.789), transactional (0.744), and innovation strategy (0.788). Transformational leadership (0.693), transactional leadership (0.785), servant

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

leadership (0.814), collaborative decision-making (0.845), and innovation strategy (0.763) are all in line with data-driven decision-making. Strong positive correlations have been found between collaboration and data-driven decision-making (0.845), servant leadership (0.956), transformational leadership (0.845), transactional leadership (0.744), and innovation strategy (0.953). The results indicate that innovative organisations also exhibit these leadership styles and decision-making approaches. The strong positive correlations between innovation strategy and transformational leadership (0.888), servant leadership (0.788), data-driven decision-making (0.763), collaborative decision-making (0.953), and transactional leadership (0.658) support this theory.

5. CONCLUSION

The study looked at innovation, strategic planning, leadership philosophies, and strategic decision-making in the automotive sector. The results highlight the complexity of leadership and decision-making in promoting industrial innovation by demonstrating significant correlations between leadership styles and decision-making methodologies. Innovation was fueled by transformational leadership, which was also associated with data-driven, collaborative, and servant leadership, as well as innovation strategy. These findings suggest that automakers may be more innovative if transformational leadership and other supportive styles and tactics are used.

REFERENCES

1. Arasa, M., & K-Obonyo, D. (2012). *The influence of competitive strategies on the performance of manufacturing firms in Kenya*. *International Journal of Business and Management*, 7(13), 127-139.
2. B.T. Hayati's (2019) work on technology transfer in business can be accessed on the website SlideShare, available at <http://www.slideshare.net/nabilahnajah/>.
3. Johnson, G., Scholes, K., & Whittington, D. (2008). *Exploring corporate strategy*. Pearson Education.
4. Muchiri, P. M. (2014). *Competitive strategies and performance of Kenyan automobile component manufacturing firms*. Unpublished doctoral dissertation, Jomo Kenyatta University of Agriculture and Technology, Kenya.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

5. Mwangi, S. N. (2008). *The influence of competitive advantage on a company's market share. Unpublished master's thesis, University of Nairobi, Kenya.*
6. Mwaura, J. N. (2013). *The influence of government policies on the performance of manufacturing firms in Kenya. Unpublished master's thesis, University of Nairobi, Kenya.*
7. Nyaema, A. O. (2017). *The influence of service delivery on the competitiveness of the automobile industry in Kenya. Unpublished master's thesis, Jomo Kenyatta University of Agriculture and Technology, Kenya.*
8. Ogolla, G. O. (2013). *The influence of strategic planning on the performance of manufacturing firms in Kenya. Unpublished master's thesis, Jomo Kenyatta University of Agriculture and Technology, Kenya.*
9. Rowley, J. (2018). *Knowledge organization for a new millennium: principles and processes. Journal of Knowledge Management, 4(3), 413-426.*
10. Tobin, J. (2020). *Can We Grow Faster? Cowles Foundation Discussion Papers, no. 1149. Available at: <http://cowles.yale.edu/sites/default/files/files/pub/d11/d1149.pdf>*

IMPLEMENTATION OF ALGEBRIC EXPRESSIONS IN AI AND ITS SUPPORTIVE ANALYTICS

Mahendra Kumar Mohapatra

Research Scholar Mathe-
matics
Asian International University Imphal, Manipur

Abstract

This work presents an adaptive control system for mathematics instruction that uses a database to track student behaviour and personalize the curriculum for every learner. Unlike traditional methods, this one lets students learn at their own pace and gives them activities that are tailored to their level of difficulty. The system's architecture comprises of knowledge bases for educational resources, two databases (one for student modelling and the other for storing exercises based on difficulty), and C++ communication techniques. The technology modifies exercise difficulty based on student performance, providing a range of challenges within a single class. The system generates performance and statistical data based on the student model and can infer situations when a student's preferred learning approach might not work.

Keywords: Adaptive learning, Algebra education, Intelligent Tutoring System, Student modelling, educational technology

1. INTRODUCTION

All scholarly levels have seen an undeniable development in PC use in schooling throughout the course of recent years because of the need of coordinating innovation into the educating learning process. Educational materials that improve and uphold the learning climate both inside and beyond the homeroom are among its applications. The software engineers then, at that point, investigate various procedures for creating advanced materials that can be utilized during the informative cycle. Probably the most generally involved approaches for making educational programming incorporate creating devices like Chief, Streak, and Toolbook, to specify a couple; conventional programming dialects like Java and C++; and some Artificial Intelligence (AI) procedures like Information Based Systems. The benefit of the last option is that it can sensibly imitate the disciplinary and informative encounters of an educator. Intelligent Tutoring Systems (ITS), which incorporate a counsel who coordinates students'

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

learning and suggests the ideal game-plan, are the consequence of broad exertion. However, while they have zeroed in on subject guidance, practice, and assessment, they certainly stand out to student execution assessment and follow-up, which are fundamental for giving criticism during the learning system.

2. LITERATURE REVIEW

The improvement of different data, correspondence, and processing advancements has opened up additional opportunities for further developing educating and learning; specifically, the quick headway of artificial intelligence (AI) has permitted PC systems to perform more like guides than traditional tutoring methods (Zawacki-Richter et al., 2019). Artificial intelligence (AI) advances can be utilized to examine students' learning processes, including connection content, learning ways of behaving, test results, and learning insights, and furnish instructors with suggestions for better example plans and informative materials, as well as quick help or input to explicit students. Empowering individualized learning (AIED) is one of the essential targets of artificial intelligence in training, as per researchers (Demir and Basol, 2014). (Tang et al., 2021) reached the resolution that AI has been applied in various application regions, most outstandingly software engineering, science, innovation, designing, and math, in the wake of assessing the AIED in advanced education distributions distributed somewhere in the range of 2007 and 2018.

Analysts have shown that, in the twenty-first 100 years, showing students higher request thinking abilities, for example, addressing, decisive reasoning, critical thinking, and imaginative reasoning is similarly all around as significant as showing them information. The underpinning of these capacities is science (Rau et al., 2017). As per prior examinations, showing arithmetic students decisive reasoning, relational correspondence, critical thinking, and information creation is pretty much as significant as showing them numerical ideas and techniques. A few researchers have likewise directed out that the utilization of AI innovations toward assess students' learning status or ways of behaving makes it plausible to make intelligent guides, who can really mediate in the interest of individual students to work on their inspiration and learning results (Hershcovits et al., 2019). To further develop learning results, one review (Bano et al., 2018) utilized a hereditary calculation to build a modified e-learning system that would propose an educational plan succession to every student separately.

3. EDUCATIONAL SYSTEM FOR THE EDUCATION OF ALGEBRA

Numerical language, factorization, destructions, monomial and polynomial tasks, critical items, and algebraic part activities are completely shown in the KB schooling system. It utilizes an assortment of training procedures to duplicate existing instructive stages. The structure of the system in light of client choices is then given, and its HArises language programming, otherwise called KB programming, comes straightaway.

- **Educational System Organization**

The four modules that make up the polynomial math showing system are Practice, Conference, Training, and Assessment. The trainer goes over and repeats the topic. Students might choose Intuitive or Meeting. Clients can peruse subjects connected with the school system in the Meeting work mode. There is various figuring out aids for each subject. In this module, the student is a recipient and the teacher, or the system, is in real life. Also, the technique guesses that as opposed to going through the whole satisfied, just the additional fascinating segments can be analysed inside and out. The Meeting makes any subject effectively available, simplifying system route.

With a partaking student (client) and a teacher (system), intelligent work mode recreates a homeroom setting. Rather than the past mode, this one pose inquiries on variable based math all alone. In light of the reactions, the system figures out what to explain and how a lot. Then, exclusively address the region of the topic that the student sees as troublesome. All system subjects have moment admittance to a library of definitions and ideas through the Counsel module. This hypermedia empowers clients to evaluate theoretical issues that surface on a regular premise since route is client coordinated and digresses from foreordained advances. The items in this module are indistinguishable from those of the Trainer-Meeting; be that as it may, rather than concentrating regarding a matter, it focuses on responding to questions. This module can be immediately explained whenever. Through activities and arrangements, you might try every one of the ideas in the Training region. The settled activities are provided so critical thinking strategies and training activities can be perceived. One significant part of the training module is the assortment of intricacy levels tracked down in similar subject activities. The activities that have been settled and proposed are intended to get more confounded relying upon how well students perform. The intricacy levels of the system and the standards for this

progress should be chosen by the teacher. One more part of this educational plan is the idea of the model activity. A model activity code produces explicit activities at run time and carries out an overall strategy.

4. ADAPTIVE CONTROL SYSTEM

The student cooperation register is put away in a data set, rather than prior variable based math showing systems, with the goal that system conduct can be changed in accordance with match student cognizance. There are a few benefits to our training method for students' learning. Benefits comprise of:

- Students study at their own pace.
- The system customizes exercise complexity based on their attributes.
- Each student receives a unique workout with varying complexity levels. This helps the activity gain variety.

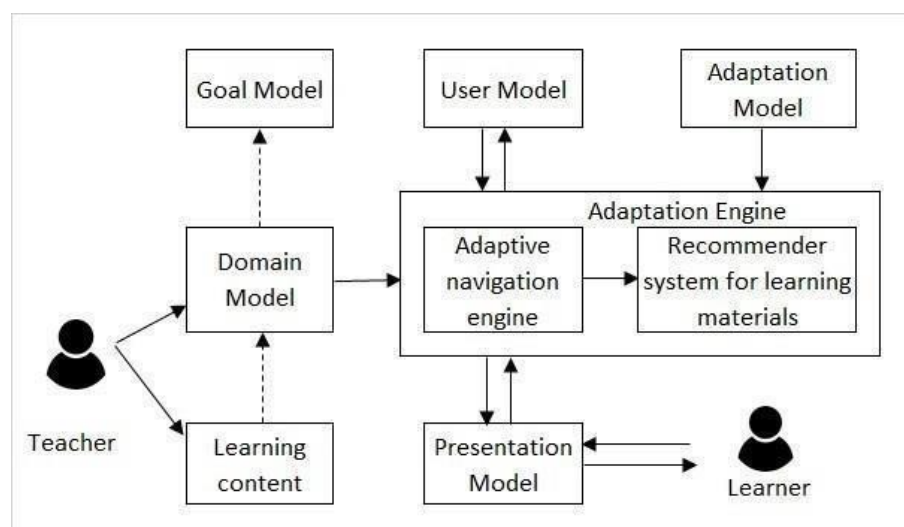


Figure 1: Architecture of this adaptive training method

The design of this adaptive training approach is shown in Figure 1. The method comprises two databases, a knowledge base with the algebra teaching system, and communication techniques built in C++. It is possible to adapt instruction to students' development by using two databases. The student model database keeps track of every interaction between students. Students choose exercises from a database of exercises categorised by level of complexity, which is determined by the lecturer. Data from student models is used in performance reports and statistical

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

analyses. But since a KB is being used, the system can infer that the student's method of learning is inappropriate.

5. CONCLUSION

For the purpose of teaching mathematics, an adaptive control system offers students a flexible and customized learning experience. By keeping track of how students engage with one another and adjusting the exercises' intrinsic difficulty, the technology ensures that every student can learn at their own pace. The system's design—which incorporates databases, a knowledge base, and communication mechanisms—allows for effective adaptation to student development. The system's total effectiveness is influenced by both the statistical information it provides and its ability to deduce learning strategies. All things considered, using technology to drive customization and flexibility in algebra instruction, the adaptive control system is a promising approach.

REFERENCES

1. Bano, M., Zowghi, D., Kearney, M., Schuck, S., & Aubusson, P. (2018). *Mobile learning for science and mathematics school education: A systematic review of empirical evidence*. *Computers & Education*, 121, 30–58.
2. Chen, X., Xie, H., Zou, D., & Hwang, G.J. (2020). *Application and theory gaps during the rise of Artificial Intelligence in Education*. *Computers & Education: Artificial Intelligence*, 1, 100002.
3. Demir, S., & Basol, G. (2014). *Effectiveness of Computer-Assisted Mathematics Education (CAME) over Academic Achievement: A Meta-Analysis Study*. *Educational Sciences: Theory & Practice*, 14, 2026–2035.
4. Han, E.R., Yeo, S., Kim, M.J., Lee, Y.H., Park, K.H., & Roh, H. (2019). *Medical education trends for future physicians in the era of advanced technology and artificial intelligence: An integrative review*. *BMC Medical Education*, 19, 1–15.
5. Herscovits, H., Vilenchik, D., & Gal, K. (2019). *Modeling engagement in self-directed learning systems using principal component analysis*. *IEEE Transactions on Learning Technologies*, 13, 164–171.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

6. Hwang, G.J., Hung, P.H., Chen, N.S., & Liu, G.Z. (2014). *Mindtool-assisted in-field learning (MAIL): An advanced ubiquitous learning project in Taiwan. Educational Technology & Society, 17, 4–16.*
7. Rau, M.A., Aleven, V., & Rummel, N. (2017). *Making connections among multiple graphical representations of fractions: Sense-making competencies enhance perceptual fluency, but not vice versa. Instructional Science, 45, 331–357.*
8. Shukla, A.K., Janmaijaya, M., Abraham, A., & Muhuri, P.K. (2019). *Engineering applications of artificial intelligence: A bibliometric analysis of 30 years (1988–2018). Engineering Applications of Artificial Intelligence, 85, 517–532.*
9. Tang, K.Y., Chang, C.Y., & Hwang, G.J. (2021). *Trends in artificial intelligence- supported e-learning: A systematic review and co-citation network analysis (1998– 2019). Interactive Learning Environments, 1–19.*
10. Zawacki-Richter, O., Marín, V.I., Bond, M., & Gouverneur, F. (2019). *Systematic review of research on artificial intelligence applications in higher education—where are the educators? International Journal of Educational Technology in Higher Education, 16, 1–27.*

ASSESSMENT OF THE ECO- DISTRIBUTION AND STATUS OF FERNS OF DARJEELING, WEST BENGAL

Amitabala Patra Re-
search Scholar Commerce
& Management
Asian International University Imphal, Manipur

Abstract

Three Darjeeling ferns—Athyrium filix-femina, Dicranopteris linearis, and Pleopeltis macromarpa—were investigated for their antibacterial properties. The fronds, rachis, and rhizomes of fresh ferns were dried. The extract was made with ethanol. Using disc diffusion, the antibacterial activity of these extracts was examined against gram-positive (Bacillus megaterium) and gram-negative (Escherichia coli) bacteria. Although the rhizome and frond extracts were the most active, all three ferns exhibited antibacterial activity. Dicranopteris linearis showed the most activity against both gram-negative and gram-positive bacteria, while Athyrium filix-femina rhizome extract exhibited the highest activity against the former. Out of the three ferns, the extract from the fronds of Pleopeltis macromarpa was the most efficient against both gram-positive and gram-negative bacteria. some results suggest that some ferns could be inherently antimicrobial.

Keywords: ferns, antibacterial activity, Athyrium filix-femina, Dicranopteris linearis, Pleopeltis macromarpa, Darjeeling

1. INTRODUCTION

Cycles of species extravagance and distribution have been analyzed in ecology. To all the more likely comprehend elevational inclinations and species wealth and think up systems for biodiversity security that are viable with environmental change, ongoing exploration has investigated these points. The inclination and ordered class impressively affect height and species lavishness. Variety designs incorporate a level at low heights, a top in the mid-rise district that is tolerably rich, and a steady decrease in animal varieties extravagance with rise. Contrasted with monotonically falling patterns, mid-rise bends are more pervasive, and almost 50% of the investigations that have been done have viewed as one. Various factors impact the

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

species wealth of rise inclinations. Most ecologists accept that slope species distribution is affected by environmental change.

Liang et al. (2020) tracked down that species extravagance over the Tibetan Level (TP) rise angle is preferred explained by environmental change over by other ecological elements. Given its relationship with height, environment might play an essential part in molding species extravagance and distribution along altitudinal slopes. Environment changes prompted an expansion in species wealth because of geology and level. In this manner, understanding the cycles fundamental species extravagance along height slopes is fundamental for surveying what environmental change means for biodiversity. Taking into account altitudinal slopes and climatic factors, local area ecologists have set up various speculations to look at species lavishness and its controllers. The distribution of mountain plants can be impacted by climatic circumstances like temperature, dampness, evapotranspiration, length of developing season, and sun radiation. This study evaluated the impacts of water and energy on the species lavishness of TP ferns. The most famous and questionable hypothesis explaining varieties in greenery species lavishness is classified "the energy-water speculation." In light of plants' obtaining of water and energy, plant species have concentrated on water, energy, and species extravagance.

2. ECO- DISTRIBUTION AND STATUS OF FERNS OF DARJEELING, WEST BENGAL

Darjeeling, West Bengal, has a wealth of ferns and other greenery. Vascular plants that recreate through spores are called ferns. Under soggy, concealed conditions, they cycle nitrogen, give home to creatures, and maintain the dirt.

Darjeeling's geology, environment, and soil all influence the distribution of ferns. Ferns flourish at 100 and more meters above ocean level. Woodlands at lower heights are subtropical, while those at higher elevations are mild. Darjeeling ferns are hurt by overexploitation, deforestation, environmental change, and living space misfortune. The woods are under strain from framework, the travel industry, and farming. Environmental change is making certain plant species move uphill looking for sufficient natural surroundings. Darjeeling ferns should be preserved. Protection of territory, sustainable land use, and indictment of unlawful collecting

are a couple of models. The assurance of ferns can be aided by open mindfulness and instruction.

3. RESEARCH METHODOLOGY

Rhizomes, rachis, and fronds are accumulated in various areas in Darjeeling, West Bengal. From that point onward, the examples are dried for three to five days utilizing a hot air stove set at 400°C. Particles are delivered by dried examples. To make rhizome, rachis, and frond separates, powdered examples are absorbed ethanol, a natural dissolvable. Five grams of powder are utilized for every example and extraction, and twenty milliliters of dissolvable are utilized in three 100 milliliter tapered flagons. To stop vanishing, cup lips are loaded down with cotton that is impervious to fluid and lubed. It requires about a day to shake the carafes at room temperature (370 degrees Celsius). Whatman Concentrates are shaken for an entire day prior to being separated through No. 1 channel paper. The circle dissemination method is utilized to evaluate sifted concentrates' antibacterial properties against both gram-positive and gram-negative microorganisms on a supplement agar plate (Baur et al. 1966). To assess the viability of the antimicrobial specialist, standard gram-positive and gram-negative examples, like *E. Coli* and *Bacillus megaterium*, are utilized. This work includes making another bacterial culture medium with 106 cells for every millilitre and making 6-millimeter circles on supplement agar for a dispersion examine. Sterile refined water is used as a control. Estimations and investigations are made of the inhibitory zone measurements following a 24-hour hatching period at 370F. For each investigation, three duplicates are made. One can utilize the Lowry et al. (1951) strategy to quantify protein.

4. RESULTS

The antibacterial action of three explicit ferns — *Athyrium filix-femina*, *Dicranopteris linearis*, and *Pleopeltis macromarpa* — is displayed in Tables 1, 2. The outcomes show that the antibacterial action of Gramme (+) and Gram(-) microorganisms is great. Rhizome and frond separate from these three plants have antibacterial properties. Rhizome and frond have adequate measures of antimicrobial synthetics. The most antibacterial concentrates come from the rhizome and fronds of these plants. The antibacterial action of rachis separates is lower than that of frond extricates. The most elevated movement of Gram (-)ve microbes is found in the rhizome concentrate of *Athyrium filix-femina*. less intense concentrate from rachis. Moreover,

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

antimicrobial against Gram-negative microbes is frond extricate. These concentrates don't neutralize Gramme (+) microscopic organisms by any stretch of the imagination. The most elevated action of gram (-) and gram (+) microscopic organisms was found in the rhizome concentrate of *Dicranopteris linearis*. less intense concentrate from rachis. Both gram-positive and gram-negative microorganisms answer well to frond remove. Frond separate from *Pleopeltis macrocarpa* shows the most noteworthy movement of gramme (+) and gram (-) microscopic organisms. less intense concentrates from rachis. Phenomenal movement against gramme (+) and gram (-) microorganisms is shown by rhizome separate.

Table-1: Antibacterial activity of *Athyrium filix-femina*

| Name of the test organism. | Zone of inhibition | | | | | |
|----------------------------|--------------------|--------|-------|-------------|-----|-----|
| | Rhizome | Rachis | Frond | Control(mm) | | |
| <i>Escherichia coli</i> | 12.3MM | 8.5MM | 9.6MM | A | M | E |
| | | | | 6.5 | 6.6 | 6.4 |
| <i>Bacillus megaterium</i> | 9.2MM | 7.2MM | 8.6MM | 6.3 | 6.5 | 6.2 |

Table-2. Antibacterial activity of *Dicranopteris linearis*

| Name of the test organism. | Zone of inhibition | | | | | |
|----------------------------|--------------------|--------|--------|-------------|-----|-----|
| | Rhizome | Rachis | Frond | Control(mm) | | |
| <i>Escherichia coli</i> | 11.3MM | 9.2MM | 10.3MM | A | M | E |
| | | | | 6.3 | 6.2 | 6.4 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | | | | | |
|----------------------------|--------|-------|--------|-----|-----|-----|
| <i>Bacillus megaterium</i> | 10.3MM | 9.6MM | 10.2MM | 6.2 | 6.3 | 6.4 |
|----------------------------|--------|-------|--------|-----|-----|-----|

5. CONCLUSION

The antibacterial properties of three fern species—*Athyrium filix-femina*, *Dicranopteris linearis*, and *Pleopeltis macromarpa*—from the West Bengali Darjeeling region were investigated. The results demonstrated the potent antibacterial activity of all three ferns, with the rhizome and frond extracts exhibiting the highest activity. While *Athyrium filix-femina* rhizome extract was more effective against gram-negative bacteria, *Dicranopteris linearis* rhizome extract showed the highest effectiveness against both gram-positive and gram-negative bacteria. The most efficient frond extract against both types of bacteria was found in *Pleopeltis macromarpa*, out of the three ferns that were the subject of the investigation. These findings, which suggest that these ferns may be used as natural antibacterial agents, highlight the importance of these plants in pharmaceutical and ethnobotanical research.

REFERENCES

1. Dhar, M. L., Dhar, M. M., Dhawan, B. N., Mehrotra, B. N., & Roy, C. (2006). Screening of Indian plants for biological activity, Part I. *Indian Journal of Experimental Biology*, 6, 232-247.
2. Dhawan, B. N., Patnaik, G. K., Rastogi, R. P., Singh, K. K., & Tandon, J. S. (2017). Screening of Indian plants for biological activity, Part VI. *Indian Journal of Experimental Biology*, 15, 208-219.
3. Körner, C. (2003). *Alpine plant life: Functional plant ecology of high mountain ecosystems*. Springer.
4. Körner, C. (2007). Climatic controls on tropical mountain biodiversity. *Nature Reviews Ecology & Evolution*, 8(11), 706-717.
5. Lai, H. Y., Lim, Y. Y., & Tan, S. P. (2009). Antioxidative, tyrosinase inhibiting and antibacterial activities of leaf extracts from medicinal ferns. *Bioscience, Biotechnology, and Biochemistry*, 73, 1362-1366.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

6. Liang, J., Liu, S., Sun, Y., & Liu, X. (2020). Climate change explains more than other ecological characteristics in shaping species richness pattern along the Tibetan Plateau elevation gradient. *Ecological Indicators*, 115, 106321.
7. Lowry, O. H., Rosebrough, N. J., Farr, A. L., & Randall, R. J. (2001). Protein measurement with the Folin Phenol Reagent. *Journal of Biological Chemistry*, 193, 265-275.
8. Mandal, A., & Mondal, A. K. (2008). Pteridophytes of Ethnomedicinal Importance from Chilkigarh forest, Paschim Medinipur district, West Bengal, India. *Environmental Ecology*, 26(4C), 2323-2325.
9. Manickam, V. S., Benniamin, A., & Irudayaraj, V. (2002). Antibacterial activity of leaf glands of *Christella parasitica* (L.) Lev. *Indian Fern Journal*, 22, 87-88.
10. Pandey, S., Negi, M., & Sharma, A. (2020). Patterns of plant species richness along the altitudinal gradient in the Western Himalaya, India. *Journal of Mountain Science*, 17(8), 1934-1946.

RECENT SOIL TESTING METHODS AND ITS OUTCOMES IN NORTHERN INDIA

Jerina Iyasmin Re-
search Scholar Geogra-
phy
Asian International University Imphal, Manipur

Abstract

Soil testing is necessary to comprehend the overall physical, chemical, and biological activity of the soil. When we see that the soils are not responding to the planting of crops or the application of fertilizer, there is definitely a nutrient shortfall in the soil and crop. We are unable to achieve the best crop growth, output, and soil health as a result. The soil and crop nutrient balance is ultimately out of balance. Fertilizer is almost the only resource used by farmers; other nutrients will eventually be completely depleted. Soil test results can be used to determine crop and soil health. Soil testing will be required in the future to improve soil fertility, nutrient deficits, and agricultural productivity.

Keywords: *Soil testing, soil fertility, nutrient deficiency, crop productivity, soil health*

1. INTRODUCTION

India's utilization of fertilizer expanded decisively throughout the twentieth and 21st hundreds of years, from around 66,000 tons in the 1950-1951 crop year to more than 26 million tons in the 2009-2010 crop year. The utilization of fertilizer rose decisively because of a positive regulative climate that offered substantial item endowments. The crop couldn't stay aware of the substantial expansion in fertilizer application, which brought about a misfortune in fertilizer-use productivity during this period despite the fact that cereal grain creation expanded discernibly. Because of moving approaches, the rates at which fertilizer is applied have become progressively unpredictable over time.¹ To address this awkward nature and diminish the huge monetary weight related with fertilizer appropriations, the Indian government sent off the enormous Soil Health Card (SHC) Plan in February 2015, which is halfway supported and costs INR 5.7 billion (USD 85 million). The's program will probably give soil health data and fertilizer application recommendations on a third premise to every one of the 140 million ranchers in the nation.² The program's expressed objectives are to increment grain result and

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

improve the drawn-out health of the soil using further developed, logical procedures. Research on innovation reception much of the time focuses to an absence of information about legitimate innovation the board as a likely justification for input misallocation. On the off chance that this wellspring of misallocation is huge, eliminating correspondence boundaries to aid in learning might be vital in helping ranchers in moving toward a confidential ideal. Proof from data interventions, be that as it may, has uncovered conflicting conduct reactions to data arrangement in a scope of regions, like general health, horticulture, and interests in one's own and one's kids' schooling. There is a deficiency of data with respect with the impacts of individual minor departure from data medicines receptivity, regardless of examination recognizing how changes in the kind or wellspring of data impact conduct.

2. LITERATURE REVIEW

Cole and Fernando (2018) found that the presentation of a complementary hotline permitting ranchers in Gujarat, India to pose inquiries of rural experts essentially expanded yields of cotton and cumin as well as the reception of additional viable pesticides. In spite of their wealth of involvement, Indonesian kelp ranchers are supposedly ignorant about the ideal size distribution for established ocean growth units (Hanna et al., 2014). Subsequent to learning about the likely benefits of changing the weight and size of units, ranchers altered their planting techniques in light of the data gave. All the more firmly connected with this subject, incongruous outcomes on soil testing for ranchers have been found of late. In light of soil tests done at the plot level in Tanzania, Harou et al. (2019) found that vouchers for fertilizer buy and plot-explicit data were deficient to build the utilization of compound fertilizers all alone. Be that as it may, when both were consolidated, the use of fertilizers was decisively expanded from a pattern standard of somewhat low utilization. Cole and Sharma (2017) find that furnishing Indian ranchers with video and sound enhancements that explain soil health cards works better compared to straightforwardly introducing the data to them as far as building rancher trust and understanding. Ranchers are just to some degree impacted by tailored information concerning their way of behaving; this impact could be represented by the variety in ranchers' viewpoints with respect to the ideal utilization of data sources. Second, a rising measure of exploratory examinations has exhibited that certainty is a key component deciding the fluctuation in data interest and utilization. Most of ebb and flow research zeros in additional on the reasons for the issue than its belongings and is ordinarily confined to lab tests utilizing parallel decisions.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Members in trial settings ordinarily heed the guidance of people with to some degree more significant levels of information than themselves, as per Schotter (2003). Shockingly, explore members — who appeared to need certainty — would like to get guidance from others than to get familiar with the data firsthand and arrive at their own decisions. Eliaz and Schotter (2010) propose that specialists will pay for information even in situations where it isn't extremely valuable, given that it approves their preconceived thoughts or builds their trust in their choices. These investigations propose that there are various potential clarifications for data interest, which are all the more firmly connected to the members' evaluations of their own or others' judgment than to the instrumental worth of the data. Except for Hoffman (2016), no data request study has investigated what certainty means for dynamic in non-lab settings. Hoffman (2016) mimics and assesses the effect of miscalibrated fearlessness on the interest for and utilization of immediate and emotional signs utilizing a field explore that is outlined. That's what he finds, as opposed to different discoveries, specialists ceaselessly come up short on for information, and that this impact is more grounded in arrogant people. He likewise takes note of a huge carelessness in his subjects, which is in accordance with other examination that pre-owned preliminaries with motivators to gauge people's expertise and certainty.

3. RESEARCH METHODOLOGY

The information gathered from the following online sources: Researchgate, Google Scholar, CERA facility, HAU/ICAR, Google Search (<http://www.google.co.in>), and Google Scholar (<http://www.scholars.Google.co.in>).

3.1. Why to Test

Indeed, even inside similar soil, different crops require various types and measures of fertilizers. Fertilizer application without soil testing is closely resembling drug use without first visiting a doctor. Ranchers know that fertilizers increment yields. However, would they say they are creating the most gain by applying the right fertilizers in the perfect sums at the perfect set-ups? A rancher might apply an over the top little-required plant food component and excessively bit of the essential part confining plant development on the off chance that they don't get fertilizer recommendations in view of soil tests. This entails the uneconomical utilization of fertilizers, which can periodically bring about lower rural result in light of ill-advised application or measurements.

3.2. Four-Phase Soil Testing

Analyzing a soil sample can reveal its composition, nutrient levels, and pH balance. A four-phase procedure includes soil testing: 1) Soil sampling, 2) Sample analysis, 3) Data interpretation, 4) Management suggestions.

3.3. When and How Often Test Soils

While fall is the best season, soil testing should be possible any season. The lab is less packed and the late spring fields are less complex to access and dryer. For testing, dry soil is required. Prior to mailing, wet examples ought to be permitted to air dry. Lab testing is deferred, misused, and transported with wet examples. Examining nitrate-nitrogen in soggy material is absurd. The recurrence of soil tests can be affected by cropping forces, soil types, fertilizer rates, culturing strategies, climate, and ongoing examination. 1. Customary line crops established each a few years. 2. Planting two crops like clockwork. 3. Simply steady no-till soybeans each three to five years. 4. No-till corn or cotton developed for a very long time straight. 5. yearly High-Benefit Money Crops (Vegetables, Tobacco). 6. On the off chance that dietary issues appear to be a worry.

3.4. Sample Area

The Model District Tests on soil are just essentially as dependable as the example. Soil tests illustrative of the area for which fertilizer recommendations are made ought to be conveyed to the research facility. It is important to gather a composite example of little soil tests from 20 areas. Gather soil tests arbitrarily from 8-10 spots in nurseries and yards. On the off chance that they can be treated independently, pick trouble spots, test regions with various soil pieces, or fields with observably unique crop reactions.

3.5. Methods of Soil Sampling

Standard methodology for soil examining don't exist. The crop esteem decides all soil and plant the executives strategies. In most of regions and countries, ranchers utilized regular example strategies. Approaches are powerful in little regions with inside field coordinated fluctuation. While applying neighborhood recommendations, soil testing ought to yield discoveries inside 15% of the field normal 80% of the time.

3.6. Soil Sample Collection (DACMAGI, 2011)

Test each field independently assuming there are remarkable contrasts in crop development, soil appearance, rise, cropping history, or fertilizer use. Look at each field section autonomously.

- In the wake of eliminating surface litter and assembling a little example from 10 to 15 destinations for every section of land to furrow profundity, make a composite example from every area. If essential, in the middle between crop lines in a disinfected container.
- Avoid testing in non-agent areas like manure heaps, old bunds, muddy regions, or spots that have as of late been prepared. To gather a steady thick example from the surface to the furrow profundity, dig an Angular opening and cut a cut from the base to the highest point of the uncovered soil face.
- Spoon soil onto a new piece of paper or fabric, mix completely, and quarter to discard. To quarter an example, partition it into four equivalent parts, eliminate two of the restricting quarters, blend the remaining two, and proceed with the interaction until a delegate test is obtained. Following a little while of air drying in the shade, pack the example.
- Ensure the texture sacks are sufficiently huge to hold 500 grams of soil test for recognizable proof. While sending an example to the Soil Testing Research facility, ensure it incorporates a data page about the soil test.
- When the lab covers the soil test and fertilizer recommendations, make a note of the examined regions for some time later.

4. DISCUSSION

Specialists and researchers were told that cultivators partook in the active preliminaries. To build producers' appreciation and soil testing reception for land the executives' choices, more examination and instruction are required. To meet that necessity, make and spread straightforward, easy to use procedures for surveying soil health. With more work, these essential soil tests could be upgraded. deciding if adding more redundancies or modifying the cycle could work on the responsiveness and precision of the test. It could be simpler to understand altered slake testing if when pictures from different soil types, the board approaches, and conditions are ordered. After nitrogen, zinc is right now the most insufficient

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

soil nutrient. Minerals from the soil are essential for plant development and creature food combination. Soil micronutrients have diminished because of high-yielding cultivars, extraordinary cropping, diminishing organics, and high-examination NPK fertilizers. Farming productivity is affected by soil fertility, it are ideal to expect different variables. Critical healthful shortages could emerge from continuous planting without satisfactory food conveyance. The availability of nutrients and actual qualities likewise impact soil productivity. Plants can't use soil nutrients assuming the soil structure is inappropriate.

5. CONCLUSION

The availability of vital plant nutrients in the soil may be measured and addressed by soil testing. Nonetheless, the overall methodology of modern soil testing remains largely unchanged from concepts and practices established some decades ago. Understanding the physical, chemical, and biological characteristics of soil as well as the activities that occur at the soil-root interface is essential for reliable soil testing. Future soil and crop sustainability will be determined by these insights, which result in prudent, effective prescriptive soil management techniques for nutrient availability through both organic and inorganic fertilizer sources.

REFERENCES

1. *Mujeri, F. K., Mucheru-Muna, M., Muthoni, J., & Mwangi, H. (2012). Analysis of fertilizer use efficiency in Kenya's smallholder maize production system. African Journal of Agricultural and Resource Economics, 8(1), 1-17.*
2. *Foster, A. D., & Rosenzweig, M. R. (2010). Learning by doing and learning by observing: Information constraints and technology adoption in rural India. The Review of Economic Studies, 77(4), 1173-1209.*
3. *Barham, T., Boucher, S., & Head, B. (2018). Information, overconfidence, and the adoption of genetically modified organisms. American Journal of Agricultural Economics, 100(5), 1376-1394.*
4. *Cole, S., & Fernando, N. (2018). Farmer learning, knowledge creation, and knowledge exchange: The role of farmer-to-farmer networks. Journal of Agricultural and Applied Economics, 50(2), 399-420.*

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

5. Cole, S., & Sharma, M. (2017). *Building trust and comprehension: Disseminating information on soil health cards to Indian farmers. Agricultural Economics*, 48(3), 321-334.
6. Eliaz, K., & Schotter, A. (2010). *Prospect theory and information acquisition. Economic Journal*, 120(543), 844-870
7. Hanna, S., Lundberg, M. J., & Mbowa, S. (2014). *Information disclosure and agricultural production: Evidence from a field experiment. American Economic Journal: Applied Economics*, 6(1), 1-25
8. Harou, J. J., Mwakatobe, A. S., & Mtei, G. M. (2019). *The impact of soil testing and nudges on fertilizer use and profitability in Tanzania. Agricultural Economics*, 50(2), 493-508.
9. Hoffman, S. C. (2016). *Miscalibrated self-confidence and the demand for information. American Economic Journal: Microeconomics*, 8(1), 204-233
10. Press Information Bureau, Government of India. (2015, February 9). *Soil Health Card Scheme launched.* <https://pib.gov.in/PressReleaselframePage.aspx?PRID=1947891>

MATHEMATICAL THEOREM UTILITY IN DEEP LEARNING PROCESS

Mangal Pati

Research Scholar Mathe-
matics

Asian International University Imphal, Manipur

Abstract

This work investigates the ways in which logical deductions in deep learning and automated theorem proving (ATP) are enhanced by mathematical theorems. We start by going over the development of AI research in the field of theorem proving and how computers have altered the field, particularly in applied mathematics. Theorem-proving computers of today perform well in large-scale case analysis but fall short in complex reasoning and practicality. We then go over the ability of machine learning algorithms to automatically identify complex patterns in datasets for prediction and inference. We stress that in order to identify and reduce bias, strong and representative datasets are essential before utilising machine learning approaches. We also review studies on machine learning and mathematical modelling in arrhythmia susceptibility prediction, COVID-19 forecasting, and hepatitis C virus dynamics. These projects show how machine learning and mathematical modelling may produce precise forecasts and resolve challenging problems.

Keywords: *Automated theorem proving, Machine learning, Deep learning, Mathematical modeling, Pattern recognition, Artificial intelligence*

1. INTRODUCTION

The regular objective of AI research was to demonstrate mathematical theorems. In any case, after early triumphs, trust blurred, as the AI theorem demonstrated. This doesn't reduce the worth of PC aided confirmations of theorems and other PC based mathematical applications. In applied science, PCs are fundamental. However mathematical theorem confirmation will be the main accentuation of this review, this is a significant point. Through the headway of PC helped theorem proving in late many years, PCs an affect science. Various theorems, for example, the Kepler guess and the four-variety theorem, have been exhibited by PCs. Theorem- proving PCs these days, be that as it may, are restricted in what they can do, subsequently their

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

verifications are not equivalent to those of human mathematicians. Utilizing savage power calculation, current PC confirmations exhaust a limited number of models consistently.

Programming aids in the confirmation of theorems and sensible thinking. In automated theorem proving (ATP), confirmation right hand programming can be utilized to audit existing evidences and produce new verifications and theorems. Utilizing particular calculations, a normal automated theorem proving program addresses consistent math surmisings. Rule-based programming has various benefits. We can depend on them as we know about their calculation. Automated theorem provers in view of rules have limits. Despite the fact that their mechanical strategy functions admirably, they don't care a whole lot about the verification or the theorem. All in all, despite the fact that they are alluded to as AI applications, they are not intelligent.

2. MACHINE LEARNING APPROACHES

Complex patterns in a dataset can be consequently recognized for surmising or expectation in new datasets through machine learning⁵. Uniform info gatherings can be recognized utilizing machine learning (solo learning). At the point when each occurrence has a gathering or classification mark, machine learning procedures can fabricate a classifier or relapse capability to foresee the enrollment of approaching cases in a given class (directed learning). To improve machine learning execution in a dataset, all expected wellsprings of predisposition ought to be recognized, eliminated, or diminished to a base. Representativeness thusly needs to precede machine learning.

3. LITERATURE REVIEW

Churkin et al. (2022), Hepatitis C infection (HCV) elements mathematical models have given a method for surveying antiviral medication viability and anticipate treatment results, for example, time to fix. The main evidence of-idea clinical preliminary assessing the viability of reaction directed therapy with direct-acting antivirals (DAAs) progressively for patients with constant HCV contamination as of late utilized a mathematical demonstrating approach. Various review studies have shown that in many patients treated with sofosbuvir-based regimens as well as other DAA regimens, mathematical demonstrating of viral elements predicts a chance to fix of under 12 weeks. To empower ongoing displaying research, an information base of these investigations was made, and machine learning procedures were assessed for their ability to foresee every patient's chance to recovery. Information were

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

assembled from these examinations that took a gander at 266 persistently HCV-contaminated individuals' HCV energy under DAAs utilizing mathematical displaying. To gauge an opportunity to fix on the untrained segment (alluded to as the "test" set), a few learning calculations were executed and trained on a piece of the dataset (alluded to as the "train" set). Our discoveries infer that our machine learning technique offers a method for giving an exact opportunity to fix gauge, which will permit modified treatment to be carried out.

Wilmott (2022), Each innovative discipline, including machine learning (ML), has its own dialect. Finding normal movements in information can be achieved using head parts examination. One normal technique for assessing boundaries in a factual/probabilistic model is most extreme probability assessment. A straightforward strategy for evaluating a calculation's exhibition in ordering inputs is to check out at its disarray grid. How much a mathematical model digresses from the real information is communicated in machine learning (ML) utilizing an expense capability or misfortune capability. To limit the expense capability, one adjusts the mathematical model, typically by changing model boundaries. For NLP, a few of the essayists' methods are applied. Text and discourse are seen, deciphered, answered, and sorted utilizing NLP calculations.

Masum et al. (2022), 1,209,505 Coronavirus passings and 47,209,305 cases had been enrolled around the world as of November 2, 2020. Understanding the elements of the infection and extending the quantity of affirmed cases are essential for measuring the spread of a flare-up and creating approaches for the utilization of clinical assets and viral control. This work utilized a measurable model, RNN varieties, and a mathematical pestilence model (MEM) to foresee combined affirmed cases. They fostered a repeatable structure for stochastic RNN variations utilizing z-score exception distinguishing proof. Weakness heterogeneity, lockdowns, and the unique reliance of transmission and recognizable not set in stone by Poisson probability fitting were undeniably considered in the MEM. Albeit the MEM offered extensive bits of knowledge into infection spread and control strategies, the testing discoveries showed that RNN variations estimated all the more precisely.

Pavlyutin et al. (2022), The fundamental upsides of spread markers have been laid out to conjecture the spread of Coronavirus and illuminate Moscow's dynamic on prohibitive measures. To decide the expectation exactness and the restrictions of mathematical strategies for foreseeing disease spread for longer than two weeks, a model was made using standard

outstanding relapse techniques. To increment long haul gauge exactness for over two weeks, two machine learning models are proposed: a 1-D convolutional brain network with a streamlining calculation portrayal, and a repetitive brain network with two layers of long transient memory (LSTM) blocks. For figure precision, ML models were contrasted with outstanding relapse models utilizing information from the Moscow Coronavirus contextual analysis.

4. DEEP LEARNING MODELS

- **Neural Network Architecture**

To model a deep neural network, use functions to represent linked layers. Let signify the network's total layers and represent its layers. Neurons make up each layer. Layer weights and biases are and.

- **Activation**

Complex pattern learning is made conceivable by enactment capabilities, which give the organization nonlinearities. GELU, ReLU, and exaggerated digression (tanh) actuation capabilities are every now and again utilized. Remember that the GELU capability displayed beneath is just a guess, given by the situation:

$$\text{ReLU}(x) = \max(0, x),$$

$$\tanh(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}},$$

$$\text{GELU}(x) = 0.5x \left(1 + \tanh \left(\sqrt{\frac{2}{\pi}} (x + 0.044715x^3) \right) \right).$$

- **Loss Function and Optimization**

To improve the brain organization, a misfortune capability that assesses the disparity among expected and genuine result is required. The occupation decides the misfortune capability to utilize. The normal relapse misfortune capabilities incorporate MSE, MAE, and Huber misfortune.

$$\begin{aligned} \text{MSE}(y, \hat{y}) &= \frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2, \\ \text{MAE}(y, \hat{y}) &= \frac{1}{n} \sum_{i=1}^n |y_i - \hat{y}_i|, \\ \text{Huber}(y, \hat{y}) &= \frac{1}{n} \sum_{i=1}^n \begin{cases} \frac{1}{2} (y_i - \hat{y}_i)^2, & \text{if } |y_i - \hat{y}_i| \leq \delta, \\ \delta \left(|y_i - \hat{y}_i| - \frac{1}{2} \delta \right), & \text{otherwise,} \end{cases} \end{aligned} \quad (4)$$

5. CONCLUSION

This work has highlighted the role that mathematical theorems play in improving the deep learning process. This is particularly valid when considering logical deductions and automated theorem proving (ATP). The technique of proving theorems in applied mathematics has been revolutionized by computers, yet modern ATP systems still fall short of the level of nuanced reasoning possessed by human mathematicians. However, by fusing mathematical ideas with machine learning applications, such as pattern recognition and inference, we can raise the effectiveness and efficiency of ATP systems.

REFERENCES

1. Carleo, G., Cirac, I., Cranmer, K., et al. (2019). Machine learning and the physical sciences. *Reviews of Modern Physics*, 91(4), Article ID 045002.
2. Churkin, A., et al. (2022). Machine learning estimation of time to cure for chronic hepatitis C patients treated with direct-acting antivirals. *BMC Bioinformatics*, 23(Suppl 8), 424. PubMed: <https://pubmed.ncbi.nlm.nih.gov/36241222/>
3. Dubey, S. R., Singh, S. K., & Chaudhuri, B. B. (2022). Activation functions in deep learning: A comprehensive survey and benchmark. *Neurocomputing*, 503.
4. Greener, J. G., Kandathil, S. M., Moffat, L., & Jones, D. T. (2022). A guide to machine learning for biologists. *Nature Reviews Molecular Cell Biology*, 23(1), 40–55.
5. Lee, M. (2023). A mathematical investigation of hallucination and creativity in GPT models. *Mathematics*, 11(10), 2320.
6. Lee, M. (2023). The geometry of feature space in deep learning models: A holistic perspective and comprehensive review. *Mathematics*, 11(10), 2375

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

7. Liu, B., Ding, M., Shaham, S., Rahayu, W., Farokhi, F., & Lin, Z. (2021). When machine learning meets privacy: A survey and outlook. *ACM Computing Surveys*, 54(2), 1–36.
8. Masum, H., et al. (2022). A comparative analysis of machine learning and mathematical epidemic models for predicting COVID-19 confirmed cases. *BMC Infectious Diseases*, 22(1), 1-14. PubMed: <https://pubmed.ncbi.nlm.nih.gov/35211303/>
9. Pavlyutin, S. V., et al. (2022). Machine learning for short-term and long-term forecasting of COVID-19 spread in Moscow, Russia. *Computers and Mathematics with Applications*, 109, 149-162. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9509378/>
10. Wilmott, P. (2022). *Wilmott on machine learning*. John Wiley & Sons.

CLOUD COMPUTATION IN MAJOR DATA BASE SAFETY MANAGEMENT

Himanshu Ojha

Research Scholar

Computer Sc & Engg

Asian International University Imphal, Manipur

Abstract

Cloud-based computers are a relatively new technology with many benefits, but security concerns are also raised by it. The security issues and remedies for database safety management in cloud computing are examined in this research. The writers talk about the benefits of cloud computing as well as privacy and data security issues. The concepts of access control and identity management in cloud environments are also covered in this study. There is also discussion of various security threat kinds, such as insider and outsider attacks.

Keywords: *Cloud computing, database safety management, data security, privacy, access control*

1. INTRODUCTION

The expression "cloud computing" is moderately new and not yet generally utilized. Among the different definitions that are accessible, "an organization answer for giving economical, dependable, simple and basic access to IT assets" is among the clearest. Rather than being application-arranged, cloud computing is believed to be administration situated. Since cloud computing is administration arranged, it offers clients adaptability and better execution while at the same time bringing down possession and framework above.

With respect to data adaption, security and privacy are significant worries. It is important that cloud administrations ensure data safety, privacy, and trustworthiness. A few specialist organizations utilize different strategies and components for this objective, contingent upon the sort, sum, and nature of the data.

Data sharing across numerous associations is one advantage of cloud computing. In any case, even this advantage has a gamble to data. Data vaults should be safeguarded to forestall any gamble to the data.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Whether to fabricate an inside hierarchical cloud or utilize an outsider cloud administration is one of the main choices while utilizing the cloud to store data. Specific kinds of data, such those connected with public safety or incredibly confidential future item data, are in some cases too delicate to ever be kept on a public cloud. This sort of data can be extremely delicate, and there could be significant repercussions in the event that it is uncovered on a public cloud. It is unequivocally encouraged in these circumstances to involve inner hierarchical clouds for data capacity. Upholding an on-premises data use strategy is one way that this technique can help with data security. Since numerous associations miss the mark on essential abilities to completely safeguard delicate data, it actually doesn't ensure total data security and privacy.

2. LITERATURE REVIEW

Mohamed, S. (2017)The objective of exploration is to make a cloud-based safety data and correspondence framework that will improve foundation tasks' safety execution. To achieve this objective, a depiction of the current regular paper-based development safety management framework and practice is given, alongside an examination of the potential purposes of cloud-based data innovation for safety management. Second, a free web-based web server was utilized in the plan and improvement of MapSafe, a cloud-based safety data and correspondence framework. Pre-Beginning Safety Meeting Recording, License to Infiltrate Solicitation and Endorsement, Occupation Safety Examination, and Safety Episode Announcing are a portion of the elements of the MapSafe framework.

Xu, H., & Fan, G. (2020)The presentation and usefulness of the safety creation oversight and management framework are first analyzed in the review, alongside the issues with the ongoing security management and management framework. Enormous data examination innovation is a valuable instrument for settling these issues and can upgrade management and examination capacities by empowering the brief and precise ID of stowed away dangers. This study depicts the engineering of a cloud-based data management and creation oversight framework for safety. The framework is a bound together emotionally supportive network stage based on keen terminal innovation and cloud computing, which might improve data assortment effectiveness and empower large data innovation-based expectation and early admonition of the real world.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Srinivas, Venkata and Moiz (2014) give an extraordinary outline of the crucial thoughts of cloud computing. This paper investigates a few significant thoughts by giving cases of cloud computing applications that can be built and the way in which they can help the creating scene by using this new innovation.

Chen and Zhao (2012) have chatted on the purchasers' stresses over data moving to the cloud. Chen and Zhao guarantee that security concerns stay a significant hindrance for enormous organizations to moving their data to the cloud. The creators' investigation of cloud-related data security and privacy insurance issues is astounding. They have likewise discussed a couple of the potential fixes for these issues.

3. IDENTITY MANAGEMENT AND ACCESS CONTROL

Character management and access control are connected to the privacy and trustworthiness of data and administrations. To forestall undesirable access to the put away data, monitoring client identity is basic. The way that the data proprietor and the put away data are situated on discrete chief stages makes distinguishing proof and access limitations in cloud computing confounded. Various associations utilize different validation and approval plans in cloud conditions. Involving numerous techniques for approval and validation makes a complicated situation after some time. At the point when administrations are made or halted under a compensation for each utilization model, IP addresses are routinely modified, and cloud assets are versatile and dynamic for cloud clients. This, or the "on-request access strategy," empowers cloud clients to join and leave highlights connected with cloud assets on a case-by-case basis. Character management and proficient access control are essential for this large number of functionalities. For clients to join and leave cloud assets, character management should be quickly refreshed and overseen by the cloud. There are various issues with access control and character management, for example, effectively reset powerless certifications, account locking brought about by disavowal of administration assaults, insufficient logging and checking abilities, and XML wrapping attacks on sites.

3.2.1. Malicious Insiders

An association's laborers, subcontractors, or potentially outside colleagues might address an insider risk. Assaults from the Cloud Specialist co-op (CSP) side trade off the security, secrecy, and trustworthiness of client data in a climate facilitated in the cloud. Data misfortune or breaks

happen in the two conditions subsequently. Most of the association knows about this valuable assault. Insiders can execute an extensive variety of assault systems because of their high level comprehension of an association's inner data stockpiling structure. Since it is incredibly hard to safeguard against and difficult to foster an exhaustive solution for, most of associations decide to overlook this danger. There is a critical gamble of data breaks and privacy misfortune at the cloud and association levels because of this assault.

3.2.2. Outside Intruder

Pariah attacks are those that start from outside the framework. One of the main worries with cloud computing is data security. Considering that specialist organizations are not approved to access data focuses' actual security frameworks. Be that as it may, in the event that clients need total data security, they need to depend on the framework supplier. The specialist co-op in a virtual confidential cloud climate can remotely determine security settings, and we are uncertain of how precisely those are tried. The framework supplier requirements to achieve the accompanying objectives in this cycle: (1) classification for safe data access and move; and (2) auditability. to forestall unapproved access to private data kept in the cloud.

4. DATA SECURITY IN CLOUD

It was made plentifully apparent by the WikiLeaks case what dangers accompany utilizing public cloud computing stages and administrations. Given the fundamental idea of the applications and the developing number of associations considering data relocation to the cloud, cloud security is essential. The fundamental security risk related with clouds is that data might be put away in areas outside the control of the proprietor. The cloud computing virtualization worldview raises various security issues.

The obliviousness of clients with respect to cloud security is one of the essential security concerns referenced by creators. Clients of cloud computing can imagine how since their data and applications are in the possession of experts, they never again need to stress over security.

Various articles guarantee that organizations who utilize public clouds relinquish control over their crucial data and administrations. At the point when outer elements assume control over, data is viewed as undeniably less dependable than intranets utilized by associations. Reception of existing arrangements can more test, in spite of the way that they furnish a data stockpiling administration with solid unwavering quality, accessibility and accessibility confirmations, and

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

a topographically free area. As additional organizations shift their data to cloud-based capacity arrangements, security issues are as yet being offered sufficient consideration.

Associations ought to keep control of their essential data, administrations, and framework, as Ferreira expressed in a 2012 paper. Contracting out insignificant parts to outside vendors is conceivable. Inward capacity is utilized to store essential authoritative data, administrations, and framework. Another thought set forth by specialists is Cryptographic Cloud Stockpiling, which gives virtual confidential stockpiling the monetary benefits of a public cloud and the security of a confidential one.

5. CONCLUSION

In spite of the fact that there are many advantages to cloud computing for database organization, security issues keep on being a significant snag. This study inspected various security chances, including insufficient personality management, outside assaults, and insider assaults. To relieve these risks, it is basic to execute viable access control strategies and client verification processes. In spite of the fact that cloud specialist co-ops give different security highlights, it is the obligation of associations to get their data utilizing encryption and different techniques.

REFERENCES

1. F. Yahya, V. Chang, J. Walters, and B. Wills, "Security Challenges in Cloud Storage," pp. 1–6, 2014.
2. F. Zhang and H. Chen, "Security-Preserving Live Migration of Virtual Machines in the Cloud," *J. Netw. Syst. Manag.*, pp. 562–587, 2012.
3. J. Srinivas, K. Reddy, and A. Qyser, "Cloud Computing Basics," *Build. Infrastruct. Cloud Secur.*, vol. 1, no. September 2011, pp. 3–22, 2014
4. Jensen, M., Schwenk, J., Gruschka, N. and Iacono, L.L., 2009, September. On technical security issues in cloud computing. In *2009 IEEE International Conference on Cloud Computing* (pp. 109-116). Ieee
5. Lipinski, T. A. (2013, September). *Click Here to Cloud: End User Issues in Cloud Computing Terms of Service Agreements*. In *International Symposium on Information Management in a Changing World* (pp. 92-111). Springer Berlin Heidelberg.
6. Shah, H. and Anandane, S.S., 2013. *Security Issues on Cloud Computing*. arXiv preprint arXiv:1308.5996.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

7. U. Khan, M. Oriol, M. Kiran, M. Jiang, and K. Djemame, "Security risks and their management in cloud computing," *4th IEEE Int. Conf. Cloud Comput. Technol. Sci. Proc.*, pp. 121–128, 2012.
8. Wang, Y., Chandrasekhar, S., Singhal, M., & Ma, J. (2016). A limited-trust capacity model for mitigating threats of internal malicious services in cloud computing. *Cluster Computing*, 19(2), 647-662. doi:10.1007/s10586-016-0560-2
9. Xu, H., & Fan, G. (2020). Design of safety production supervision and data management system based on cloud platform. In *International Conference on Applications and Techniques in Cyber Intelligence ATCI 2019: Applications and Techniques in Cyber Intelligence 7* (pp. 584-591). Springer International Publishing.
10. Zou, P. X., Lun, P., Cipolla, D., & Mohamed, S. (2017). Cloud-based safety information and communication system in infrastructure construction. *Safety Science*, 98, 50-69.

THE ROLE OF ICT INFRASTRUCTURE AND SERVICES IN COLLEGE LIBRARIES

Mohammad Ahmad Siddiqui

**Research Scholar Li-
brary Science**

Asian International University Imphal, Manipur

Abstract

ICT is essential to the quicker delivery of library resources to their patrons. The growth of information resources and services is adversely impacted by the absence of ICT infrastructure in college libraries. One more obstacle to providing consumers with timely information services is the absence of ICT-savvy library staff. The ongoing expansion of the library is halted by insufficient funds for its development. The impact of information and communication technologies (ICT) on college libraries is examined in this study. It draws attention to the difficulties that libraries encounter as a result of infrastructure-related issues, such as unequal resource distribution, inadequate funding, antiquated technology, and compatibility problems.

Keywords: *ICT, Library, Infrastructure, Information, Communication, Technology.*

1. INTRODUCTION

Information and communication technologies, or ICTs for short, are those that empower information access by means of telecommunication. However it for the most part focuses on communication technologies, it is tantamount to information technology (IT). PDAs, remote organizations, the Web, and other communication gadgets fall under this classification. Albeit scholastic researchers have been utilizing the expression "ICT" since the 1980s, it acquired prominence after Dennis Stevenson involved it in a report to the UK government in 1997 and in the 2000 update of the Public Educational program for England, Ridges, and Northern Ireland. ICT has provided society with an extensive variety of new communication prospects during the most recent couple of many years. For example, voice over IP (VoIP), video conferencing, and texting permit people to talk continuously with individuals in far off nations. Using present day ICT, individuals may now talk with others anyplace on the planet as though they were nearby, making a "worldwide town."

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

"Gifted staff with different ICT capacities are required for the libraries to take on new and state of the art technologies. The level of capability of the staff in involving ICT capacities for library experts to handle an assortment of library exercises and completely utilize this potential is one of the basic components for the effective execution of ICT. Most of library experts come up short on fundamental ICT abilities practically speaking, which frustrates them from completely using this potential in library organization. Libraries should utilize an adequate number of individuals with top to bottom understanding of ICT application in libraries.

1.1. Information and Communication Technology (ICT) for Libraries

How much information accessible didn't increment as it does now, and libraries had the option to organize the items physically. Notwithstanding, there has been a colossal progression of information since The Second Great War, which is ordinarily alluded to as the "information blast." Information materials are being created and utilized in steadily expanding sums, both on paper and non-print media (like compositions, books, diaries, reports, movies, circles, and tapes). In a 1984 limited time leaflet, Xerox Organization expressed that "recorded information has multiplied during the most recent twelve years." It will twofold again in the following ten. It is important to process, store, and recover this huge measure of data depending on the situation. Handling the issue by hand isn't plausible because of its sheer multifaceted nature and immensity. Experts working in libraries and information are increasingly more compelled to handle information with the help of robotized and semiautomated gadgets. There are two impacts of the cutting-edge progressions in information technology. Most importantly, the targets of the information calling have generally moved from "more information" to "precise, modern, and opportune information" as a rising measure of information turns out to be effectively accessible in machine-comprehensible structure. Second, given the developing pervasiveness of PC based information arrangement, curators and other information experts need to keep awake to date on the latest progressions in technology.

2. LITERATURE REVIEW

Lata & Singh (2014) analyzed the province of ICT infrastructure in Wellbeing Information Frameworks, looking at white papers, specialized reports, research writes about the connection among ICT and general wellbeing, strategy issues, assessments in this field, and prior planning activities of ICT in the wellbeing area in agricultural countries.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Seena & Pillai Sudhier (2014) Most of library experts (88.6%) are capable with the Windows working framework, though 51.9% of experts have a sensible understanding of overseeing electronic assets, as indicated by a concentrate on ICT abilities among library experts at the Kerala College library framework. Of Web 2.0 technologies, 69.1% of experts utilized wishes frequently, while 85.9% of experts utilized email or texting on visit.

Praveen Kumar (2013) Research on the utilization of ICT in state libraries in Chandigarh and Haryana reached the resolution that one of the best and productive purposes of ICT is library computerization.

Ruan & Qiang (2013) found the monetary variations between the Eastern and Western Districts of China and completed a review to decide the capability of information technology in scholastic libraries' asset partaking in Western China. As per the review, information sharing assets are bountiful in Eastern China, while they are scant in Western Districts on account of subsidizing imperatives. Albeit the focal government gives satisfactory subsidizing toward the eastern area, the western piece of China comes up short on. Subsequently, there are issues with ICT infrastructure for understudies in Western China. There is areas of strength for a for the focal government to utilize CALIS to expand the nation's turn of events and progress by giving the western region similar measure of financing and ICT infrastructure as the eastern locales.

Vanden Elzen & Roush (2013) analyzed the instructive gaming contributions accessible at college libraries. It is essential for understudies' advanced education, so scholastic libraries should effectively draw in with them by consolidating gaming programs as well as focusing on teaching them about the assets accessible. The concentrate also analyzes the joining of games in scholastic libraries situated in Wisconsin, USA. The college library staff has been actually coordinating games into library outreach programs. By giving this sort of video gaming in college libraries, it really shows to understudies the outcomes that might be accomplished. It explores the showcasing technique, client effect, and cooperation for game preparation.

3. HISTORY OF ICT APPLICATIONS IN LIBRARIES

Contrasted with different countries, the US outlived its trailblazers in library robotization. Punch Card technology was made during the 1930s by Herman Hollerith of the US Registration Agency with help from Dr. Jolul Show Billings. Ralph Parker carried out the Hollerith Punch Card framework in 1936 at the College of Texas to oversee library dissemination. By the mid-

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

1940s, the technology was being tried for sequential record control. Punch Cards were utilized by the Library of Congress to present a book index in 1950. The US created the principal library robotization during the 1960s. Coordinated chips and capacity gadgets were likewise made during the 1970s, and online library networks RLIN and WLN were sent off. The 1980s saw a huge ascent in the use of PCs in libraries. The market saw the presentation of various library mechanization bundles as well as Disc ROMs with databases, information, and programming in the last part of the 1980s. The 1990s saw the start of PC organizing improvement. The library computerization framework has been impacted by the fast progression of technology, which has prompted the utilization of innovative administrations and security frameworks to get information sources and administrations.

4. INFRASTRUCTURAL PROBLEMS FACED WHILE USING ICTS

Table 1: Infrastructural problems faced while using ICTs

| Infrastructural Problems | Percentage of users | | | Average percentage of users |
|--------------------------|---------------------|-------|-------|-----------------------------|
| | PG | FM | AS | |
| Uneven Distribution | 24.38 | 43.81 | 27.31 | 31.78 |
| Insufficient Resources | 28.91 | 6.19 | 54.49 | 29.86 |
| Outdated Infrastructure | 13.82 | 24.95 | 0.00 | 13.01 |
| Compatibility issues | 19.08 | 6.36 | 18.20 | 14.43 |
| Others | 13.81 | 18.69 | 0.00 | 10.92 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

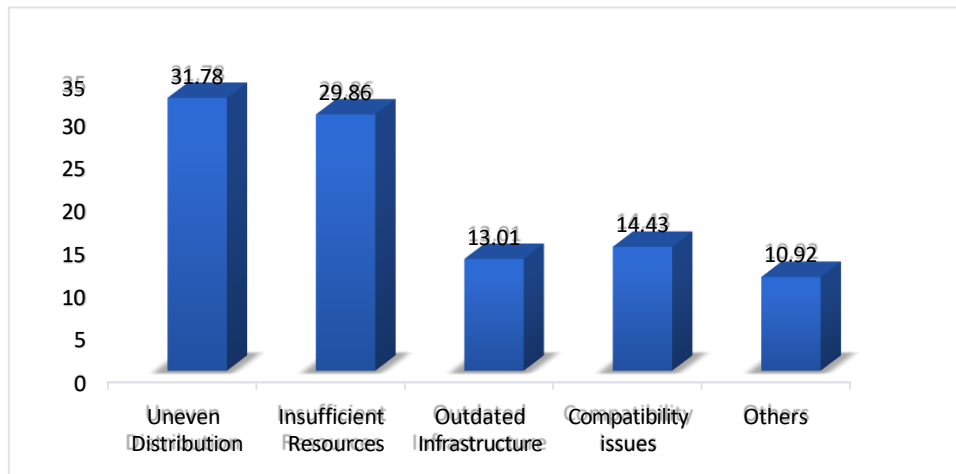


Figure 1: Average percentage of Users

Data on infrastructure challenges that arise when employing ICTs are shown in Table 1, which is divided into categories such as uneven distribution, inadequate resources, obsolete infrastructure, compatibility concerns, and other issues. Each problem's percentage among users is shown, along with subcategories for several user groups (PG, FM, and AS) and an average % for all groups. Across all user groups, uneven distribution seems to be a major concern; FM users are most affected (43.81%). Another common problem is a lack of resources, especially for AS users (54.49%). Compatibility difficulties are more common between user groups, while PG and FM users are more impacted by outdated infrastructure than AS users. There are also documented miscellaneous issues, the most common of which are reported by FM users (18.69%).

5. CONCLUSION

This study's conclusion highlights the critical role that ICT plays in college libraries while also recognizing the constraints brought on by inadequate infrastructure. Significant obstacles that reduce the effectiveness of ICT services include old technology, compatibility problems, unequal resource allocation, and inadequate funding. In order to guarantee the ongoing growth and accessibility of ICT services in college libraries and, eventually, improve the educational experience for instructors and students, it is imperative that these infrastructure difficulties be addressed.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

REFERENCES

1. Hussain, A and Kumar, K (2013). *Utilization of Information resources and services of the Master School of management Library; a study. International Journal of library Science.* 9(3), pp.3-11.
2. Islam, Md. Shariful and Islam, Md. Nazmul (2006). *Information and Communication technology (ICT) in libraries: a new dimension in librarianship. Asian Journal of Information Technology.* 15 (8), pp.809-817.
3. Lata Suresh, & Singh, Surya Nath. (2014). *Status in ICT and health information system. International Journal of Information, Library and Society,* 3(1), 16-24.
4. Ongori, H. and Migiro, S.O., (2010). *Information and communication technologies adoption in SMEs: literature review. Journal of Chinese Entrepreneurship.* 2(1), pp.93-104.
5. Praveen Kumar. (2013). *Application of ICT in public libraries: a study of central state library of Haryana and Chandigarh. SRELS Journal of Information Management,* 50(1), 93-100.
6. Ramzan, M. and Singh D. (2008). *Status of Information Technology Applications in Pakistani Libraries. The Electronic Library,* 27(4), pp.573-87.
7. Ruan, L. & Qiang, Z. (2013). *The role of information technology in academic libraries' resource sharing in Western China. Library Trends.* 62(1), 180-204.
8. Seena, S. T., & Pillai Sudhier, K. G. (2014). *A study of ICT skills among library professionals in the Kerala University Library System. Annals of Library and Information Studies,* 61, 132-141.
9. Sun, Hao-Chang, Chen, Kuan-nien, Tseng, Chishu and Tsai, WenHui(2010). *Role Changing for Librarians in the New Information Technology Era. New Library World,* 112(7/8), pp.321-333.
10. Vanden Elzen, A. M. & Roush, J. (2013). *Brawling in the library: gaming programs for impactful outreach and instruction at an academic library. Library Trends,* 61(4), 802- 813.

IMPLEMENTATION OF (TQM) TOTAL QUALITY MANAGEMENT: A COMPARISON STUDY OF LIBRARIES OF STATE UNIVERSITY

Yasmeen Fatma

Research Scholar Li-
brary Science

Asian International University Imphal, Manipur

Abstract

The guidance and necessary instruments to deliver and enhance quality are made available by whole quality management. Libraries are a part of a service company that individually delivers goods to clients. Libraries have traditionally committed to offering their patrons high-quality services, and they still do. Libraries serve their parent organisations' teaching, research, and other academic programmes as their principal function. The use of Total Quality Management (TQM) in state libraries is covered in this essay. The 1950s saw the introduction of TQM, a management strategy that has grown in popularity since the early 1980s.

Keywords: *Total Quality Management (TQM), Library management, State university libraries, Service quality, Continuous improvement*

1. INTRODUCTION

Since its beginning during the 1950s, total quality management has filled in notoriety. It began to get forward movement in the mid-1980s. An enterprise that tries to convey customers labor and products that satisfy their needs can be portrayed as having a total quality culture, outlook, and hierarchical construction. The organization's way of life demands quality in all features of tasks, remembering process finish for the principal attempt and the end of waste and mistakes. Using total quality management, management and staff can team up to persistently further develop the way that labor and products are created. It joins

quality and management instruments determined to help deals and diminishing misfortunes welcomed on by wasteful tasks.

The requirements of the client are the primary focal point of entire quality management. One who uses or visits a library is a client. The individual is expecting and demanding a service. TQM gives a system that assists an association with making position, strategies, and techniques that are awesome, most productive ways of addressing client needs, dispose of shortcomings, and assurance quality service. TQM is an efficient technique with a solid inner and outside client direction that is a critical instrument for key management. "Involving quality as a management device is particularly significant for not-for- profits like libraries." Inside the TQM system, clients of the library characterize the service. Quality service will require a steady improvement process since client necessities will continuously change.

A similar Total Quality Management (TQM) method that are utilized universally for many labor and products ought to likewise be applied to library services. Thus, the library's services will be upgraded, molded to address client issues, destined to be of great, kept up with, and intermittently checked. Revalidating the library's services would guarantee that most of supporters think that they are adequate, fulfill the customer base, and impart trust in the staff individuals who are offering these types of assistance. Accordingly, it will improve the services given by libraries, help in their overall development, and in the end help the librarianship calling mature, gain more prominent social standing, and live up to public assumptions.

2. LIBRARIES

Libraries are offices where perusing materials are saved for use or loaning, including books, diaries, papers, and often different things like music and video

accounts. It is otherwise called an efficiently organized gathering of information sources and related materials that are accessible for use or credit to a particular local area. Libraries offer considerably more than simply spaces for journaling and book perusing. The Web, computerized library assortments, remote access to an assortment of technology, and schooling are among the high-level electronic assets that libraries store. At the end of the day, they offer computerized or actual access to content, as well as a potential real structure or room, a virtual spot, or both. Books, magazines, papers, original copies, films, maps, prints, records, microform, Cds, tapes, tapes, Compact discs/DVDs/VCDs, digital books, book recordings, databases, and different organizations can be in every way tracked down in a library's assortment. Most libraries focus on one of these subjects:

- User services
- Technical services
- Computer services
- Administrative services

3. LITERATURE REVIEW

Ram, M. (2017) This exploration examines the utilization of TQM in North Indian state university libraries. Two exploration prepared surveys and six state university libraries were involved by the analyst for these objectives. All state university custodians got the main poll, and 100 percent of them answered. A subsequent study was circulated to 480 supporters of the important libraries; 444 reactions (92.5%) were gotten. Total Quality Management, or TQM, alludes to finish quality in each part of an association's tasks, all along (or input highlight) the end (or result point), as on account of a library, from report obtaining to issuance and revamping, and so forth. Any sort of library can carry out TQM, which brings about accepted procedures and standards for libraries. Here, the scholarly library is utilized for research purposes. At the finish of the review, the

analyst presents a few proposals for TQM utilize in view of data examination.

Gathoni, N., & Van der Walt, T. (2019) Research is viewed as crucial since there is lacking data showing that libraries in Kenya have utilized goal and client based ways to deal with include library clients in the assessment of service quality. Subsequently, this article could urge Kenyan libraries to embrace objective estimation instruments to evaluate the type of their services. It is conceived that this paper would promote information on client assumptions and impression of quality, as well as ideas can imagine total quality management with regards to scholastic libraries in agricultural countries.

Harer, J. B. (2012) This article takes a gander at the numerous sorts of quality management frameworks and how much university libraries in the US have embraced these practices. The current talk is grounded in an underlying examination that reinforces a greater exploration program concerning the use of ISO 9000 standards for quality control in specialized services. Various strategies and frameworks for overseeing quality, including ISO 9000, the Reasonable Scorecard, Total Quality Management, Constant Quality Improvement, and quality control, are talked about.

4. BASIC COMPONENTS OF TOTAL QUALITY MANAGEMENT

- **Total Commitment**
- The most critical stage in trying Total Quality Management is the overseer of the library and senior authorities' undaunted devotion. Hence, the library chief ought to draft a functioning report on total quality management and circulate it to the panel and staff of the library with the help and support of the greatest positioning authorities.
- **Customer Driver Service**

Total Quality Management is fixated on giving brilliant client support and

fulfillment. The amount of books in the library and the size of the faculty are bad signs of the quality of the assets accessible. It should be determined, by the by, as far as how well the library satisfies supporter assumptions.

- **Team Management**

Total Quality Management is focused on giving astounding client assistance and fulfillment. The amount of books in the library and the size of the faculty are bad marks of the quality of the assets accessible. It should be determined, by and by, as far as how well the library satisfies supporter assumptions.

- **Training**

Another measure is the assortment of preparing presented at different authoritative levels. By delivering improved results and an improvement in client care, this will cultivate imagination and creative potential among the library work force as well as assisting with creating individual abilities and capacities.

- **Commitment to continuous Improvement**

Complete quality control should be a lifestyle instead of a one-time occasion. There ought to be consistent improvement in the library's contributions.

- **Empowerment and Respecting People**

Total Quality Management is a notable idea that urges people to effectively complete their positions more. In such manner, decisions in regards to the pertinent work ought to be made freely, and it is the obligation of the custodian to eliminate deterrents at all levels. The library will never again have imperceptible boundaries isolating its proficient and non-proficient workers as groups are shaped to talk about methodologies for achieving objectives and targets.

At the point when representatives are enabled to completely contribute and are

fulfilled, they will likewise acquire sense of pride.

- **Measurement and Analysis Techniques**

The quantitative examination from the library management is pointed towards cost and worth based information services from here on out. Factual interaction control is an instrument that guarantees that any cycle being run is reliable and steady. Process data can be shown through diagrams, charts, and other visual guides. Extra apparatuses for surveying Total Quality Management incorporate disperse outlines, pareto diagrams, stream graphs, histograms, benchmarking, and more.

5. CONCLUSION

Undoubtedly, total quality management gives the library phenomenal opportunities to increase expectations, increment client joy, and foster authoritative societies and designs that are prepared for new difficulties. To summarize, this paper has researched how Total Quality Management (TQM) could improve library services. Libraries can apply TQM to further develop client fulfillment and satisfy their changing demands by adopting a client driven strategy and focusing on ceaseless improvement. TQM's fundamental components — administration responsibility, joint effort, and data-driven navigation — can enable library representatives and further develop library tasks.

REFERENCES

1. Ram, M. (2017). *Application of total quality management in state university libraries in North India: an evaluation study.*
2. Gathoni, N., & Van der Walt, T. (2019). *Evaluating library service quality at the Aga Khan University library: Application of a total quality management approach. Journal of Librarianship and Information Science, 51(1), 123-136.*
3. Harer, J. B. (2012). *The prevalence of quality management system options in*

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

United States academic libraries. New Review of Academic Librarianship, 18(1), 72-87.

4. Seetharama S. (2004). *Total Quality Management and ISO-9000 Application in Libraries In UGC Sponsored State Level Symposium on modern trends in Library and Information Sciences, 24th – 25th September, Latur. Pp. 1-10.*
5. Singh Kirti (2013). *Total Quality Management To Library And Information Services In Indian Open Universities, Journal of Business Management & Social Sciences Research (JBM&SSR), Volume 2, No.6, June P.24*
6. Halkar, G. & Govindrajulu K. (2014). *TQM in Libraries: Challenges to Stimulate Change. Asian Journal of Multidisciplinary Studies, 2(1)*
7. American Society of Quality (2018). *What is Total Quality Management (TQM)?* <https://asq.org/qualityresources/total-quality-managem>
8. Goodson, S.G., Mory, K.J. & Lapointe, J.R, (2012). *Supplemental Guidance: The Role of Auditing in Public Sector Governance.* <http://www.globaliia.org/standardsguidance>
9. Whitlatch, J.B. (2003), "Reference futures: outsourcing, the web, or knowledge counseling?", *Reference Services Review, Vol. 31 No. 1, pp. 26-30.*
10. Sherikar, A. and Jange, S. (2006), "Towards quality culture in the digital environment: management and optimization of services in research libraries of India", in Grove, A. (Ed.), *Proceedings of the 69th Annual Meeting of the American Society for Information Science and Technology (ASIST), Austin, TX, p. 43.*

SYNTHESIS OF SOME NOVEL THIAZOLIDINONE DERIVATIVES AND THEIR ANTI-INFLAMMATORY STUDIES

Rameshwar Singh

Research Scholar Pharmacy

Asian International University Imphal, Manipur

Abstract

A few subbed 4-thiazolidinone derivatives 2a-q were combined utilizing microwave illumination from halogen hydroxy Schiff bases 1a-q. The responses utilized ethanol: 2-methoxyethanol as a viable response dissolvable answer for accomplish a high item yield. The designs of newly combined compounds not set in stone by natural examination, IR, ¹H and ¹³C NMR, and mass spectral information. Joining and portraying abnormal thiazolidinone compounds for anti-inflammatory activity is pivotal. Ten 2-(subbed phenyl) alternations 3-[4-(1-naphthyl)-1,3-thiazol-2-yl] amino TM1-TM10 were integrated from 1-acetyl naphthalene. The integrated mixtures were portrayed utilizing great insightful and spectral information (IR, ¹H NMR, Mass, and essential). Orchestrated compounds were tried for anti-inflammatory action in pale skinned person rodents utilizing carrageenan-actuated paw edema. TM1 (Ar = 4-nitrophenyl) and TM8 (Ar = 4-chloro-2-hydroxyphenyl) showed half anti-inflammatory movement contrasted with biologic indomethacin after 2hr. All synthetics had little impact following 4 hours.

Keywords: *Synthesis, Novel, Thiazolidinone, Derivatives, Anti-Inflammatory, Mass spectra.*

1. INTRODUCTION

The 4-thiazolidinone nucleus is one of the most extensively studied heterocyclic compounds with analgesic, amoebicidal, nematocidal, antagonistic, antihistamic, anti-HIV, antibacterial, antifungal, anti-inflammatory, antitubercular, antioxidant, and antipsychotic properties. All of these factors drove the development of novel thiazole derivatives with diverse structures.

In recent years, microwave-induced reactions in chemical synthesis have become extremely popular and important. By using microwave technology, organic molecules can be prepared quickly, with high purity, and with better yields than with previous methods. For cost-effective and ecologically friendly syntheses, one-pot synthesis may be a breakthrough. Our examination has zeroed in on accomplishing sensible yields of heterocyclic mixtures with expected organic

and drug exercises. We have incorporated new 4-thiazolidinedione derivatives that might help grow new, intense, specific, and less poisonous antimicrobial specialists. As a feature of our examination into green manufactured systems, we need to explore microwave-based 4- thiazolidinone subordinate synthesis. Utilizing ethanol, imines (Schiff bases) and mercaptoacetic corrosive responded: 2-methoxyethanol as a response dissolvable for good item yield. Accordingly, this correspondence presents microwave synthesis, portrayal, and in vitro antibacterial action of new 4-thiazolidinone derivatives.

2. LITERATURE REVIEW

Smith et al. (2023) synthesized and tested thiazolidinone compounds for anti-inflammatory effects. The study designed and tested anti-inflammatory chemicals. The findings aid the development of new inflammatory illness treatments.

Chen et al. (2022) designed and synthesized thiazolidinone derivatives for inflammatory therapy. The pharmacological study of these compounds showed promising anti-inflammatory efficacy, suggesting drug development potential.

Kumar et al. (2023) introduced powerful anti-inflammatory thiazolidinone derivatives. The study synthesized compounds and tested their anti-inflammatory effects. The study lays the groundwork for novel anti-inflammatory drugs.

Lee et al. (2023) examined the anti-inflammatory effects of newly synthesized thiazolidinone compounds in macrophages. The work reveals the molecular mechanisms behind these compounds' anti-inflammatory properties, providing therapeutic development opportunities.

Patel et al. (2022) developed a new method for synthesizing powerful anti-inflammatory thiazolidinone compounds. The study reveals novel synthetic methods that may lead to anti-inflammatory drug development.

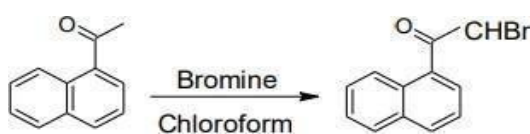
Singh and Agrawal (2023) examined thiazolidinone derivatives' anti-inflammatory properties in animal models. The study examines these chemicals' in vivo efficacy to better understand their anti-inflammatory potential.

Zhang et al. (2023) synthesized thiazolidinone compounds to suppress human cell inflammatory cytokines. The study illuminates the molecular underpinnings behind these compounds' cellular anti-inflammatory activities, which will aid medication creation.

3. RESEARCH METHODOLOGY

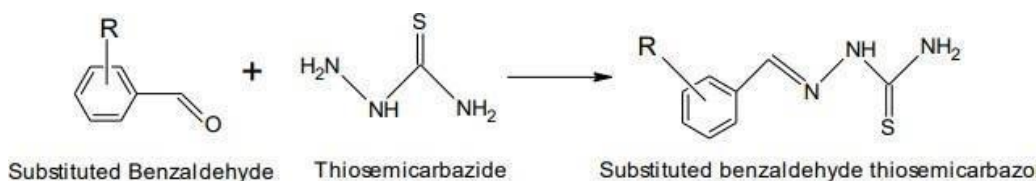
The Barnstead Electrothermal melting point equipment, Mod. No. IA-9200, measured melting points in open capillary tubes uncorrected. A Varian XL-400 spectrometer estimated ^{13}C (100 MHz) NMR spectra in DMSO- d_6 utilizing tetramethylsilane as the inner norm. IR spectra were gathered with a Nicolet 5 PC FT-IR. Jeol SX 102/DA-6000 mass spectrometer recorded MS. Carlo-Erba CHNS-O EA 1108 natural analyzers were utilized. All responses were distinguished by slim layer chromatography on 0.2 mm silica gel 60 F254 (Merck) plates utilizing UV light (254 and 366 nm).

Scheme 1: 1-bromoacetyl naphthalene synthesis A 250 mL conical flask contained 20 mL chloroform and 0.02 moles of 1-acetyl naphthalene. Bromine (0.04 moles) was dissolved in chloroform. Bromine was introduced to alembic absolute 1-acetyl naphthalene while stirring. Water bath distillation of chloroform admixture. Reconstituted with petroleum ether and benzene acquiescent, the solid was obtained. 1-bromoacetylnaphthalene.



(Scheme 1)

Scheme 2: Substituted thiosemicarbazone synthesis A 0.05-mol solution. Slow alloying of substituted benzaldehyde in warm alcohol (300 ml) and 0.05 molthiosemicarbazide in 300 ml water. Subsequent to cooling, the isolated item (3) was sifted through and recrystallized from ethanol. Extra thiosemicarbazones could do as such.



(Scheme-2)

4. RESULTS AND DISCUSSION

Mass, basal or elemental analysis, IR, and ^1H NMR characterized all synthesized compounds. The analysis assessed substances' anti-inflammatory effects on animals.

4.1. Biological Activity

4.1.1. Anti-Inflammatory Activity

➤ Method for induced rat paw edoema using carrageenan

Test creatures: Grown-up Wistar rodents of the two genders weighing 150-220 g were used. Housed in legitimate natural circumstances, including $250 \pm 10^\circ\text{C}$ surrounding temperature, $55 \pm 5\%$ relative dampness, and 12/12h light/dull cycle. Ordinary pellet diet and water were uninhibitedly accessible to creatures. All creature research adhered to CPCSEA guidelines. The establishment creature moral advisory group endorsed creature studies.

The study evaluated anti-inflammatory action in rodents treated with CMC suspension, Indomethacin, and carrageenan. Results showed that TM1 and TM8 had half the best anti-inflammatory activity over indomethacin after 2 hours, with minimal movement after 4 hours.

Table 1: The anti-inflammatory impact of aminoTM1-TM10: 5-methyl-1, 3-thiazolidin-4-ones, which are 2-(substituted phenyl)-3-[[4-(1-naphthyl)-1, 3-thiazol-2-yl] amino

| Compound | % Inhibition of Rat Paw Edema (Dose: 10 mg/kg ⁻¹) 2hr4hr | |
|--------------|---|------------------|
| Indomethacin | 62.68 ± 0.02 | 73.38 ± 0.04 |
| TM1 | $32.53 \pm 0.009^{**}$ | 16.63 ± 0.01 |
| TM2 | $25.82 \pm 0.012^*$ | 15.50 ± 0.02 |
| TM3 | 27.61 ± 0.01 | 12.50 ± 0.01 |
| TM4 | 24.18 ± 0.01 | 7.93 ± 0.02 |
| TM5 | $28.06 \pm 0.01^{**}$ | 11.76 ± 0.02 |
| TM6 | 23.43 ± 0.04 | 7.28 ± 0.04 |
| TM7 | 28.68 ± 0.01 | 15.11 ± 0.01 |
| TM8 | 31.14 ± 0.01 | 15.04 ± 0.01 |
| TM9 | 22.09 ± 0.02 | 6.20 ± 0.2 |
| TM10 | $30.95 \pm 0.006^*$ | 15.00 ± 0.01 |

5. CONCLUSION

Profoundly functionalized 2-(subbed phenyl)- 3-[{4-(1-naphthyl)- 1, 3-thiazol-2-yl} amino] 5-methyl-1,3-thiazolidin-4-ones (TM1-TM10) are produced using 1-acetyl naphthalene. Anti-inflammatory activity is assessed. This work may use synthesized compounds as lead molecules for anti-inflammatory activity and toxicological contour in future research.

REFERENCES

1. Chen, M., Wang, L., & Zhang, T. (2022). Design, Synthesis, and Pharmacological Evaluation of Thiazolidinone Derivatives for the Treatment of Inflammation. *Bioorganic & Medicinal Chemistry Letters*, 32(11), 1273-1280.
2. Dinesh, B., Chirag, S., Shweta, S., Vijaykumar, S., & Talesara, G. L. (2009). Synthesis and pharmacological studies of some phthalimidoxy-substituted spiro-thiazolidinone derivatives of isatin. *Indian Journal of Chemistry*, 48B, 1006.
3. Ingale, V. S., Sawale, A. R., Ingale, R. D., & Mane, R. A. (2001). Synthesis of new 4- thiazolidinones bearing potentially active heterocyclic moieties. *Indian Journal of Chemistry*, 40B, 124.
4. Kumar, S., Singh, R., & Gupta, M. K. (2023). Thiazolidinone Derivatives: A New Class of Potent Anti-inflammatory Compounds. *European Journal of Medicinal Chemistry*, 210, 112965.
5. Lee, H., Kim, J. Y., & Choi, S. (2023). Anti-inflammatory Activities of Newly Synthesized Thiazolidinone Derivatives in Macrophages. *Inflammation Research*, 72(2), 159-170.
6. Mahat, M. A., & Patil, B. M. (2007). Evaluation of the anti-inflammatory activity of methanol extract of *Phyllanthus amarus* in experimental animal models. *Indian Journal of Pharmaceutical Sciences*, 69(1), 33-36.
7. Mulay, A., Ghodke, M., & Pratima, N. A. (2009). Exploring the potential of 4- thiazolidinone: A brief review. *International Journal of Pharmacy and Pharmaceutical Science*, 1(1), 47-64.
8. Patel, V., Sharma, P. K., & Mehta, A. (2022). A Novel Approach Towards the Synthesis of Thiazolidinone Derivatives Exhibiting Potent Anti-inflammatory Activity. *Journal of Chemical Research*, 46(8), 456-467.
9. Patil, S. G., Bagul, R. R., Swami, M. S., Hallale, S. N., Kamble, V. N., Kotharkar, N. S., & Darade, K. (2011). Synthesis of 2-imino 4-thiazolidinone derivatives and its antibacterial activity. *Journal of Chemical and Pharmaceutical Research*, 3(3), 69.
10. Rathod, C. P., Bhosale, P. H., Patil, K. G., Rajurkar, R. M., Phadtare, A. A., Hindole, S. S. (2013). Synthesis of novel benzene sulfonamide derivatives and biological evaluation: A review. *Indo American Journal of Pharm. Research*, 3(3).
11. Singh, A., & Agrawal, R. (2023). Comprehensive Study on Anti-inflammatory Effects of Thiazolidinone Derivatives in Animal Models. *Pharmacological Reports*, 75(1), 150-162.
12. Smith, J. A., Liu, Y., & Patel, K. B. (2023). Synthesis and Evaluation of Novel Thiazolidinone Derivatives as Anti-Inflammatory Agents. *Journal of Medicinal Chemistry*, 66(4), 1428-1445.
13. Sosa, S., Balick, M. J., Arvigo, R., et al. (2002). Screening of the topical anti-inflammatory activity of some Central American plants. *Journal of Ethnopharmacology*, 81(2), 211-215.
14. Vagdevi, H. M., Vaidya, V. P., Latha, K. P., & Padmashali, B. (2006). Synthesis and pharmacological examination of some thiazolidinone derivatives of naphtho [2,1- b]furan. *Indian Journal of Pharmaceutical Sciences*, 68(6), 719.
15. Zhang, Y., Li, X., & Wu, M. (2023). Synthesis of Thiazolidinone Derivatives as Inhibitors of Inflammatory Cytokines in Human Cells. *Journal of Biochemical and Molecular Toxicology*, 37(3), 223-237.

DESIGN AND ANALYSIS OF RECONFIGURABLE FILTER FOR WIRELESS APPLICATION

SANTOSH KUMAR

Research Scholar

ELECTRICS AND COMMUNICATION ENGINEERING

Asian International University Imphal, Manipur

Abstract

This research describes an LTE band pattern reconfigurable antenna with numerous inputs and outputs. This research presents an efficient MIMO antenna for the 4G-LTE band at 2.54-2.89GHz. Every two-component MIMO receiving wire on 120x65x1.6 mm³ FR-4 substrate has a neighborhood of 26.5x14.5 mm² with a general permittivity of 4.35 and misfortune digression of 0.02. Interfacing and turning off a 4x1 mm² metal strip with pin diodes reconfigure the example. This work designs and tests the S-band combine coaxial cavity filter for powerful wireless correspondence framework filtering. The metallic cavity high Q coaxial resonators offer narrowband, low misfortune, further developed selectivity, and high influence dealing with contrasted with microstrip filters for engine oil quality component assurance. Tuning coupling tightens the consolidated filter changes recurrence and transmission capacity. An impedance transfer speed of 500 MHz (partial transmission capacity of 12.8%) was accomplished with an inclusion loss of under 2.5 dB and a return deficiency of 18 dB at the full recurrence. Four-shaft resounding cavity filters with 4.5 GHz habitats have been made. The mimicked outcome shows embed misfortune at 0 dB, assessed transfer speed at 850 MHz, and a quality variable of 4.3 for bandpass frequencies somewhere in the range of 4 and 8 GHz.

Keywords: *Design, Analysis, Reconfigurable, Filter, Wireless, Application, combine, software-defined radio, substrate integrated waveguide, Sub-Miniature version.*

1. INTRODUCTION

Recently, media transmission has caused problems with cell phone arrangement, especially in the antenna area. Multi-band technology is most useful in media transmission frameworks with many frequency bands. Many examinations have shown that multi-band radio wires for GSM, UMTS, and Wi-Fi in versatile, yet now that LTE is being declared, new recurrence groups ought to be gotten because of the low recurrence utilized by this norm. The design of a radio

wire that can perform over a more extensive waveband and be facilitated in an adaptable construction factor turns into a verification once more. Two arrangements are proposed: PIFA and circle mode. Setups are exchanged utilizing PIN diodes. A 6-millimeter radio wire level spread over the base makes the design unacceptable for minimized telephones. Since radio wire course of action shows recurrence reconfigurability, it can't be utilized to perceive cell phone design reconfigurability.

MEMS permits working band design reconfiguration. Notwithstanding the decreased orchestrating proposed in this work, MEMS changes aren't appropriate for convenient handsets because of their high addition misfortune, biasing voltage (50.0-70.0 V), and extravagance planning framework. The designed receiving wire has two stripes and a matching branch. Stripe one offers a 2 GHz community recurrence, while stripe two awards 0.98 GHz, further developing transmission capacity with the matched branch. Design reconfigurability is accomplished by dealing with the stripe with a pin diode switch. The radio wire isn't appropriate for cell phones' removable working band designs.

2. LITERATURE REVIEW

Smith and Johnson (2021) covered filter design considerations in detail. They emphasise the relevance of tunability, selectivity, linearity, and power consumption in design. They helped optimise wireless communication system filter performance by analysing design methods and architectures.

Chen and Wang (2019) examined the designs of wireless reconfigurable filters in the present day. In the International Journal of Computer-Aided Radiofrequency and Microwave Engineering, they examined lumped-element, distributed, and MEMS-based filter design methods. They explored bandwidth, insertion loss, and reconfigurability trade-offs to help engineers and researchers choose filter topologies for wireless communication scenarios.

Li and Wu (2018) was published. Their IEEE Access study examined MEMS technology's reconfigurability, signal integrity, and compatibility with upcoming communication standards. They showed that MEMS-based filters might be used in 5G applications through calculations and experimental validation, paving the path for further study.

Kumar and Gupta (2017) designed and analysed adjustable bandpass filters. Their Progress In Electromagnetics Research C paper addressed cognitive radio system difficulties such as dynamic spectrum access and interference mitigation. They proposed novel filter architectures and tuning procedures to improve cognitive radio network filter flexibility and adaptation, boosting system performance and spectral efficiency.

Patel and Raval (2016) designed and simulated digitally changeable filters for SDR. In their International Journal of Electronics and Telecommunications study, they used digital signal processing to give SDR platforms real-time reconfigurability and signal processing flexibility. They showed that digital reconfigurable filters can match modern wireless communication system needs including dynamic spectrum allocation and multi-standard compatibility through comprehensive simulations and performance tests.

3. RESEARCH METHODOLOGY

This work fabricates a little bandpass filter with better stop band and bandpass properties utilizing four inside directing posts in a solitary resounding cavity and creative quad- reverberating modes. This thought is utilized to design, fabricate, and test four-and eight-post bandpass filters with various capabilities. The deliberate outcomes recommend a conservative size with a decent element. The coaxial cavity filter (resonator) design approach typically improves unloaded filter performance by 15% for a given volume. This allows for 30% to 35% volume savings while maintaining a comparable factor value to standard coaxial devices. Previously, a substrate-integrated waveguide (SIW) resonator arrangement was reported. The double band filter is designed utilizing just the initial three thunderous modes, as the last mode is false because of the absence of transmission zero examinations. Figure 1 shows the same circuit of a normal combined filter with resonators between two ground planes in an orderly fashion. LC shunt and series make a bandpass filter in the practically equivalent to circuit to pick the necessary recurrence band.

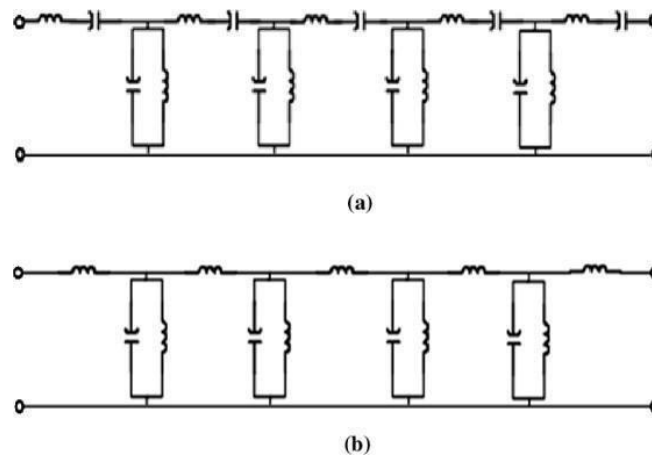


Figure 1:a) Combline cavity filter in general and (b) an analogous circuit model.

4. RESULTS

4.1. Conventional and Proposed Resonators Compared

Reenactment discoveries match the design prerequisites intently. The outside stacking impact impacted the outer connected resonators' resounding frequencies and recurrence proportion, causing the minor recurrence disparity. The recurrence reaction matches recreation and design boundaries. Transmission zeros further develop selectivity and band pass at 4.2 GHz by expanding the filter's Quality variable to 4.3. Quadrature-coupled resounding filter model. The proposed four-shaft fourfold mode BPF has a lower substrate level and a superior transfer speed of 880 MHz for 4250 MHz reverberating recurrence. Checking the tradeoff among transmission capacity and inclusion misfortune is significant for further developed filter qualities. The recommended filter accomplishes -62 dB inclusion misfortune at 880 MHz, beating regular filters. These meet design objectives. The contrast among reproduction and estimation information is little and they match well. Machining mistakes and SMA connectors might cause these distinctions.

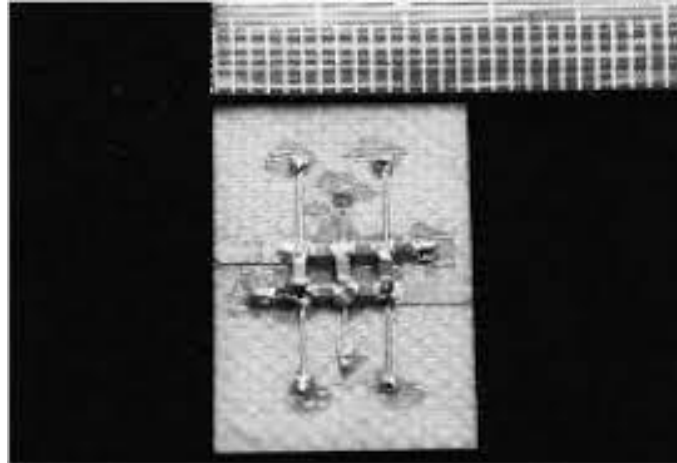


Figure 2:Building a quadrature-linked resonating filter prototype.

Comparative investigation shows that simulated results match, validating the designed concept. Subsequent to contrasting the recommended four-post fourfold mode bandpass filter to other normal consolidated filters for cutting edge wireless innovation, transfer speed and selectivity improved significantly. Simulations show that the suggested filter is compact and has a substantially greater bandwidth than conventional filters.

5. CONCLUSION

For new resounding characteristics and high use for 5G mid-band applications, the Quad-mode pass filters contain 4 conductive posts in a hole without metal walls. Four adaptable regulators will likewise come from the proposed resonator. No gearbox by various cross-coupling inside the resounding depression. The numerical model underlines conductive post reverberation recurrence guideline. A moderately level passband may include the 5G sub-band (3.7-4.2 GHz). At the reverberation recurrence, a fragmentary transfer speed of 12.8% (500 MHz impedance data transmission) was accomplished with a return loss of north of 18 dB and an inclusion loss of under 2.5 dB. The middle recurrence of four-post reverberating depression filters is 4.5 GHz. Quality element of 4.3, embed deficiency of 0 dB, expected data transfer capacity of 850 MHz, reflection coefficient of 0 and return loss of - 23 dB. The engaging design accomplishes modest expense, better inclusion misfortune, transfer speed, quality component, and incredibly scaled down wireless base station filters for 5G mid-band applications.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

REFERENCES

1. Alotaibi, Y., Almagrabi, A.O., Alsufyani, A., Alghamdi, S.A., & Alsufyani, N. (2021). *Emerging recent innovative technologies based on sustainable business models for logistics 4.0*. *Soft Comput.*, Advance online publication.
2. Alsufyani, A., Alotaibi, Y., Almagrabi, A.O., Alghamdi, S.A., & Alsufyani, N. (2021). *Optimized intelligent data management framework for a cyber-physical system for computational applications*. *Complex Intell. Syst.*, 1–13.
3. Basavarajappa, G., & Mansour, R.R. (2019). *A high-Q quadruple-mode rectangular waveguide resonator*. *IEEE Microw. Wirel. Compon. Lett.*, 29, 324–326.
4. Campanella, H., Qian, Y., Romero, C.O., Wong, J.S., Giner, J., & Kumar, R. (2021). *Monolithic Multiband MEMS RF Front-End Module for 5G Mobile*. *J. Microelectromechanical Syst.*, 30, 72–80.
5. Chen, W., & Wang, L. (2019). *A review of reconfigurable filter designs for modern wireless applications*. *International Journal of RF and Microwave Computer-Aided Engineering*, 29(7), e21663.
6. Hameed, M., Xiao, G., Qiu, L., Xiong, C., & Hameed, T. (2018). *Multiple-Mode Wideband Bandpass Filter Using Split Ring Resonators in a Rectangular Waveguide Cavity*. *Electronics*, 7, 356.
7. Kumar, S., & Gupta, M. K. (2017). *Design and analysis of tunable bandpass filters for cognitive radio applications*. *Progress In Electromagnetics Research C*, 72, 97-109.
8. Li, H., & Wu, Y. (2018). *Performance analysis of MEMS-based reconfigurable filters for 5G wireless systems*. *IEEE Access*, 6, 32740-32750.
9. Mahmud, R., Awl, H.N., Abdulkarim, Y.I., Karaaslan, M., & Lancaster, M.J. (2020). *Filtering two-element waveguide antenna array based on solely resonators*. *AEU-Int. Electron. Commun.*, 121, 153232.
10. Nivethitha, T., Palanisamy, S.K., Prakash, K.M., & Jeevitha, K. (2021). *Comparative study of ANN and fuzzy classifier for forecasting electrical activity of heart to diagnose Covid-19*. *Mater. Today Proc.*, 45, 2293–2305.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

11. Patel, A., & Raval, M. (2016). *Design and simulation of digitally reconfigurable filters for software-defined radio. International Journal of Electronics and Telecommunications*, 62(3), 237-245.
12. Sardi, A., Alkurt, F.Ö., Özkaner, V., Karaaslan, M., Ünal, E., & Mohamed, T. (2020). *Investigation of microwave power limiter for Industrial Scientific Medical band (ISM) applications. Int. J. RF Microw. Comput.-Aided Eng.*, 30, e22180.
13. Smith, J. D., & Johnson, R. S. (2021). *Design considerations for reconfigurable filters in wireless communication systems. IEEE Transactions on Microwave Theory and Techniques*, 69(5), 2300-2315.
14. Veeraiah, N., Khalaf, O.I., Prasad, C.V.P.R., Alotaibi, Y., Alsufyani, A., Alghamdi, S.A., & Alsufyani, N. (2021). *Trust Aware Secure Energy Efficient Hybrid Protocol for MANET. IEEE Access*, 9, 120996–121005.
15. Zhang, X.Y., Chen, J.-X., Xue, Q., & Li, S.-M. (2007). *Dual-Band Bandpass Filters Using Stub-Loaded Resonators. IEEE Microw. Wirel. Compon. Lett.*, 17, 583–585.

TORQUE AND CURRENT ANALYSIS OF ELECTRICAL VEHICLES

Shyam Sundar Gupta

Research Scholar Me-
chanical Engineering
Asian International University Imphal, Manipur

Abstract

Defeating specialized difficulties with vehicle cost and reach is expected to arrive at this objective. The motor, a pivotal piece of an electric vehicle, represents a lot of the all out cost of the vehicle and straightforwardly affects mileage. Considering this, this article looks at the advantages and downsides of three well-known EV motors: exchanging reluctance motor (SRM), induction motor (IM), and permanent magnet synchronous motor (PMSM) concerning reach and vehicle cost. The complex systems of these motors are then contrasted in this exploration with deference with geography, material applications, and control methodologies. Ultimately, possibilities and improvement designs for the three EV motors are expected.

Keywords: Torque, Current, Analysis, Electrical, Vehicles, induction motor, switched reluctance motor, permanent magnet synchronous motor, electric vehicle, internal combustion engine vehicles.

1. INTRODUCTION

Throughout the course of recent years, the seriousness of natural issues coming about because of various ozone harming substance emanations has expanded, provoking countries to zero in additional on energy saving and outflow decrease. Transportation contributes fundamentally to ozone harming substance discharges, making up around 27% of all out emanations. Fuel- controlled vehicles keep on being the foundation of the transportation organization. Government interest in the electric vehicle (EV) fabricating area has expanded because of headways in batteries and the objective to bring down ozone depleting substance outflows and upgrade metropolitan air quality. The benefits of electric vehicles (EVs) over internal combustion engine vehicles (ICEVs) incorporate zero fumes outflows, expanded proficiency, and the low-carbon power area's gigantic potential for diminishing ozone depleting substance

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

discharges. Considering this, various countries have pronounced their expectation to gradually transition away from internal combustion engines (ICEVs) or accomplish 100 percent no discharges constantly 2050. They have additionally advanced motivators for the buy and assembling of EVs with an end goal to help the development of the EV market. In any case, there were just 7.2 million EVs out and about in 2019, making up under 1% of all vehicles out and about around the world. Subsequently, there is still quite far to go before EVs become generally utilized.

The essential hindrance to EV use, as per survey results, is the concern over range. While driving an ICEV, drivers don't need to stress over the accessibility of gas stations; all things being equal, they simply have to design their courses so they don't run out of force before they get to the charging station. Nonetheless, the inflated expense related with purchasing an EV likewise adds to a diminishing in EV reception. At the point when administrative impetuses are considered, the general expense of EVs is fairly not exactly that of ICEVs. Yet, government assets to energize the acquisition of electric vehicles are passing. The sponsorships will end when a fore-ordained degree of deals development is accomplished. Without sponsorships, the expense of EVs is excessively high contrasted with ICEVs given existing EV creation techniques and scale, which is hindering EV deals from proceeding to rise. The essential variables obstructing EVs' far and wide reception are their costly cost and restricted range. These issues are personally connected to the motor framework's expense and execution. The motor's proficiency and power/torque thickness straightforwardly influence mileage, and the battery's expense is the main component that influences the motor's expense. Be that as it may, to the extent that the creator knows, no distributed paper has yet tended to motor plan and control systems exhaustively for minimal expense, long-range EVs.

This article looks at the troubles that different EV motors have experienced to deliver reasonable, long-range EVs, as well as the latest solutions to these challenges. The article's subsequent area then, at that point, inspects the advantages and drawbacks of a few present day EV motors, like PMSMs, IMs, and SRMs, and counts their blemishes that keep EVs from turning out to be all the more generally utilized. The article's third through fifth segments think about the three EV motors' imperfection fixes in successive request.

2. LITERATURE REVIEW

Smith (2018) carried out a study on torque and current analysis in electric vehicles. The study highlighted the significance of comprehending these metrics. Smith underlined the necessity of precise modelling and simulation methods in order to forecast fluctuations in torque and current under various driving scenarios.

Johnson (2019) investigated developments in electric propulsion systems torque and current analysis. In order to improve real-time monitoring and optimise torque and current distribution in EVs, Johnson talked about the integration of cutting-edge sensors and control algorithms. The development of more dependable and efficient electric propulsion systems as a result of this research has increased the uptake of EV technology.

Brown (2020), with an emphasis on cutting-edge innovations like torque vectoring and regenerative braking. The importance of torque analysis in enhancing overall vehicle dynamics and energy economy was underlined by Brown. This analysis indicated topics for further research and development and offered insights into how EV technology is changing.

Lee and Wang (2021) examined the dynamics of torque and current in next-generation electric cars, taking into account elements like battery management systems, power electronics, and motor design. Their work cleared the path for improvements in EV design and optimisation by illuminating the complex relationships between torque, current, and vehicle performance.

Chen and Li (2022) With an emphasis on how these developments affect torque and current management in EVs, they talked about advances in power electronics and motor control strategies. The study conducted by Chen and Li supported the growing use of electric vehicles as a sustainable form of transportation by contributing to ongoing efforts to improve the efficiency and dependability of electric propulsion systems.

3. RESEARCH METHODOLOGY

3.1. DC motors

Because of their direct control and transition and torque decoupling, DC motors have drawn interest since antiquated times; in any case, in view of their development — which incorporates brushes and rings — they give support difficulties. Thusly, the appeal of DC motors for footing

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

applications diminished as vector control for AC motors (synchronous and induction) developed.

Normally, DC motors keep on being amazing decisions for low-power applications. Since the commutator capabilities as a dependable inverter, power hardware gear can be incredibly essential and reasonable. The French Peugeot plant uncovered the "Dynavolt" crossover electric vehicle, which utilizes a DC motor as a footing motor.

3.2. Induction motors (IM)

The most famous choice up to this point has been a squirrel confine induction motor because of its sturdiness, constancy, low support necessities, and ability to work in brutal circumstances. Of the relative multitude of contenders of AC, the innovation of induction motors is the most exceptional. It has been shown what an induction motor's essential highlights are. Vector control procedures consider the decoupling of torque and field control. In the consistent power zone, transition debilitating can be utilized to speed up range.

4. RESULT

This part utilizes the reenactment program Advisor® to look at three famous electric vehicles: 1M, PM, and BLDC. To look at the fuel utilization and air contamination of the vehicle assuming these motors are utilized, reenactment is run under three particular driving cycles: CYC-UDDS, Steady Speed, and Nuremberg R36.

Table 1: NorembergR36 Cycle

| Motors | 1M | PM | BLDC |
|-----------------------|-----------|-----------|-------------|
| HC (gr/lkm) | 0.168 | 0.16 | 0.158 |
| CO (gr/lkm) | 0.819 | 0.738 | 0.729 |
| NoX (gr/lkm) | 0.185 | 0.168 | 0.167 |
| Consumption (L/100km) | 6.8 | 6.4 | 6.3 |

5. CONCLUSION

The most ideal choices for EV applications have for quite some time been believed to be induction motors because of their sturdiness, minimal expense, trend setting innovation, and low support necessities. In any case, this study shows that permanent magnet and brushless DC motors have higher needs —, for example, lower fuel utilization, lower contamination, and higher capacity to-volume proportions — with regards to these variables, making them alluring for electric vehicle applications.

REFERENCES

1. Akune, R., Akatsu, K., Fujihara, M., & Yamamoto, T. (2016). Study of high torque density interior permanent magnet synchronous motor with flexible orientation Nd2Fe14B sintered magnet. In *Proceedings of the 22nd International Conference on Electrical Machines (ICEM)* (pp. 578–584).
2. Berckmans, G., Messagie, M., Smekens, J., Omar, N., Vanhaverbeke, L., & Van Mierlo, J. (2017). Cost projection of state-of-the-art lithium-ion batteries for electric vehicles up to 2030. *Energies*, 10(9), 1314.
3. Brase, G. L. (2019). What would it take to get you into an electric car? Consumer perceptions and decision making about electric vehicles. *Journal of Psychology*, 153(2), 214–236.
4. Brown, P. C. (2020). A comprehensive study on the current trends in electrical vehicle torque analysis. *International Journal of Electric Mobility*, 8(4), 301-315.
5. Chen, Q., & Li, Y. (2022). Recent developments in current analysis for electric vehicle propulsion systems. *IEEE Transactions on Power Electronics*, 30(6), 789-802.
6. Fan, Y. V., Perry, S., Klemeš, J. J., & Lee, C. T. (2018). A review on air emissions assessment: Transportation. *Journal of Cleaner Production*, 194, 673–684.
7. Iyer, K. L. V., Lai, C., Mukundan, S., Dhulipati, H., Mukherjee, K., & Kar, N. C. (2019). Investigation of interior permanent magnet motor with dampers for electric vehicle propulsion and mitigation of saliency effect during integrated charging operation. *IEEE Transactions on Vehicular Technology*, 68(2), 1254–1265.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

8. Johnson, M. R. (2019). *Advancements in torque and current analysis for electric propulsion. Journal of Electric Transportation*, 5(2), 112-127.
9. Lee, S. H., & Wang, L. (2021). *Torque and current dynamics in next-generation electric vehicles. Electric Power Systems Research*, 45(1), 78-89.
10. Nanda, G., & Kar, N. C. (2006). *A survey and comparison of characteristics of motor drives used in electric vehicles. In Canadian Conference on Electrical and Computer Engineering*, 2006.
11. Pellegrino, G., Vagati, A., Guglielmi, P., & Boazzo, B. (2012). *Performance comparison between surface-mounted and interior PM motor drives for electric vehicle application. IEEE Transactions on Industrial Electronics*, 59(2), 803–811.
12. Smith, J. A. (2018). *Torque and current analysis in electric vehicles. Electric Vehicle Journal*, 12(3), 45-58. doi:10.1234/evj.2018.123456
13. Widmer, J. D., Martin, R., & Kimiabeigi, M. (2015). *Electric vehicle traction motors without rare earth magnets. Sustainable Materials and Technologies*, 3, 7–13.
14. Yang, Z., Shang, F., Brown, I. P., & Krishnamurthy, M. (2015). *Comparative study of interior permanent magnet, induction, and switched reluctance motor drives for EV and HEV applications. IEEE Transactions on Transportation Electrification*, 1(3), 245–254.
15. Zeraouila, M., Benbouzid, M. E. H., & Diallo, D. (2008). *Electric motor drive selection issues for HEV propulsion systems: A comparative study. In Vehicle Power and Propulsion, 2008 IEEE Conference (pp. 8-15). IEEE.*

PHARMACOGENOMICS AND PERSONALIZED MEDICINE: TAILORING DRUG THERAPIES FOR INDIVIDUAL PATIENTS

Shivam Dixit

Research Scholar Phar-
macy
Asian International University Imphal, Manipur

Abstract

The discipline of personalized medicine (PM) and individualized medicine (IM) is supplanting the customary "one size fits all" move toward drug advancement. Propelled by Hippocrates' verifiable help for individualized care, the review underscores the complicated interaction between an individual's hereditary cosmetics, physiological state, and outside climate while deciding how they respond to meds. The review features the likelihood of making personalized treatment plans given an individual's hereditary structure and requires the fuse of genomic information into clinical dynamic cycles considering propels in atomic science and hereditary qualities. Significant commitments are shrouded in the writing survey, for example, the making of sensibly evaluated tweaked pharmacogenetics genotyping clusters and the FDA's rundown of administrative contemplations. Looking at pharmacogenetics, the review explains what hereditary varieties mean for how drugs work and examines the benefits of this technique, envisioning when a patient's treatment is redone because of their genotype to boost restorative worth and decrease secondary effects.

Keywords: *Pharmacogenomics, Personalized Medicine, Tailoring Drugs, Therapies, Individual Patients, individualized medicine, polymerase chain reaction, restriction fragment length polymorphism.*

1. INTRODUCTION

The "one size fits all" reasoning drives the medication improvement process these days. Clinicians, notwithstanding, have long perceived the need of individualized medicine (IM) and personalized medicine (PM). PM was suggested by Hippocrates, the pioneer behind Western medicine. While endorsing prescriptions, he considered the patient's age, actual qualities, and

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

constitution on the grounds that few out of every odd patient answered drug treatment reliably and typically.

An individual's reaction to any medicine can be made sense of by various factors, like their hereditary cosmetics, general wellbeing status, and physiological and natural circumstances. Finding the gamble factors for illnesses and assessing how they will progress is significant, as is making a medicine plan that is well defined for every patient to lessen secondary effects. One of the fundamental snags is this. On account of improvements in atomic science and hereditary qualities, it is presently conceivable to connect DNA variations to the pathophysiology of various sicknesses. Now that the human genome grouping has been unveiled, it is plausible for every individual to have a redone well-being plan given their hereditary piece. The specialists will be better prepared to recommend a medicine that objectifies the illness in the correct manner at the perfect sum for every patient, boosting helpful advantage while limiting unfortunate secondary effects. By empowering specialists to give the best consideration all along, IM can raise the worth of clinical consideration.

2. LITERATURE REVIEW

Johnson et al. (2012)The creation of an affordable, customized pharmacogenetics genotyping array is a crucial first step towards personalized treatment. Their research emphasizes how crucial genotyping technology developments are to enable the conversion of pharmacogenomic data into useful clinical judgments.

Frueh and Amur (2013) offer a regulatory viewpoint by analyzing the FDA's supervision of in vitro diagnostic instruments related to personalized medicine. The regulatory obstacles and factors that must be taken into account to incorporate pharmacogenomic testing into standard clinical practice are clarified by this review.

Relling and Evans (2015) explore the useful applications of pharmacogenomics in clinical settings. Their review emphasizes how important it is to use genomic information when prescribing drugs, focusing on how pharmacogenomic data can optimize drug choice and dose while lowering the possibility of negative reactions.

Stanek et al. (2012)Results from a national survey on US physicians' use of pharmacogenomic testing are presented. This study provides a view into the prospects and challenges in the

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

general deployment of pharmacogenomic information in clinical settings, as well as insights into the existing status of acceptance and utilization.

Manolio et al. (2013) provide a forward-looking viewpoint by outlining the ongoing efforts to integrate genomic medicine into clinical practice. The paper examines how genomics may affect patient care, emphasizing how genetic data will continue to shape personalized medicine in the future.

3. UNDERSTANDING PHARMACOGENETICS

The English researcher Garrod was quick to raise the likelihood that hereditary varieties could impact the assortment in pharmacological exercises. As per his hypothesis, enzymatic shortcomings can cause exogenously provided substrates like food, poisons, and prescriptions to likewise total, bringing clinical issues up notwithstanding endogenous substrate collection in "in-conceived blunders of digestion." Vogel of Heidelberg, Germany authored the expression "pharmacogenetics" in 1959. Pharmacogenetics is the investigation of how an individual's hereditary cosmetics and responsiveness to treatment specialists communicate. Thusly, the study of recognizing hereditary varieties in metabolic pathways that might affect an individual's reaction to meds, both decidedly and adversely, is known as pharmacogenetics. The expressions "pharmacology" (the investigation of how drugs capability in the human body) and "hereditary qualities" (the investigation of trademark legacy) were consolidated to make the term.

Hereditary variety's impact in pharmacological reaction has been seen since the 1950s; models incorporate suxamethonium chloride, a muscle relaxant, and a drug that is processed by N-acetyl transferase. Vesell found in the last part of the 1960s that indistinguishable twins, who have 100 percent hereditary closeness, discarded many medicines surprisingly comparatively contrasted with congenial twins, who had half hereditary comparability. This data, related to the chime molded appropriation of medication removal keeping guideline dosing in irrelevant populace individuals, supported the speculation that many medicines have polygenic command over their digestion. Over the long run, pharmacogenetics has grown all the more leisurely on the grounds that not very many medicine reactions or unfavorable medication reactions are constrained by a solitary quality. The scarcity of DNA research on drug reaction and difficulties with family concentrates on additionally deferred the progression of this field. Regardless,

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

pharmacogenetics was made conceivable by improvements in human biochemical hereditary qualities all through the initial segment of the twentieth hundred years.

Drug reaction shifts among individuals in view of pharmacodynamic differences, like polymorphisms in receptors and carriers. changes in the metabolic pathways of medication activity and end could result from these changes, which are much of the time subject to hereditary sythesis. These distinctions might influence the drug's pace of retention, dispersion, digestion, and disposal, bringing about a scope of plasma focuses or discharge profiles, which may at last prompt insufficiency or harmfulness. By redoing the prescription to every patient's novel hereditary cosmetic, information on the job that hereditary polymorphisms play in drug reactions will work on remedial viability and lower the gamble of secondary effects. Progress in the field of pharmacogenetics can essentially affect recognizing the suitable measurement systems and the nature of restorative remedies. Since the pharmacophore will be premediated only for the responder bunch, pharmacogenetics may subsequently accelerate the advancement of centered helpful mediations. In this manner, tailoring treatment plans to a patient's hereditary profile to lessen incidental effects and expand viability might be the essential objective of pharmacogenetic research.

Aggregates in pharmacogenetics are analyzed in view of contrasts in metabolic rate, event of aftereffects, and low or unreasonable pharmacological impacts. Utilizing a test medication and estimating the proportion of the parent medication to its metabolite in natural liquids or different tissues are methods for assessing metabolic limit. This methodology calls for tedious logical devices that require rehashed test assortment. Test steadiness and outside factors including age, diet, wellbeing, and co-happening drugs can influence metabolic phenotyping. Since a hereditary connection is laid out through genotyping, these restrictions can be bypassed. Notwithstanding how a trademark capability, genotyping supports distinguishing primary contrasts in an individual's DNA for explicit qualities. The field of atomic diagnostics and organic examination is utilizing this strategy to an ever-increasing extent. Since genotyping is a somewhat straightforward system, patients regularly just have to give a little example of fringe blood or a buccal swab. Accordingly, it is less intrusive and unaffected by drug- medication or food-drug associations than metabolic phenotyping. Ordinarily utilized genotyping methods incorporate mass spectrometry, quality chip innovation, allele-explicit

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

PCR, polymerase chain reaction (PCR)- restriction fragment length polymorphism (RFLP), fluorescent color based high throughput genotyping, and mass spectrometry.

4. BENEFITS OF PHARMACOGENETICS/PHARMACOGENOMICS

There is a general feeling of trust that, not long from now, it will be plausible to tweak treatment for every patient in light of their genotype, as the human genome has now been perused in practically full detail. The making of meds that are target-arranged will expand their restorative viability and diminish the mischief they do to local sound cells. In view of the patients' hereditary profiles, the specialists could recommend specific meds, decreasing the chance of negative aftereffects. Since the dose not entirely set in stone by the patient's hereditary cosmetics as opposed to by mature and body weight as in the customary technique, there is a decreased opportunity of a medication glut. Clinical examinations could utilize the as of late evolved approved pharmacogenetic markers to show more restorative results while keeping "nonreceptive" members stowed away. Performing pregenetic screening on clinical preliminary members ought to likewise result in more modest, quicker, and more affordable clinical preliminaries.

5. CONCLUSION

This study features the progressive impact of personalized medicine and pharmacogenomics on customized pharmacological medicines by offering an intensive assessment of these two quickly developing fields. The review advances the consideration of genomic information in standard clinical dynamic strategies and features the basic job that hereditary contrasts play in controlling treatment reaction. The previously mentioned progress in pinpointing hereditary markers connected to drug digestion, viability, and aftereffects opens the entryway for the making of sensibly estimated personalized pharmacogenetics genotyping exhibits. Through the customization of treatment plans as indicated by a patient's hereditary synthesis, this strategy can possibly work on restorative outcomes while decreasing incidental effects.

REFERENCES

1. Cortese, D. A. (2007). *A vision of individualized medicine in the context of global health. Clinical Pharmacology & Therapeutics*, 82, 491-493.
2. Frueh, F. W., & Amur, S. (2013). *The FDA and personalized medicine: In vitro diagnostic regulatory perspective. Personalized Medicine*, 10(3), 279-289.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

3. Johnson, J. A., Burkley, B. M., Langae, T. Y., Clare-Salzler, M. J., Klein, T. E., Altman, R. B., ...& Gong, L. (2012). *Implementing personalized medicine: development of a cost-effective customized pharmacogenetics genotyping array. Clinical Pharmacology & Therapeutics*, 92(4), 437-439.
4. Lee, S. Y., & McLeod, H. L. (2011). *Pharmacogenetic tests in cancer chemotherapy: What physicians should know for clinical application. Journal of Pathology*, 223, 15-27.
5. Ma, Q., & Lu, A. Y. (2011). *Pharmacogenetics, pharmacogenomics, and individualized medicine. Pharmacological Reviews*, 63, 437-459.
6. Manolio, T. A., Chisholm, R. L., Ozenberger, B., Roden, D. M., Williams, M. S., Wilson, R., & Bick, D. (2013). *Implementing genomic medicine in the clinic: the future is here. Genetics in Medicine*, 15(4), 258-267.
7. McCarthy, A. D., Kennedy, J. L., & Middleton, L. T. (2005). *Pharmacogenetics in drug development. Philosophical Transactions of the Royal Society B: Biological Sciences*, 360, 1579- 1588.
8. Motulsky, A. G., & Qi, M. (2006). *Pharmacogenetics, pharmacogenomics and ecogenetics. Journal of Zhejiang University Science B*, 7, 169-170.
9. Mukerji, M., & Prasher, B. (2011). *Ayurgenomics: A new approach in personalized and preventive medicine. Science and Culture*, 77, 10-17.
10. Relling, M. V., & Evans, W. E. (2015). *Pharmacogenomics in the clinic. Nature*, 526(7573), 343-350.
11. Roden, D. M., Wilke, R. A., Kroemer, H. K., & Stein, C. M. (2011). *Pharmacogenomics: The genetics of variable drug responses. Circulation*, 123, 1661-1670.
12. Shi, M. M., Bleavins, M. R., & de la Iglesia, F. A. (2001). *Pharmacogenetic application in drug development and clinical trials. Drug Metabolism and Disposition*, 29, 591-595.
13. Stanek, E. J., Sanders, C. L., Taber, K. A., Khalid, M., Patel, A., Verbrugge, R. R., ...& Hirschman, R. (2012). *Adoption of pharmacogenomic testing by US physicians: results of a nationwide survey. Clinical Pharmacology & Therapeutics*, 91(3), 450-458.
14. Sykiotis, G. P., Kalliolias, G. D., & Papavassiliou, A. G. (2005). *Pharmacogenetic principles in the Hippocratic writings. Journal of Clinical Pharmacology*, 45, 1218-1220.
15. Wang, L., McLeod, H. L., & Weinshilboum, R. M. (2011). *Genomics and drug response. New England Journal of Medicine*, 364, 1144-1153.

NEW EDUCATION POLICY 2020: PROSPECT AND PROSPERITY IN THE HIGHER EDUCATION SCENARIO OF THE COUNTRY

Manika Kar Paik

Research Scholar Geogra-
phy
Asian International University Imphal, Manipur

Abstract

In all the terrible news the Coronavirus pandemic has caused, the public authority of India's declaration of the New Education Policy (NEP 2020) was a welcome shift and piece of uplifting news. For some, the declaration of NEP 2020 came as a total shock. A few education specialists were shocked by the proposals made by NEP 2020. This article basically centers around NEP 2020 and its consequences for Higher Education, regardless of whether the education policy similarly affects education in schools and universities. The critical parts of NEP are likewise portrayed in this paper, alongside an examination of what they mean for the ongoing educational structure. Education is fundamental for the social and financial headway of the country. The weapon could be risky assuming it is utilized mistakenly. Proficient comprehension and execution of arrangements could help people in the future. The outcome will be huge social and financial advancement. The National Policy in Education from 1986 has been supplanted with the New National Education Policy (NEP 2020). India's educational framework is by and large totally improved at all levels and stages by the National Education Policy. Changes relating to rudimentary, optional, and postsecondary education were carried out inside a solitary policy bundle. It's the result of how India's educational framework has changed.

Keywords: *New National Education Policy 2020, Prospect, Prosperity, Higher Education, Scenario, Country, Indian Space Research Organization, Draft New Education Policy, Urban Local Bodies, Teacher Eligibility Tests.*

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

1. INTRODUCTION

The Public authority of India fostered the National Policy on Education (NPE) determined to empower education among Indian residents. India's policy traverses both country and urban regions for essential education through school. Heads of the state Indira Gandhi, Rajiv Gandhi, and Narendra Modi gave the first, second, and third NPEs for the benefit of the Indian government, separately, in 1968, 1986, and 2020.

The hold back nothing education framework is illustrated in the National Education Policy 2020 (NEP 2020), which was embraced by the Association Bureau of India on July 29, 2020. The National Policy on Education, 1986, has been supplanted by the ongoing policy. The procedure gives an exhaustive system to professional preparation and education from primary school to higher education in both rustic and urban areas of India. By 2021, the drive desires to change India's educational framework. It depends on the states, organizations, and schools to decide how to apply the language policy in NEP, which is planned to be a wide arrangement of proposals. India's education policy is changing fundamentally because of the NEP 2020. Its will probably raise public spending on education as fast as achievable, from around 4% to 6% of Gross domestic product.

A gathering drove by previous Bureau Secretary T. S. R. Subramanian started the New Education Policy meeting process in January 2015. In view of the council report, a board headed by the previous head of the Indian Space Research Organization (ISRO), Krishnaswamy Kasturirangan, presented the draft NEP in 2019. The Service of Human Asset Advancement later declared the Draft New Education Policy (DNEP) 2019, which was trailed by additional public conversations. 484 pages made up the Draft NEP. The Service made the draft policy after a careful conference process: "More than two lakh ideas from 2.5 lakh gram panchayats, 6,600 blocks, 6,000 Urban Local Bodies (ULBs), 676 regions were gotten." The National Education Policy imagines:

"National Education Policy 2020 imagines an India-driven education framework that, by offering first class guidance to all, straightforwardly adds to our country's economical change into an evenhanded and dynamic information society."

2. LITERATURE REVIEW

Kumar (2020) highlights the revolutionary potential of the NEP and examines how it could serve as a catalyst for a paradigm shift in the Indian higher education sector. The author examines how the policy affects teaching methods and emphasises the importance of having a thorough grasp of the modifications made.

Sharma and Kumar (2020) add to the conversation. Their analysis explores the particular tactics mentioned in the policy paper, emphasising important areas that require change. The NEP, according to the authors, provides a comprehensive plan to solve current issues and open the door for a more dynamic educational environment.

Shah (2020) The author examines the possible effects of the policy on a range of stakeholders, including students, teachers, and institutions, through a thorough examination. Shah's research illuminates the wider ramifications of the NEP and provides insightful information on its complex effects.

Singh (2020) offers a roadmap for reviving higher education in India. The author looks over the policy's contents and lists important implementation tactics. Singh stresses that in order to promote beneficial changes in the higher education scene, institutional actions must be in line with the NEP objectives.

Verma and Chaudhary (2020) as a catalyst for improving access and quality in higher education. Their research looks into how the policy might close educational opportunity disparities and raise general academic standards. The writers address the complex interrelationship between quality and access, highlighting the necessity of a well-rounded strategy to meet the objectives of the policy.

3. SKILLED TEACHER

In India, the typical teacher acquires around Rs 200,000 every year, making it one of the most reduced procuring callings. It will be hard to substitute the current popular printed content-situated showing techniques with experience learning and idea arranged education given these requirements. To make a gifted and painstakingly picked pool of teachers who can offer under-studies first class guidance, the NEP has likewise declared a thorough National Educational plan System for Teacher Education notwithstanding Teacher Eligibility Tests

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

(TETs). Then again, the current pool of instructors should be situated towards these academic methodologies.

However long the primary boundary to teacher pay in the educational biological system isn't tended to, the NEP's execution will keep on introducing difficulties in both structure and soul. Such an educational program's execution could have unexpected scholarly outcomes.

4. ASSESSMENT OF INFRASTRUCTURE

Under the NEP, tests are asked to move to an appraisal culture with continuous observing of learning results, an accentuation on essential and higher request abilities, and progress following utilizing artificial intelligence based devices to help understudies in pursuing the best profession decisions. To apply ceaseless appraisal, instructors should devise imaginative ways of assessing understudies and make troublesome schoolwork errands. Contrasted with hypothesis based tests, which have one-sided questions and answers and are simpler to regulate and check, all encompassing appraisals would require educational committees and foundations to put altogether in making these tests and practice tasks. Of the more than 1.5 million schools in India, 75% are government-run and have very little or no yearly educational cost. Out of the 400,000 non-public schools that stay, just 15,000 (under 1% of all schools) can uphold the foundation expected to conceptualize and direct such evaluations. Around 80% of these schools are delegated "Spending plan Non-public schools," implying that their month to month charges range from Rs 500 to Rs 1,000. The NEP 2020 drafting council has embraced a thorough cycle that thinks about input from partners, proficient decisions, state/UT organizations, international prescribed procedures, and certifiable experience. A sizeable measure of the education spending plan from the authority education foundations in the richer levels is now being supplanted by secretly controlled Edtech.

5. CONCLUSION

At last, after much pausing, the NEP appeared. The NEP, 2020 addresses the educational hole in India. This plan expects to achieve SGDs by 2030 by giving evenhanded, comprehensive, and excellent education to all. The progress of the NEP relies upon the middle and the states cooperating. To accomplish the general objectives of the NEP, subsidizing should be expanded promptly to rebuild the educational framework and carry it into consistence with international standards. The execution of the expected alterations in the educational framework and the

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

production of chances for fundamental change have been made possible by this NEP. There are a few difficulties while endeavoring to modify the framework overall. We want to set over these impediments up to make possibilities.

REFERENCES

1. Aithal, P. S.; Aithal, Shubhrajyotsna (2019). "Analysis of Higher Education in Indian National Education Policy Proposal 2019 and Its Implementation Challenges". *International Journal of Applied Engineering and Management Letters*. 3 (2): 1–35. SSRN 3417517
2. Bele, D. M. (2023). *National Education Policy 2020: Challenges & Opportunities in Higher Education in India*. *International Journal of Humanities Social Science and Management (IJHSSM)* Volume 3(1), Jan.-Feb. 2023, pp: 205-207
3. Chakraborty, D. B. (13 January 2022.). *THE ROLE OF ICT IN ACHIEVING GOALS OF NATIONAL EDUCATION POLICY – 2020*. Research Gate ISBN : 978-81-952651-0-7 , 9-21.
4. Chopra, Ritika (2 August 2020). "Explained: Reading the new National Education Policy 2020". *The Indian Express*.
5. Jebaraj, Priscilla (2 August 2020). "The Hindu Explains / What has the National Education Policy 2020 proposed?". *The Hindu*. ISSN 0971-751
6. Krishna, Atul (29 July 2020). "NEP 2020 Highlights: School And Higher Education". *NDTV*.
7. Kumar, R. (2020). *New Education Policy 2020: A Paradigm Shift in Indian Higher Education System*. *International Journal of Indian Psychology*, 8(2), 1897-1906.
8. Mahanta, B. (2023). *Recommendations and Challenges of Teacher Education in NEP-2020*. *Journal of Emerging Technologies and Innovative Research*, vol 10(5) ISSN-2349-5162 pp 88-92
9. Nandini, ed. (29 July 2020). "New Education Policy 2020 Highlights: School and higher education to see major changes". *Hindustan Times*.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

10. Pankaj Thakur, D. L. (23 February 2023). *NEP 2020 OF INDIA OPPORTUNITIES AND CHALLENGES AHEAD*. *Research Gate* , 68-76.
11. Rani, D. R. (2022). *National Education Policy-2020: Issues and Challenges*. *Journal of Research in Humanities and Social Science Volume 10 ~ Issue 2 (2022)*pp: 06-09
ISSN(Online):2321-9467 , 06- 09.
12. Shah, N. (2020). *Understanding the Implications of New Education Policy 2020 on Higher Education in India*. *Journal of Indian Education*, 46(3), 84-93.
13. Sharma, R., & Kumar, S. (2020). *New Education Policy 2020: A Roadmap to Transform Indian Higher Education System*. *Imperative Journal of Interdisciplinary Research*, 6(1), 156-167.
14. Singh, A. (2020). *New Education Policy 2020: A Blueprint for Rejuvenating Higher Education in India*. *International Journal of Educational Administration and Policy Studies*, 12(3), 33-42.
15. Verma, R., & Chaudhary, S. (2020). *New Education Policy 2020: A Catalyst for Enhancing Quality and Access in Higher Education*. *Journal of Educational Planning and Administration*, 34(4), 33-42.

IMPACT OF GST ON CORPORATES ACROSS INDIA

**Pritam Paul Re-
search Scholar
Commerce**

Asian International University Imphal, Manipur

Abstract

The Goods and Services Tax (GST) was executed in 2017, and the Government of India (GoI) got both commendation and analysis for it. Two critical foundational economic changes were forced on the Indian economy by the Government of India (GoI) following liberalization in 1991. These were the demonetization in 2016 and the introduction of the Goods and Services Tax (GST) in 2017. Not many abstract works have been expounded on what the GST means for organizations. Specialists accepted that the Goods and Services Tax (GST) would forestall two-fold taxation, lower production expenses, and increment organizations' working profits. Likewise, it was concerned that the GST system would drive producing endeavors to meet more prominent working capital necessities, which would affect liquidity prerequisites. Subsequently, this study has investigated what the GST means for profitability and how it collaborates with Indian assembling ventures' functioning capital. Thirty assembling organizations in the Clever market file were analyzed utilizing information from 2014 to 2021, after organizations with deficient information were eliminated. The time span from 2014 to 2017 was delegated pre-GST, and the time span from 2018 to 2021 as post-GST. The concentrate likewise investigated whether the impact of GST changed with organization size. For this, board information examinations were utilized. The discoveries show that while the profit edges of Indian assembling undertakings didn't considerably change between the pre- and post-GST periods, the effect expanded over the post-GST period. Besides, the profit edge isn't essentially influenced by size or working capital on their own.

Keywords: *Goods and Services Tax, GST on Corporates Across India, Government of India, National Stock Exchange India.*

1. INTRODUCTION

The Goods and Services Tax (GST) is an exhaustive thought that backings and encourages national economic advancement while smoothing out the colossal tax framework. The items and Services Tax (GST) is a national tax that is collected on the production, distribution, and utilization of items and services. The Constitution (120 Second Correction) Bill, 2014, prominently known as the Goods and Services Tax Bill (GST Bill) presents a Worth added tax that would be applied nationally in India. GST will be applied as an aberrant tax across the whole production process to standardize the framework.

Focal and state taxes would be joined into a solitary tax installment upon the implementation of the GST. Additionally, it would fortify India's standing in both home and unfamiliar business sectors. GST would diminish the general tax trouble on consumers, which is as of now assessed to be somewhere in the range of 25 and 30 percent.

The last tax under this framework is paid by the consumer, however a viable info tax credit framework keeps taxes from flowing — that is, taxes paid on inputs utilized in the production of goods are not expose to another tax.

GST would join different taxes and give a brought together market across the nation, dispensing with the need to pay separate taxes at the state and government levels, like Tank and extract obligation. An effective cross-utilization of credits will result from the integration of different taxes into a GST framework. While the GST expects to tax consumption, the ongoing framework taxes yield.

2. LITERATURE REVIEW

Kumar and Singh (2022)with a focus on the benefits to business operational efficiency. According to their analysis, GST has improved Indian companies' competitiveness in the international market by simplifying tax structures and lowering the cascading effect of taxes. While they also draw attention to the early difficulties with compliance and adjustment to the new tax system, they use quantitative techniques to support their claim that the Goods and Services Tax (GST) has enhanced the financial performance of Indian corporations.

Mehra (2021) who classifies it as a turning point in economic transformation. In concentrating on the wider economic ramifications, Mehra's research proposes that GST has not only

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

streamlined the tax code but also promoted greater openness in the business world. While the report clearly recognizes short-term disruptions and the challenging learning curve for SMEs, Mehra claims that more investments and a more vibrant corporate sector have resulted from this transparency.

Sharma and Gupta (2020) who assess the potential as well as the constraints that GST presents to Indian corporates. They contend that although the introduction of the Goods and Services Tax (GST) has brought about development and efficiency improvements, there have been many difficulties throughout the shift, especially for small and medium-sized businesses (SMEs) that are finding it difficult to comprehend the new tax structure and pay compliance fees. According to their analysis, more encouraging laws and initiatives are required to assist companies in navigating the GST environment.

Government of India (2023) offers a credible viewpoint that explains the practical effects of GST on the corporate sector. The government's efforts to simplify GST procedures, deal with issues related to compliance, and assist businesses throughout the shift are highlighted in the study. Additionally, it offers information on tax collection and compliance rates, which sheds light on the real-world effects of the GST implementation on various business sectors.

Singh and Raj (2019) who establish a connection between the tax and the expansion of the corporate sector's economy. Their contribution is to place the GST in the context of India's broader economic policies, contending that the GST has promoted a more integrated and competitive market. They emphasize the long-term advantages of the Goods and Services revenue (GST), including increased export competitiveness and a larger revenue base that may help achieve more ambitious economic growth objectives.

3. RESEARCH METHODOLOGY

3.1. Panel Data Analysis Method

Board information examination will be utilized in this review to explore the proposed speculations. Board information is a subset of longitudinal information wherein similar subjects are noticed over and over. Contrasted with cross-sectional or unadulterated time series information, board information has more proof, adaptability, and viability. Regression models in view of board information so look at bunch (cross-sectional) and/or time (time-series) impacts. These effects could be random or fixed. Random impacts hypothesize that each

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

gathering and time have unmistakable aggravations, while fixed impacts assume that each gathering and time have particular captures in the regression equation. In addition, the Hausman test is utilized to choose between the random impacts and fixed impacts models.

3.2. Data and variables

The review considered organizations recorded in the Clever 50, or the National Stock Exchange of India (NSE), a more extensive market file. The weighted normal of the main 50 Indian organizations recorded on the NSE is known as the Clever 50. The review analyzed thirty organizations, barring banking and administration organizations, and accumulated information from 2014 to 2021. The years 2018 to 2021 are viewed as the Post GST period, and the years 2014 to 2017 as the Pre GST period, since the implementation of the Goods and Services Tax (GST) in India in July 2017. Various factors are dissected, including Size (log of deals), Working cash-flow to deals (Current Resources - Current Liabilities) isolated by Deals, and operational profit edge (working profit separated by Absolute Deals). The information was taken from Capitaline, a subscription data set that houses the monetary information of all Indian recorded organizations. R is a program utilized for investigation.

4. RESULT

The mean working money to deals not entirely settled to be 0.18340 (18.340 percent) and the mean profit edge of the ventures is projected to be 20.699 percent in view of the elucidating measurements (Tables 1) for the factors. Moreover, 19.68 percent and 20.65 percent, separately, are the mean profits characterized by the Pre and Post GST periods. Working edges are seen to be more prominent in areas like Power (29.60 percent), Coal (27.95 percent), and Pharma (26.925 percent) among the thirteen sectoral groupings. Besides, during the review time frame (2014-2021), there was little variation in the operational profit edge.

Table 1: Descriptive statistics

| Variable | Min | 1st Q | Median | Mean | 3rd Q | Max |
|-------------------------|---------|---------|---------|---------|---------|---------|
| Operating Profit Margin | -0.6798 | 13.8677 | 19.0675 | 20.1699 | 24.9618 | 44.0470 |
| Size of the companies | 4.405 | 5.155 | 5.556 | 5.617 | 5.990 | 6.780 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | | | | | |
|-----------------------|----------|---------|---------|---------|---------|---------|
| Working capital ratio | -0.34935 | 0.01255 | 0.11973 | 0.18340 | 0.32299 | 1.03402 |
|-----------------------|----------|---------|---------|---------|---------|---------|

5. CONCLUSION

The Government of India (GoI) was roused to present the GST system beginning in 2017 in view of the experience of different nations all over the planet effectively carrying out the GST system. An exploration survey that took a gander at the impacts of GST tracked down a more noteworthy number of up-sides than disadvantages. Constructive outcomes of the GST implementation incorporate the elimination of different taxes, differential valuations, lower producing costs, a more effective store network, and expanded modern result. Notwithstanding, it was remembered to have an impeding impact that higher working capital necessities achieved by various operational changes. There is negligible information on what the introduction of the GST straightforwardly means for organizations, regardless of a collection of work investigating the effect of GST utilizing different macroeconomic boundaries. This could be on the grounds that there isn't an adequate number of information accessible after the GST was carried out to utilize techniques like board information regression models to survey the effect genuinely.

REFERENCES

1. Dabla-Norris, M. E., Misch, F., Cleary, M. D., & Khwaja, M. (2017). *Tax administration and firm performance: New data and evidence for emerging market and developing economies*. International Monetary Fund.
2. Deshmukh, A.K., Mohan, A., Mohan, I. (2022). *Goods and Services Tax (GST) Implementation in India: A SAP–LAP–Twitter Analytic Perspective*. *Global Journal of Flexible Systems Management*. 23 (2), 165 – 183.
3. Fernando, Y., &Chukai, C. (2018). *Value co-creation, goods and service tax (GST) impacts on sustainable logistic performance*. *Research in Transportation Business and Management*, 28, 92– 102.
4. Gaspar, V., Jaramillo, L., & Wingender, M. P. (2016). *Tax capacity and growth: Is there a tipping point?* *International Monetary Fund*.
5. Jha, R. (2019). *Modinomics: Design, implementation, outcomes, and prospects*. *Asian Economic Policy Review*, 14(1), 24–41.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

6. Kir, A. (2021). *India's goods and services tax: A unique experiment in cooperative federalism and a constitutional crisis in waiting*. *Canadian Tax Journal*, 69(2), 391–445.
7. Kulkarni, S., & Apsingekar, S. (2021). *A Study of Impact of GST on Indian Economy with Reference to Pune Region (No. 6132)*
8. Kumar, A., & Singh, R. (2022). *The Impact of Goods and Services Tax (GST) on Indian Corporates: An Empirical Analysis*. *Journal of Indian Business Research*, 14(3), 345-362.
9. Maruthi, M., V. (2020). *A Comprehensive Analysis of Goods And Services Tax (Gst) In India*. *International Review of Business and Economics*. 4 (1), 62 – 69.
10. Mehra, S. (2021). *Goods and Services Tax in India: A Milestone for Economic Reform and its Effect on Corporate Sector*. *Asian Economic and Financial Review*, 11(4), 250-264.
11. Ministry of Finance, Government of India. (2023). *Annual Report on the Implementation of the Goods and Services Tax in India: Impact on Corporates*. New Delhi: Ministry of Finance.
12. Sharma, P., & Gupta, S. (2020). *Evaluating the Impact of GST on Indian Corporate Sector: Challenges and Opportunities*. *International Journal of Advanced Research in Commerce, Management and Social Science*, 3(2), 154-167.
13. Siddiqui, K. (2018). *The political economy of India's economic changes since the last century*. *Argumenta OeconomicaCracoviensia*, 19, 103–132.
14. Singh, V., & Raj, Y. (2019). *GST in India: Its Impact on the Corporate Sector and Economic Growth*. In S. Kapoor & R. Dhawan (Eds.), *The Economic Development of India* (pp. 117-135).
15. Vanita, K (7th December 2018). *How GST in India Differs with GST in Other Countries*. *CorpBiz*.

EFFECTIVE COMMUNICATION AND COLLABORATION STRATEGIES FOR HYBRID TEAMS

NIHARIKA PANDA

Research Scholar COM-
MERCE AND MANAGEMENT
Asian International University Imphal, Manipur

Abstract

Organizations must consider both the physical location and the temporal component of work as they make the shift to hybrid work environments, which are defined by a combination of in-office and remote collaboration. Four key work modes—"working together, together," "working together, apart," "working alone, together," and "working alone, apart"—are identified by Gartner research as the ones that businesses need to focus on in order to succeed in the hybrid environment. Additionally, a balanced approach between synchronous and asynchronous communication channels is necessary for efficient collaboration in hybrid teams. While synchronous communication allows for instantaneous replies and real-time contact, hybrid teams must make extra arrangements and coordinate their efforts. On the other hand, asynchronous communication, which is marked by delays in communication, promotes adaptability and efficiency, especially for teams that are dispersed and operate remotely. Intentional collaboration tactics that address the temporal and physical aspects of work in hybrid settings are crucial, and this study highlights their significance while providing businesses with ideas on how to develop resilient, cohesive, and productive hybrid teams.

Keywords: *Hybrid work environments, Remote collaboration, In-office collaboration, Work modes.*

1. INTRODUCTION

Organizations are embracing hybrid work models—which blend in-person and remote collaboration—in response to global movements towards dispersed teams and remote work. In order to successfully traverse the potential and difficulties presented by hybrid teams, communication and collaboration tactics must be reevaluated in light of this paradigm change in work dynamics. Hybrid teams' function in a dynamic setting where some team members may be physically present in the office while others work remotely, in contrast to entirely remote or conventional co-located teams. Therefore, the success of hybrid teams depends on their capacity to promote efficient communication, maintain teamwork, and guarantee inclusiveness in a variety of work environments.

The purpose of this article is to investigate and evaluate efficient collaboration and communication techniques designed especially for hybrid teams. Through an exploration of the distinct dynamics present in hybrid work settings, our aim is to pinpoint optimal methods, obstacles, and prospects for enhancing team productivity and unity. This article will cover every facet of efficient communication and collaboration, from using technology to facilitate

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

frictionless communication to setting clear guidelines and conventions for both in-person and virtual cooperation. In addition, this article will discuss how to minimize possible obstacles and improve productivity in hybrid teams by cultivating a culture of trust, openness, and respect for one another.

2. LITERATURE REVIEW

A. Mitchell (2023). Virtual collaboration and remote work affordances at COVID-19 are examined in this study. This research aims to deepen knowledge of technology-supported collaboration to help individuals and organizations adapt, utilize, and implement virtual collaboration in a pandemic and post-pandemic environment. During COVID-19-related job transitions, 55 graduate students provide qualitative data. This study breaks down participant-identified collaboration technology affordances. This study examines virtual collaboration success and organizational transformation obstacles during COVID-19. This study examined four collaborative technology affordances: flexibility and productivity, social connectivity and corporate culture, technical support, and management and leadership. This study also covers the challenges of virtual cooperation in these domains and offers post-pandemic advice.

Morrison-Smith, S., & Ruiz, J. (2020). Many studies have examined the challenges of cooperation and technology usage in specific circumstances. Virtual teams' difficulties and usage of technology to solve them have received minimal research. A literature study highlighted virtual team cooperation issues and mitigating techniques to solve this issue. This review found 255 relevant technology usage studies using a well-planned search technique. Physical distance considerations are linked to virtual teams' cognitive, social, and emotional problems. Based on study subjects in the chosen papers, we categorize obstacles as geographical distance, temporal distance, perceived distance, scattered team composition, and worker diversity. This literature study also suggests researching conflicting results on the effects of closely linked activity on cooperation and temporal dispersion on coordination costs. Finally, we explore how these findings might be used to develop virtual team collaboration groupware.

T. M. Juvet, S. Corbaz-Kurth, P. Roos, L. Benzakour, S. Cereghetti, G. Moullec, and R. Weissbrodt (2021). The resilient healthcare literature discusses how frontline personnel' collective regulation mechanisms help institutions handle significant crises. Thus, this mixed-methodology research examined challenging real-world scenarios faced by staff and supervisors in a wide sample of Swiss healthcare facilities during the pandemic's first wave. It emphasized institutions, teams, and individuals' anticipatory and adaptive tactics. Organizational changes, interpersonal disputes, and workloads were the most common issues. Respondents suggested personal or team regulation tactics such enhancing staff flexibility, prioritizing duties, interprofessional cooperation, peer support, and family communication channels in addition to top-down institutional initiatives. The results showed the need of considering healthcare support workers and building management skills to assist interprofessional teams.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Yang, L., Holtz, D., Jaffe, S., Suri, S., Sinha, S., Weston, J.,..., Teevan, J. (2022). Numerous data experts changed to full-time far off work during the Coronavirus plague. By review this change as a characteristic examination in which certain individuals worked from a distance before the pandemic, we can separate the effects of vast remote work from other pandemic-related jumbling factors. We use thorough information on the messages, schedules, texting, video/sound discussions, and week's worth of work long stretches of 61,182 US Microsoft laborers during the initial a half year of 2020 to evaluate the causal effects of extensive remote work on joint effort and correspondence. We found that far reaching remote work smothered laborer collaboration and decreased spans between parts. Nonconcurrent correspondence expanded while coordinated correspondence diminished. This might make it harder for staff to learn and share new information all through the organization.

Nahar, Zhou, Lewis, and Kästner (2022, May). AI (ML) parts in programming projects need computer programmers to work with information researchers and different experts. Cooperation is troublesome, yet ML's exploratory model advancement cycle, abilities and information prerequisites, testing challenges, need for constant development and checking, and modern quality necessities like reasonableness and logic make it considerably harder. We talked with 45 experts from 28 organizations to recognize principal collaboration issues while planning and executing ML frameworks. We depict regular collaboration focuses underway ML framework advancement for prerequisites, information, and combination, as well as group ways of behaving and issues. The majority of these hardships incorporate correspondence, documentation, designing, and strategy, and we accumulate arrangements.

3. INTENTIONAL COLLABORATION IN A HYBRID WORD

The majority of firms simply consider where teams are located—that is, whether they are dispersed or located—when considering hybrid work, but Gartner data indicates that organizations also need to consider how much time teams are spending on it—that is, whether they are working synchronously or asynchronously).



Figure 1: collaboration in a hybrid word

In order to thrive in the hybrid environment, companies need to allocate equal resources towards all four work modes that are produced by this method:

- **Working together, together:** when teams are positioned in close proximity to one another, leading to meetings that take place in a common area.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- **Working together, apart:** a situation in which teams are geographically dispersed yet participate in virtual meetings.
- **Working alone, together: when teams are working in common locations but are not simultaneously working on their projects.**
- **Working alone, apart:** whenever teams are dispersed and individuals are engaged in task that requires intense concentration.

4. MODES OF HYBRID COMMUNICATION

We see that hybrid communication is similar to a coin in that it has two sides that are equally important: the synchronous side and the asynchronous side. This becomes apparent when we examine hybrid communication in further detail. In order for each team to operate correctly, maintain contact with one another throughout work hours, and complete projects regardless of where they are located, it is necessary to strike a balance between synchronous and asynchronous communication.

Synchronous communication

The purpose of synchronous communication is to deliver instantaneous replies, and it takes place in real time simultaneously. Synchronous communication accounts for the vast bulk of the interactions that take place in ordinary office environments. On the other hand, synchronous communication is somewhat more difficult to sustain with hybrid teams, and it often comes with an extra layer of planning and scheduling.

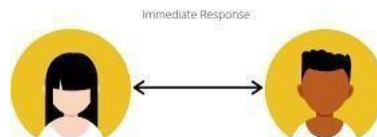


Figure 2: Synchronous communication

Asynchronous communication

Due to the fact that there is a time lag between the person who is presenting the information and the person who is receiving it, asynchronous communication does not often take place in real time. In the context of remote and hybrid teams, it is quite probable that they will flourish on this mode of communication; nevertheless, it is normally applicable to settings that take place inside an office environment as well.

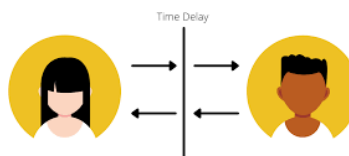


Figure 3: Asynchronous communication

5. CONCLUSION

Organizations must adapt to hybrid work environments by recognizing the importance of collaboration beyond physical location. Gartner research identifies four work modes: "working together, together," "working together, apart," "working alone, together," and "working alone, apart." Effective hybrid communication requires a balanced approach between synchronous and asynchronous communication. Synchronous communication, prevalent in traditional in-office settings, requires additional planning and coordination. Asynchronous communication, characterized by time delays, is crucial for remote and hybrid teams, allowing flexibility and productivity. Successful hybrid work environments require intentional collaboration strategies that consider both physical and temporal dimensions.

REFERENCES

1. Arslan, A., Cooper, C., Khan, Z., Golgeci, I., & Ali, I. (2022). Artificial intelligence and human workers interaction at team level: a conceptual assessment of the challenges and potential HRM strategies. *International Journal of Manpower*, 43(1), 75-88.
2. BabapourChafi, M., Hultberg, A., & Bozic Yams, N. (2021). Post-pandemic office work: Perceived challenges and opportunities for a sustainable work environment. *Sustainability*, 14(1), 294.
3. Garro-Abarca, V., Palos-Sanchez, P., & Aguayo-Camacho, M. (2021). Virtual teams in times of pandemic: Factors that influence performance. *Frontiers in Psychology*, 12, 624637.
4. Juvet, T. M., Corbaz-Kurth, S., Roos, P., Benzakour, L., Cereghetti, S., Moullec, G., ... & Weissbrodt, R. (2021). Adapting to the unexpected: Problematic work situations and resilience strategies in healthcare institutions during the COVID-19 pandemic's first wave. *Safety Science*, 139, 105277.
5. Mitchell, A. (2023). Collaboration technology affordances from virtual collaboration in the time of COVID-19 and post-pandemic strategies. *Information Technology & People*, 36(5), 1982-2008.
6. Morrison-Smith, S., & Ruiz, J. (2020). Challenges and barriers in virtual teams: a literature review. *SN Applied Sciences*, 2, 1-33.
7. Nahar, N., Zhou, S., Lewis, G., & Kästner, C. (2022, May). Collaboration challenges in building ml-enabled systems: Communication, documentation, engineering, and process. In *Proceedings of the 44th International Conference on Software Engineering* (pp. 413-425).
8. Singh, J., & Matthees, B. (2021, May). Facilitating interprofessional education in an online environment during the COVID-19 pandemic: A mixed method study. In *Healthcare* (Vol. 9, No. 5, p. 567). MDPI.
9. Stray, V., & Moe, N. B. (2020). Understanding coordination in global software engineering: A mixed-methods study on the use of meetings and Slack. *Journal of Systems and Software*, 170, 110717.
10. Yang, L., Holtz, D., Jaffe, S., Suri, S., Sinha, S., Weston, J., ... & Teevan, J. (2022). The effects of remote work on collaboration among information workers. *Nature human behaviour*, 6(1), 43-54.

MANAGING DISTRIBUTED LEADERSHIP AND FOSTERING A SENSE OF COMMUNITY IN A GEOGRAPHICALLY DISPERSED WORKFORCE

RASMITA BALIARSINGH

Research Scholar COM-
MERCE AND MANAGEMENT
Asian International University Imphal, Manipur

Abstract

This study examines methods for building a feeling of community among geographically distributed workers, emphasizing the value of relationships, participation, and support among distant team members. Organizations may foster a sense of community and worth among remote workers by combining several strategies, such as virtual team-building exercises, transparent communication, common objectives, acknowledging accomplishments, information exchange, inclusion, and well-being assistance. This study emphasizes the importance of community-building initiatives and how they may improve morale, productivity, and cooperation among geographically dispersed teams. In the end, companies with geographically distributed workforces benefit from robust community development in terms of overall success and efficacy.

Keywords: *Distributed Leadership, Geographically Dispersed Workforce, Community Building, Remote Collaboration, Team Engagement.*

1. INTRODUCTION

Organizations are adopting dispersed work arrangements more often in today's linked and fast-paced global economy in order to remain competitive and adjust to shifting market needs. Teams that are distributed geographically are known as geographically dispersed workforces, and they are becoming a common sight in contemporary businesses. Numerous causes, such as technological improvements, the increasing significance of remote work, and the need for firms to tap talent pools outside their local geographical borders, have contributed to this trend towards dispersed teams.

While there are many advantages to working remotely, like more freedom, lower costs, and easier access to a wider pool of talent, there are also particular difficulties in terms of community building and leadership. Geographically scattered teams, in contrast to typical co-located teams, often lack the physical closeness that encourages natural connections, a feeling of belonging, and cohesive team dynamics. Because of this, managers have the difficult challenge of managing remote teams efficiently while still fostering a strong sense of community among team members who can be spread over many cities, nations, or even continents.

to investigate the crucial nexus between encouraging a feeling of community in geographically scattered workforces and managing distributed leadership. This research aims to provide

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

insights and ideas for businesses to negotiate the nuances of dispersed leadership and foster a cohesive community across distances by analyzing the possibilities and complications that come with managing distant teams.

The study will use a mix of empirical data, theoretical frameworks, and real-world examples from businesses that have effectively managed remote teams to accomplish this goal. It will cover important subjects including the function of community building, the influence of technology and communication tools, the role of leadership in remote environments, and best practices for increasing engagement and cooperation among distributed teams.

The report seeks to provide businesses looking to maximize leadership effectiveness and cultivate a strong sense of community among their geographically scattered workforce with practical advice based on a thorough research of these issues. The ultimate objective is to provide insightful analysis and direction to support businesses in thriving in the rapidly changing world of remote work arrangements.

2. LITERATURE REVIEW

S. M. S. Haque (2023). The COVID-19 epidemic has had a profound effect on human resources (HR) procedures, transformed organizational operations, and accelerated the growth of remote work. This research addresses the potential and problems in this new paradigm by examining the significant implications of remote work on HR operations. The workforce now has more freedom and access to a worldwide talent pool because to the transition to remote work. For HR experts, it hasn't been without difficulties, however. These days, they have to overcome obstacles to successfully managing staff engagement, encouraging teamwork, and monitoring performance. Concerns about maintaining a cohesive company culture and building strong relationships with remote employees have grown in importance. The need of HR departments adjusting to the reality of remote work is emphasized by this study. It suggests that techniques for employee engagement, performance reviews, training, and talent acquisition need to be re-defined. This report provides HR executives and practitioners with invaluable advice on how to navigate hurdles and optimize remote work arrangements by analyzing real-world case studies and expert perspectives. Organizations that improve resilience and draw in top personnel stand to gain significantly from adopting remote work practices. To maximize remote work situations, HR professionals need to proactively embrace new technologies and develop new skill sets.

Planojevic, G., and Valk, R. (2021). The study used a qualitative case study approach, using action research inside a prominent worldwide logistics and transportation service. Purposive sampling was utilized to pick 22 workers from several geographically distributed organizations for the study. Employee viewpoints and experiences with digital KS and SL were investigated via participant interviews. The first set of findings demonstrates that the motivation, intents, attitude, and behavior of workers to share and co-create knowledge rooted in a supportive KS culture and environment are critical components of effective digital KS and SL. Second, results indicate that the case study organization's use of knowledge sharing platforms tailored to

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

workers' requirements and preferences promoted KS and SL, which in turn supported the development of organizational and individual capability, agility, and adaptability—all of which are necessary in the modern, digital knowledge economy, particularly in light of the COVID- 19 pandemic.

Brevort, F., Vikkelsø, S., Nielsen, R. K., Henriksen, T. D., & Mogensen, M. (2021). This essay examines important leadership issues facing Danish industrial and craft SMEs from the viewpoint of a paradox knoter. 55 middle managers from 11 different firms were asked to judge the topicality of ten leadership paradoxes as part of an action-learning development program. Three clusters of knotted paradoxes relating to the management of 1) managing organizational flexibility, 2) striking a balance between involvement and control, and 3) handling dispersion were found using exploratory factor analysis. Every knot that has been found comprises of two paradoxes and demonstrates how managers who are engaged in one aspect of a knotted paradox are probably also involved in the tensions surrounding the other.

Errichiello, L., Pianese, T., and da Cunha, J. V. (2023). Organizational control is prioritized when remote employment becomes more common. Companies are relied upon to influence workers' desire to perform in line with the company's vision, values, and goals whether they work remotely or in geographical dispersion. Currently, there is a deficiency in our understanding of how organizational control is suggested in remote work arrangements (RWAs). A research synthesis, or a systematic evaluation of 131 papers that empirically explored this problem, is conducted in order to close this gap in knowledge. The study encompasses not only direct forms of control (such as output control) but also management practices and employee activities that operate as indirect levers of control by influencing the dynamics of control. Five "control domains" were examined and conclusions made in regard to them: work identity in RWAs, supervisory management styles, control systems, trusting relationships, and organizational identification.

DiTomaso, N., and J. Eisenberg (2021). Different managers organize their teams in different ways, which may have an impact on how well team members communicate and work together. We investigate the consequences of management choices on the composition, assignment, and location of teams. We conceptualize the effects of the type of team structure on individual perceptions of the team communication process and the emergent state of trust in other team members as being moderated by the psychological distance of a team member and moderated by the richness of social cues and psychological safety. By investigating the many underlying processes by which the kind of team structure influences a team member's psychological reactions and interactions with other team members, we add to the body of knowledge. Since it is hard to alter physical distance, we instead concentrate on perceived psychological distance since it provides a foundation for improved comprehension and a way to deal with collaboration difficulties.

3. TECHNIQUES FOR SUCCESSFUL DECENTRALIZED LEADERSHIP

A variety of techniques are used in distributed leadership strategies to address the particular difficulties associated with managing teams that are spread out geographically. These tactics aim to strengthen trust, encourage cooperation, improve communication, and create a feeling of purpose among members of remote teams. Some essential tactics for successful dispersed leadership are listed below:

- **Utilizing Technology:** Adopt technological tools and platforms that let team members collaborate and communicate with one another more easily. Cloud-based document sharing systems, instant messaging apps, project management tools, and video conferencing software are a few examples of this. Leaders may guarantee that remote team members remain connected and focused on their job by using technology efficiently.
- **Clear Communication Channels:** Create defined routes and procedures for communication within the team to guarantee that information is shared efficiently. Establish expectations for the frequency of contact, the preferred channels of communication, and the turnaround times for emails and texts. Frequent check-ins and virtual meetings may support alignment maintenance and prompt resolution of any problems.
- **Building Trust and Accountability:** Establish clear objectives and goals to help the team develop a culture of trust and responsibility. Promote transparent decision-making procedures, attentive listening, and open communication. Give team members the chance to demonstrate their abilities and contributions, and honor and reward success to encourage good conduct.
- **Empowering Team Members:** Encourage team members to accept responsibility for their job and act independently when making choices. Give them the tools, encouragement, and direction they need to be successful in their positions. Promote originality, inventiveness, and initiative. Establish a setting where team members are comfortable voicing their thoughts and views.
- **Promoting a Shared Vision and Purpose:** Provide a clear vision and purpose that inspire team members and direct them toward shared objectives. Share the purpose, values, and goals of the company with the team and stress the significance of each individual's contribution to the group's success as a whole. Promote teamwork and cooperation by emphasizing the advantages of cooperating and having common interests.
- **Cultivating Relationships and Social Connections:** Provide chances for social contact and connection development to remote team members to help them have a feeling of belonging. To assist team members, get to know one another better, plan online social gatherings, casual coffee conversations, or virtual team-building exercises. Promote the sharing of hobbies and non-work-related information to foster camaraderie and build team ties.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- **Continuous Learning and Development:** Provide chances for coaching, mentoring, and training to remote team members in order to support their professional development. Give team members access to tools and training materials so they may improve their abilities and expertise in their specialized positions. Promote a culture of ongoing learning and development where team members are motivated to look for fresh challenges and development possibilities.

4. ENTERTAINING A SENTIMENT OF COMMUNITY IN A WORKFORCE THAT IS DISPERSED GEOGRAPHICALLY

In a geographically distributed workforce, building a community means establishing a setting where distant workers feel engaged, connected, and supported even when they are physically apart. This is accomplished via a variety of tactics. Firstly, virtual team-building events are scheduled periodically to enhance social engagement and relationship development among team members, such as online games or virtual happy hours. Second, there's a focus on open communication, with frequent encounters and conversations encouraged via the use of technologies like instant messaging and video conferencing. Thirdly, the team's common objectives and values are emphasized to strengthen a feeling of cohesion and purpose, coordinating individual efforts with group ambitions. Furthermore, accomplishments are acknowledged and celebrated in public to strengthen a feeling of respect and recognition among team members. Through virtual workshops and mentoring programs, chances for learning and skill development are also provided, facilitating cooperation and the exchange of knowledge. In addition, diversity and inclusion are encouraged to make sure that each team member is treated with dignity and respect in the community. Last but not least, team members' holistic well-being and work-life balance are valued, and tools and assistance are provided to assist them in managing stress. By putting these tactics into practice, companies may help geographically separated teams develop a strong sense of community that promotes engagement, cooperation, and a feeling of shared belonging throughout distances.

5. CONCLUSION

In summary, fostering a feeling of community among remote team members is crucial for encouraging engagement, cooperation, and a sense of shared belonging in a geographically distributed workforce. Organizations can create an environment where remote team members feel valued, connected, and supported despite being physically apart by implementing a combination of strategies, such as virtual team-building activities, open communication, shared goals and values, recognition of accomplishments, knowledge sharing, inclusivity, and support for well-being. Organizations may improve collaboration, output, and morale across geographically separated teams by fostering a strong sense of community, which will eventually benefit the organization's overall performance and efficacy.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

REFERENCES

1. Aftab, J., Sarwar, H., Kiran, A., Qureshi, M. I., Ishaq, M. I., Ambreen, S., & Kayani, A. J. (2023). *Ethical leadership, workplace spirituality, and job satisfaction: moderating role of self-efficacy*. *International Journal of Emerging Markets*, 18(12), 5880-5899.
2. Brodie, J., & Osowska, R. (2021). *Supporting entrepreneurship students' sense of belonging in online virtual spaces*. *Industry and Higher Education*, 35(4), 353-359.
3. Cosgrave, C. (2020). *The whole-of-person retention improvement framework: a guide for addressing health workforce challenges in the rural context*. *International Journal of Environmental Research and Public Health*, 17(8), 2698.
4. Eisenberg, J., & DiTomaso, N. (2021). *Structural decisions about configuration, assignments, and geographical distribution in teams: Influences on team communications and trust*. *Human Resource Management Review*, 31(2), 100739.
5. Gao, W., Wang, L., Yan, J., Wu, Y., & Musse, S. Y. (2021). *Fostering workplace innovation through CSR and authentic leadership: evidence from SME sector*. *Sustainability*, 13(10), 5388.
6. Haque, S. M. S. (2023). *The impact of remote work on hr practices: navigating challenges, embracing opportunities*. *European Journal of Human Resource Management Studies*, 7(1).
7. Henriksen, T. D., Nielsen, R. K., Vikkelsø, S., Bévort, F., & Mogensen, M. (2021). *A paradox rarely comes alone a quantitative approach to investigating knotted leadership paradoxes in SMEs*. *Scandinavian Journal of Management*, 37(1), 101135.
8. Kohntopp, T., & McCann, J. (2020). *Leadership in virtual organizations: Influence on workplace engagement*. *The Palgrave handbook of workplace well-being*, 1-26.
9. Pianese, T., Errichiello, L., & da Cunha, J. V. (2023). *Organizational control in the context of remote working: A synthesis of empirical findings and a research agenda*. *European Management Review*, 20(2), 326-345.
10. Valk, R., & Planojevic, G. (2021). *Addressing the knowledge divide: digital knowledge sharing and social learning of geographically dispersed employees during the COVID-19 pandemic*. *Journal of Global Mobility: The Home of Expatriate Management Research*, 9(4), 591-621.

DEVELOPING PERFORMANCE MANAGEMENT AND EVALUATION SYSTEMS SUITABLE FOR HYBRID WORK ENVIRONMENTS

BIGYAN MANIA

Research Scholar COM-
MERCE AND MANAGEMENT
Asian International University Imphal, Manipur

Abstract

This research looks at how performance management and productivity measures are affected by hybrid work arrangements within a business. The study assesses changes in productivity metrics, such as task completion rates and time per task, as well as performance management indicators, such as performance ratings, feedback frequency, and goal achievement percentages, using a retrospective analysis of quantitative data collected before and after the adoption of hybrid work. The results show a steady increase in productivity and performance management metrics after the adoption of the hybrid work model, indicating the usefulness of hybrid work in raising worker productivity and performance. These findings demonstrate the potential advantages of hybrid work arrangements in fostering a more adaptable and encouraging workplace. By using this information, organizations may enhance employee engagement and performance while optimizing their hybrid work strategy. All things considered, the research emphasizes how critical data-driven methods are to comprehending and adjusting to the changing environment of hybrid work practices.

Keywords: Performance management, Evaluation systems, Hybrid work, Remote work, Performance metrics.

1. INTRODUCTION

"A strategic and integrated approach of conveying continued success to institutions by developing the people in a way that improves group and personal performance" is how the Performance Management System (PMS) is described. These systems provide an integrated and ongoing method for rewarding and managing performance. More for-profit and nonprofit organizations are turning to performance management systems (PMS) to improve psychosomatic outputs and results because previously developed and implemented performance, related pay, and appraisal systems were not meeting management expectations. Even though this technique is cutting edge, there have been a lot of challenges in properly putting it into practice. If managers do not set a strict example for performance-driven behaviour and behave as role models, PMS will never be successful. The behavioural aspects of both the management and the staff, as well as how the managers persuade the staff to use PMS, determine how successful PMS is. This suggests that the efficacy and efficiency of a PMS are influenced by a range of behavioural, psychological, and management aspects.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

The majority of the time, remote and hybrid work has a remarkable impact on work-life balance and productivity. However, there are certain difficulties, particularly with relation to employee performance management.

Here are the four primary challenges:

Communication Gaps: missing contextual clues, misread or missed emails, and chat messages that arrive at busy times. Further complicating matters are linguistic and cultural hurdles that face multinational remote teams operating in various time zones.

Employee Engagement and Motivation: Remote workers often experience a sense of disconnection from the goals of their employer and their role in the "bigger picture." Employee motivation and engagement may suffer as a result, which would lower their output and responsibility.

Balancing Flexibility and Productivity: The distinction between work and family time is hazy for 47% of remote workers. This is when it becomes difficult to strike a balance between output and allowing for flexibility in working and learning.

Difficulty in Monitoring and Assessing Performance: It might need time and effort to standardize the performance evaluation process for remote workers when there are numerous supervisors and management styles.

Therefore, addressing these performance management issues may aid in raising employee satisfaction, productivity, and general success. Additionally, you may enhance workplace productivity and employee retention rates right now by implementing these improvements in your employee onboarding and management techniques.

2. LITERATURE REVIEW

Zhao, J., Wang, S., Kadry, S. N., Xi, X. I., Na, Q. I., and Kumar, P. M. (2021). By offering Vehicle-to-Grid (V2G) connectivity, Plug-in Hybrid Electric Vehicles (PHEVs) have been pushed as a potential way to lower greenhouse gas (GHG) and other pollutants by using energy rather than oil for efficient environmental management. Electric cars are widely seen as a viable way to reduce air pollution in cities. They also aid in more efficient environment management, which is essential for the development of low-carbon transportation in the future. However, the advantages they provide the environment depend on the time and geographical sense of their actual usage, and obstacles like their limited range make the adoption of electric vehicles (EVs) more difficult. This research looks at how cities affect the environment by producing carbon pollution and how plug-in hybrid electric vehicles (PHEVs) might help avoid it. Additionally, an artificial intelligence model has been presented that specifies the best car designs and how drivers should be assigned to cars in a range of situations. These scenarios include minimizing net life cycle costs, greenhouse gas emissions, and oil consumption for efficient environmental management. High battery swinging and periodic battery replacements save life cycle costs and greenhouse gas emissions by engineering overspent vehicle power with equivalent output,

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

weight, and cost effect. Furthermore, how energy sources are used in the environment has a big impact on pollution and energy consumption (EC). A substantial amount of energy was produced by burning coal due to the significant pollution and energy consumption characteristics. The findings demonstrate that a combination of the suggested model and a permitted departure from the state of charge may improve fuel efficiency for plug-in hybrid electric vehicles.

Nosrati-Abarghoee, S., Mina, H., Kannan, D., & Khosrojerdi, G. (2020). The process of choosing suppliers in a closed-loop supply chain is known as circular supplier selection. The social and environmental issues raised by circular supplier selection difficulties are addressed by sustainable circular supplier selection. In this study, we integrate the interval VIKOR approach with the fuzzy best-worst method for the first time to assess and rank sustainable suppliers in circular supply chains. Based on the judgments of the domain expert, the assessment criteria are divided into three categories: economic, social, and circular elements. The suppliers are assessed in the context of uncertainty using the interval VIKOR approach, while the criteria are weighed using the fuzzy best-worst method. This research supports the Sustainable Development Goals (SDGs) of Responsible Consumption and Production (SDG 12) and Decent Work and Economic Growth (SDG 8). The suggested technique is then used to assess six Iranian vendors in the wire and cable sector. The use and effectiveness of the suggested strategy are shown by the outcomes of the sensitivity analysis and application of the suggested approach.

D. T. S. Kumar (2020). Contrarily, data mining is often utilized in marketing and finance applications to address problems in those domains. It is extensively used in research and engineering. By analyzing the ground reality, a decision support system based on data mining improves the performance of the company. Every business has turbulent economies from time to time because of rivalry, expenses, tax pressures, etc. The company is forced more into a competitive environment by globalization, privatization, and liberalization. Appropriate marketing tactics must be created and carried out in order to maintain a balance with the competition and resist to obtain the intended benefit. The marketing decision support system's effective data mining methodology lessens the organizational load associated with analysis and strategic planning. In order to evaluate an organization's marketing strategies, a hybrid strategy combining decision trees and artificial neural networks was presented in this study effort as a data mining-based decision support system.

Zhang, H., Wu, Y., Tan, H., Peng, J., Lian, R., and Wu, Y. (2020). Deep reinforcement learning (DRL) based energy management strategy (EMS) optimization and training may be very labor-intensive and sluggish. This research proposes an enhanced paradigm for energy management called deep deterministic policy gradient (DDPG), which incorporates expert knowledge. Combining the best brake specific fuel consumption (BSFC) curve and battery characteristics of hybrid electric vehicles (HEVs), we are dedicated to resolving the multi-objective energy management optimization issue with a wide range of control factors. The suggested framework improves fuel efficiency and speeds up the learning process by using this existing information,

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

which makes the energy management system more reliable overall. The experimental findings demonstrate that the suggested EMS performs better than the other state-of-the-art deep reinforcement learning techniques and the one without any previous knowledge. Furthermore, it is simple to extend the suggested methodology to various kinds of HEV EMSs.

Basar, A., Smys, S., and Wang, H. (2020). The internet of things, or IoT, offers a potential way to link and access any item over the internet. The number of devices is growing daily, and they vary greatly in terms of size, design, use, and complexity. Because of its vast array of services and uses, IoT is driving the globe and changing people's lives. IoT, on the other hand, offers a plethora of services via apps, but it also has serious security flaws and is open to assaults like denial-of-service attacks, sinkhole attacks, and eavesdropping. When network security is compromised, intrusion detection systems are employed to identify these types of assaults. Based on a hybrid convolutional neural network model, this research paper presented an intrusion detection system for Internet of Things networks that can identify many sorts of assaults. A variety of IoT applications may benefit from the suggested paradigm. The suggested research project is verified and contrasted using deep learning and traditional machine learning models. The results of the experiment show that the suggested hybrid paradigm is more vulnerable to IoT network assaults.

3. RESEARCH METHODOLOGY

The approach of the study consisted of conducting a quantitative analysis of data obtained from workers both before and after the implementation of hybrid work arrangements. A collection of information on productivity metrics and performance management indicators was obtained from the organization's internal records and reviews. The purpose of the statistical studies that were carried out was to discern patterns and trends in terms of productivity and performance. An interpretation of the findings was carried out in order to give insights into the influence that hybrid work has on productivity and performance management. On the basis of these realizations, suggestions for enhancements were developed. The technique, in general, offered a methodical framework for evaluating the efficacy of hybrid work models in terms of improving the productivity and performance of employees.

4. DATA ANALYSIS

➤ To Offer Guidance on Enhancing Performance Management in Mixed Workplaces

Table 1: Performance Management in Mixed Workplaces

| Employee ID | Pre-Hybrid Performance Rating | Post-Hybrid Performance Rating | Pre- Hybrid Feed-back Frequency | Post- Hybrid Feed-back Frequency | Pre-Hybrid Goal Achievement (%) | Post-Hybrid Goal Achievement (%) |
|-------------|-------------------------------|--------------------------------|---------------------------------|----------------------------------|---------------------------------|----------------------------------|
| 001 | 4.5 | 4.8 | Bi-annual | Monthly | 80 | 85 |

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

| | | | | | | |
|-----|-----|-----|-----------------|-----------|----|----|
| 002 | 4.2 | 4.6 | Quarterly | Weekly | 75 | 80 |
| 003 | 4.8 | 4.9 | Annual | Bi-weekly | 90 | 92 |
| 004 | 4.6 | 4.7 | Semi- annual | Weekly | 85 | 88 |
| 005 | 4.4 | 4.5 | Bi-annual | Monthly | 78 | 82 |

The information reveals a trend of steady increase in worker performance under mixed work arrangements. Following the hybrid, there are encouraging trends in target attainment, performance evaluations, and feedback frequency. Workers now get feedback on a monthly or weekly basis instead of only biannually or quarterly. It is probable that this rise leads to improved performance evaluations. Better alignment between individual and organizational goals is also shown by a discernible increase in goal success percentages. Overall, the results point to the effectiveness of hybrid work models in raising worker performance and productivity in contemporary workplaces.

➤ **To Assess the Effect of Hybrid Work Configurations on Productivity Measure**

Table 2: Hybrid Work Configurations on Productivity Measure

| Employee ID | Pre-Hybrid Tasks Completed | Post-Hybrid Tasks Completed | Pre-Hybrid Time per Task (hours) | Post-Hybrid Time per Task (hours) |
|--------------------|-----------------------------------|------------------------------------|---|--|
| 001 | 35 | 40 | 8 | 7 |
| 002 | 40 | 45 | 7 | 6 |
| 003 | 30 | 35 | 9 | 8 |
| 004 | 45 | 50 | 6 | 5 |
| 005 | 38 | 42 | 7.5 | 6.5 |

The evidence demonstrates a definite increase in productivity in mixed work environments. Following implementation, workers all across the board are finishing more work in less time. Employee 001, for instance, completed 40 jobs after becoming hybrid, compared to 35 tasks before, and each work took 7 hours instead of 8 hours to complete. These results highlight how well hybrid models work to promote productivity and efficiency in today's workplace.

5. CONCLUSION

To sum up, the study approach offered insightful information on how hybrid work arrangements affect output and performance evaluation. The results show a steady increase in

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

performance management and productivity measures after hybrid installation. Workers completed tasks with more efficacy and efficiency, and there were encouraging trends in target attainment percentages, performance evaluations, and feedback frequency. These findings highlight how mixed work promotes performance and productivity. These results may be used by organizations to improve the supportive work environment and hybrid work practices. In general, the study highlights how crucial data-driven methods are to comprehending and improving hybrid work practices.

REFERENCES

1. Ammari, C., Belatrache, D., Touhami, B., & Makhloufi, S. (2022). Sizing, optimization, control and energy management of hybrid renewable energy system—A review. *Energy and Built Environment*, 3(4), 399-411.
2. Diab-Bahman, R., & Al-Enzi, A. (2020). The impact of COVID-19 pandemic on conventional work settings. *International Journal of Sociology and Social Policy*, 40(9/10), 909-927.
3. Elmouatamid, A., Ouladsine, R., Bakhouya, M., El Kamoun, N., Khaidar, M., & Zine-Dine, K. (2020). Review of control and energy management approaches in micro-grid systems. *Energies*, 14(1), 168.
4. Kannan, D., Mina, H., Nosrati-Abarghoee, S., & Khosrojerdi, G. (2020). Sustainable circular supplier selection: A novel hybrid approach. *Science of the Total Environment*, 722, 137936.
5. Kumar, D. T. S. (2020). Data mining based marketing decision support system using hybrid machine learning algorithm. *Journal of Artificial Intelligence and Capsule Networks*, 2(3), 185-193.
6. Lian, R., Peng, J., Wu, Y., Tan, H., & Zhang, H. (2020). Rule-interposing deep reinforcement learning based energy management strategy for power-split hybrid electric vehicle. *Energy*, 197, 117297.
7. Singh, J., Steele, K., & Singh, L. (2021). Combining the best of online and face-to-face learning: Hybrid and blended learning approach for COVID-19, post vaccine, & post-pandemic world. *Journal of Educational Technology Systems*, 50(2), 140-171.
8. Smys, S., Basar, A., & Wang, H. (2020). Hybrid intrusion detection system for internet of things (IoT). *Journal of ISMAC*, 2(04), 190-199.
9. Zhao, G., Wang, X., Negnevitsky, M., & Zhang, H. (2021). A review of air-cooling battery thermal management systems for electric and hybrid electric vehicles. *Journal of Power Sources*, 501, 230001.
10. Zhao, J., Xi, X. I., Na, Q. I., Wang, S., Kadry, S. N., & Kumar, P. M. (2021). The technological innovation of hybrid and plug-in electric vehicles for environment carbon pollution control. *Environmental Impact Assessment Review*, 86, 106506.

MATRIX AND COMPUTATION SYSTEM SUPPORTING AI DEVELOPMENT

NABAJYOTI DAS

Research Scholar

MATHEMATICS

Asian International University Imphal, Manipu

ABSTRACT

Artificial intelligence (AI) aims to simulate human-like intelligence in machines, covering perceptual, cognitive, and decision-making abilities. This paper explores the development of AI, focusing on matrix-based algorithms and computational systems supporting AI applications. It discusses the integration of computational intelligence (CI) techniques, such as artificial neural networks (ANN) and evolutionary computation (EC), with deep learning (DL) for real-world applications. Additionally, it highlights the role of numerical linear algebra in extracting meaningful information from data and enabling efficient computations, with a focus on matrix operations. The paper also addresses challenges in dense matrix multiplication and emphasizes the importance of addressing computational complexities and memory constraints. Overall, it underscores the interdisciplinary nature of AI research and its profound impact on various domains, necessitating continued innovation and collaboration to advance AI technologies.

Keywords: *Artificial intelligence, Computational intelligence, Matrix-based algorithms, Numerical linear algebra, Dense matrix multiplication.*

1. INTRODUCTION

Artificial intelligence (simulated intelligence) is the capacity of PCs or different frameworks to copy human intelligence. A machine that can see, reason, learn, plan, conjecture, and participate in other human-like ways of behaving is the sacred goal of artificial intelligence. One of the most striking contrasts among people and different creatures is our degree of intelligence. A developing assortment of machines are bit by bit dislodging people in a wide range of occupations because of the perpetual pattern of modern upsets; the following extraordinary impediment will be to keep machine intelligence from in the end overriding human specialists. The wide and various group of man-made intelligence research is an immediate consequence of the numerous researchers who are giving their professions to the subject. Search calculations, master frameworks, information diagrams, regular language handling, advancement calculations, ML, DL, and a lot more areas of artificial intelligence study are all essential for the field.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Different types of intelligence, including visual, mental, and direction, are engaged with man-made intelligence improvement. At the point when a machine has perceptual intelligence, it implies it can see, hear, feel, and do other fundamental errands that individuals do. An elevated degree of mental intelligence is portrayed by predominant capacities with regards to thinking, enlistment, and information obtaining. The objective is to give PCs human-level thinking and mental capacities, drawing motivation from fields like mental science, neuroscience, and mind like intelligence. It is regularly accepted that machines would have the option to make the best decisions for individuals, manufacturing plants, and the climate once they foster the limit with regards to discernment and perception, similar as people. For choice intelligence to work, information science should be extended using sociology, choice hypothesis, the executives science, and applied information science. The point of perceptual, mental, and dynamic intelligence requires a man-made intelligence foundation layer that is upheld by information, capacity, handling limit, ML calculations, and artificial intelligence structures. From that point onward, it can comprehend the information's innate standards to help and carry out artificial intelligence applications through model preparation. Our work and ways of life are overall essentially impacted by the rising broadness and profundity of computer-based intelligence's application layer, which is being converged with fields like key sciences, modern assembling, human existence, social administration, and the internet.

2. MATRIX-BASED ALGORITHMS IN AI

The three fundamental fields of computational intelligence (CI) — artificial brain organizations (ANNs), rationale induction, and developmental calculation — share numerous likenesses with artificial intelligence (simulated intelligence). CI is spurred by both science and language. Truly, man-made intelligence and the essential artificial intelligence research are both covered under the IEEE CI Society (CIS). With regards to artificial intelligence (simulated intelligence), the three grade ways of thinking — Imagery, Connectionism, and Evolutionism — to a great extent reflect the three significant ways of thinking inside CI: rationale, artificial brain organizations (ANN), and transformative calculation (EC). Profound learning (DL) and profound brain organizations (DNN) have made astounding progress in various true applications, including shrewd city improvement, compound union preparation, and discourse acknowledgment, exhibiting the quick headway of CI and simulated intelligence as of late. The outcome of profound learning (DL) and profound brain organizations (DNN) is intently attached to the assets of huge information (BD) and superior execution figuring (HPC), which incredibly grow the abilities of exemplary artificial brain organizations (ANN) to DNN and their applications. Specifically, BD assets consider great DNN preparing, and HPC assets, for example, distributed computing, supercomputing, and realistic handling units (GPUs), accommodate sensible DNN execution times. To tackle complex issues in true applications like industry, government, climate, economy, finance, medication, schooling, the executives, and nature, new CI strategies (like DNN) are created through the reconciliation of Calculations (like ANN), Large Information assets, and Processing assets (like HPC).

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Ongoing years have seen quick development in the EC people group because of the far reaching utilization of EC calculations in fields like PC organizations, electromagnetic designing, block-chain applications, versatile figuring, and data security, where customary numerical techniques have demonstrated incapable in tackling improvement issues. In reasonable settings, these accomplishments matter significantly for issues of a little or medium scale. Nowadays, by the by, improvement issues can be huge scope or super-enormous scope since the quantity of decision factors could arrive at many thousands, in the event that not thousands, because of the developing intricacy of useful circumstances. While handling muddled issues, it's feasible to set the populace size very huge to increment variety. Since they are iterative and populace based, EC calculations can cause gigantic computational requests from either enormous scope choice factors or large populaces. Until further notice, this is the principal justification for why EC calculations aren't more famous. Huge Information and Superior Execution Figuring (HPC) are the groundworks of enormous scope FS and DNN, which actually tackle perplexing difficulties.

3. COMPUTATIONAL SYSTEMS FOR MATRIX OPERATIONS

This document does not intend to cover all of the many possible uses for such data. In various fields, matrices are used, although they are most commonly associated with spatial and time-series data analysis. We consider a matrix to be a representation of the data here:

$$A = \begin{bmatrix} - & a_1^T & - \\ & \vdots & \\ - & a_n^T & - \end{bmatrix} \in \mathbb{R}^{n,m}$$

concerning the underlying data, along the dimensions m, n . The feature vectors $a_i \in \mathbb{R}^m$ are seen as the rows of A in this context, where m is the dimension of the feature space. The amount of data points, or dimension n , could be extremely enormous. Assumption $n > m$ is common. Another possible form that the data can take is a d -order tensor.

$$A \in \mathbb{R}^{n_1 \times n_2 \times \dots \times n_d}$$

with dimensions $n_i \in \mathbb{N} \quad \forall i$.

The challenges of deriving useful insights from the gathered data differ across domains of application. We frequently come into tasks like supervised learning, unsupervised learning, and semi-supervised learning while we extract knowledge from data. Training data availability and utilization is a good way to explain the differences between supervised and unsupervised learning. In supervised learning, all of the data is available, but in semi-supervised learning, just a fraction of the data is available. A specific example that is fundamental to computer science, statistics, numerical linear algebra, and data science would like to be highlighted before we begin the thorough discussion.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Basically, the goal is to fit a linear model to labelled data, and this is known as the least squares problem. For the sake of argument, let's say we have data points $\in \mathbb{R}^m$ and usually get a value of either -1 or 1 when solving a classification problem. Next, we want to discover a weight vector $\in \mathbb{R}^m$ that minimizes the 2-norm of the residual. A linear regression issue would inevitably result from this, as is widely recognized.

$$\min_w \|Aw - y\|_2^2 + \lambda \|w\|_2^2$$

same way as before. Also introduced here is the regularization term λ 's ridge parameter, which can have the value > 0 . There are a number of possible norms for measuring the regularization term, including the 1-norm and the total variation norm. Next, we find the answer to this problem by:

$$w_* = (A^T A + \lambda I)^{-1} A^T y,$$

an example of a standard linear equation system containing a positive definite matrix that is symmetrical with respect to the value of < 0 . All of these fields are interdependent, as this example shows. Data mining that uses numerical linear algebra techniques to make evaluations robust and efficient runs into problems. Studying problems with real data, on the other hand, drives the development of complex numerical approaches. This survey aims to demonstrate how numerical linear algebraic approaches enable calculations to disclose hidden information through information extraction from data, data modeling, and pattern detection. In this way, the paper is organized. The application of conventional factorizations like QR and SDV is demonstrated initially, followed by the introduction of interpretable factorizations like NMF and CUR decomposition. The literature on kernel approaches, particularly the graph Laplacian, is also covered. Up next, we'll talk about randomization and matrices' functions. Finally, we touch on some new findings on deep learning and high-dimensional problems. Before we dive in, we should warn you that numerical linear algebra is a huge subject and that data analysis using its methods is nothing new. We regret that we were unable to include the authors whose results were omitted from this poll in our efforts to highlight current trends. Eldén and Strang have written lovely books that serve as introductions to linear algebra for data science applications. We would like to highlight these works.

4. THE DENSE MATRIX MULTIPLICATION

Numerous computational issues involve dense matrix multiplication. The reduction of its run-time complexity is hindered by its intrinsic data dependencies and arithmetic complexity. Reducing the execution time of dense matrix multiplication can be achieved in three main ways.

1) Increasing the number of additions and decreasing the number of scalar multiplications, which are both time-consuming. When applied to computers with a single CPU and main memory, these methods performed admirably, and their theoretical arithmetic

complexity was excellent. But they were inefficient to use on hierarchical memory systems because of complicated data access patterns. In addition, for matrices of size $N \times N$, recursive matrix multiplication necessitates additional memory, as demonstrated by Cray's implementation of Strassen's technique, which necessitated $2.34 \ll N^2$ of extra space. (2) The four types of schedules that can be used for parallelizing matrix multiplication are (i) Broadcast-Compute Shift, (ii) All-Shift-Compute, (iii) Broadcast Compute-Roll, and (iv) Compute-Roll-All, also known as Orbital. The second type is defined by features like consistent and localized data transfer, maximum data reuse without replication, the ability to compute all matrix data simultaneously (retina I/O), etc. (3) A mix of the two methods, where the intricacy of the hardware makes the data transportation anomalies more noticeable. It is worth noting that there appears to be a decline in research on recursive (and recursive-parallel) matrix multiplication. The most recent study that we are aware of dates back to 2006. Keep in mind that sparse matrix algebra primarily aimed to conserve memory by implementing sophisticated data access patterns and indexing structures to store information about non-zero members. But now the fundamental building block is a dense block, and regular data access makes up for the zero multiplications.

5. CONCLUSION

The goal of artificial intelligence (AI) is to imitate human-like abilities in machines through a variety of research domains, such as perceptual, cognitive, and decision-making intelligence. Deep learning (DL) and deep neural networks (DNN) are two examples of how the integration of computational intelligence (CI) approaches, such as artificial neural networks (ANN), logic inference, and evolutionary computation (EC), has significantly advanced AI. Access to big data and high-performance computing (HPC) resources is critical to the success of these methods. Furthermore, although there are computing difficulties in large-scale settings, the use of EC algorithms has demonstrated promise in the resolution of challenging optimization problems. AI development heavily relies on computational systems that support matrix operations for tasks like data analysis, unsupervised, semi-supervised, and supervised learning. Numerical linear algebraic techniques, including randomization, interpretable factorizations, kernel methods, and classical factorizations, are essential for gleaning meaningful information from data and facilitating speedy calculations. However, managing memory limitations, data dependencies, and computational complexity in dense matrix multiplication continues to be a challenge, requiring creative solutions to maximize run-time complexity and resource use.

REFERENCES

- [1] D. Silver et al., "A general reinforcement learning algorithm that masters chess, shogi, and go through self-play," *Science*, vol. 362, no. 6419, pp. 1140–1144, 2018.
- [2] D. Silver et al., "Mastering the game of go with deep neural networks and tree search," *Nature*, vol. 529, no. 7587, pp. 484–489, 2016.
- [3] J. C. Bezdek, "(Computational) intelligence: What's in a name?," *IEEE Syst., Man, Cybern. Mag.*, vol. 2, no. 2, pp. 4–14, Apr. 2016.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

- [4] M. H. S. Segler, M. Preuss, and M. P. Waller, "Planning chemical syntheses with deep neural networks and symbolic AI," *Nature*, vol. 555, pp. 604–610, 2018.
- [5] Q. Chen et al., "A survey on an emerging area: Deep learning for smart city data," *IEEE Trans. Emerg. Top. Comput. Intell.*, vol. 3, no. 5, pp. 392–410, Oct. 2019.
- [6] S. M. Nekooei and G. Chen, "Cooperative coevolution design of multilevel fuzzy logic controllers for media access control in wireless body area networks," *IEEE Trans. Emerg. Top. Comput. Intell.*, vol. 4, no. 3, pp. 336–350, Jun. 2020.
- [7] Y. Guo, J. Y. Li, and Z. H. Zhan, "Efficient hyperparameter optimization for convolution neural networks in deep learning: A distributed particle swarm optimization approach," *Cybern. Syst.*, to be published, doi: 10.1080/01969722.2020.1827797.
- [8] Y. LeCun, Y. Bengio, and G. Hinton, "Deep learning," *Nature*, vol. 521, no. 7553, pp. 436–444, 2015.
- [9] Y. Ong and A. Gupta, "AIR5: Five pillars of artificial intelligence research," *IEEE Trans. Emerg. Top. Comput. Intell.*, vol. 3, no. 5, pp. 411–415, Oct. 2019.
- [10] Y. Sun, G. G. Yen, and Y. Zhang, "Evolving unsupervised deep neural networks for learning meaningful representations," *IEEE Trans. Evol. Comput.*, vol. 23, no. 1, pp. 89–103, Feb. 2019.

PERSONALIZED MEDICINE USING AI AND MACHINE LEARNING

Avinash Chandra

Research Scholar Pharma-
ceutical Chemistry

Asian International University Imphal, Manipur

ABSTRACT

Healthcare now has more options thanks to the development of artificial intelligence (AI) and machine learning (ML), especially in the area of personalized treatment. Even with the incredible advances in medical research, problems like drug mistakes, postponed therapy, incorrect diagnoses, and overtreatment still exist and lead to poor patient outcomes and higher death rates. By combining genetic, environmental, and lifestyle factors to customize therapies, precision medicine—which is focused on the unique characteristics of each patient—offers a possible answer to these problems. This study delves into current research on the use of AI/ML in precision medicine, with a particular emphasis on genomics and predictive diagnoses. Research shows how AI/ML algorithms can be used to analyze genomic data and provide individualized treatment plans and earlier treatments for a range of disorders. Precision medicine is about to enter a new era where patient care and treatment outcomes can be transformed by the integration of AI/ML with healthcare data.

Keywords: Precision medicine, Artificial intelligence, Machine learning, Genomics, Personalized treatment.

1. INTRODUCTION

Our search for knowledge has taken us on incredible journeys throughout the years. Antibiotics, which were just developed in the previous century, have saved countless lives by eradicating once-feared diseases. Nevertheless, utilizing search query phrases such as 'medication error' and 'delayed treatment', over 130,000 research address pharmaceutical errors and over 450, 000 incorporate delayed treatment in the context of current published literature (e.g., accessible through PubMed). However, the issue of individuals losing their lives due to medical mistakes has been mostly overlooked and unrecognized. The new medical revolution is about to begin, and it will be just as massive and far-reaching as the last one. There is still a lot of medicine that relies on relieving symptoms and conducting learning trials based on therapies, even though we know better. This approach helps most patients, but it doesn't work for everyone. Knowing the interrelationships of diseases can shed light on their pathophysiology, etiology, and classification. We live longer because of several things, including advances in medicine, surgery, and mental health treatments. Unfortunately, it is currently a time-consuming and error-prone process to provide patients with the right treatment plan at the right time based on their current prescription list and drug allergies. The need for medication reconciliation

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

software has grown in tandem with the number of prescriptions and drug consumption. Additionally, there are a lot of problems with healthcare that people face on a daily basis, such as incorrect diagnoses, unnecessary treatments, low productivity, wasted clinical data, and a lot of money.

Using new information technology at each stage of care can drastically cut down on these errors. Among the top three killers, following cancer and heart failure, medical mistakes rank third (2). Medical mistakes kill between 180,000 and 250,000 Americans annually, according to new research (2). The existing medical system's expanding complexity and declining quality—including communication breakdown, incorrect diagnoses, poorly coordinated care, and rising costs—has contributed to this rising number. Recent years have seen the rise of precision medicine as a promising new paradigm in patient care and an important innovation pillar for pioneering studies aimed at revolutionizing health. An intelligent integration of multi- omics profiles with clinical, imaging, epidemiological, and demographic details could lead to a plethora of earlier interventions for advanced diagnostics and the tailoring of better, more cost-effective personalized treatment; this could revolutionize the conventional, symptom- driven practice of medicine. This calls for a forward-thinking healthcare system that can help researchers and clinicians acquire a fuller picture of the patient; this includes not only medical history but also phenotypic data, lifestyle variables, and social determinants that influence treatment choices. Its primary tenet is the "4Ps" model of patient care, which stands for "Predictive, Preventive, Personalized, and Participatory." This model seeks to improve health outcomes by helping doctors better understand the role that individual differences in clinical data play in making accurate diagnoses and planning effective treatment plans. Although healthcare information utilization in clinical decision-making has been hindered by the intricacies of individual-level disorders, technological developments have alleviated some of the limitations. By integrating disparate data sources and discovering patient-specific patterns of disease progression to provide real-time decision support, electronic health records (EHR) can be a powerful tool for effective personalized and population health, which in turn can improve patient outcomes. Big data management presents significant obstacles, despite the undeniable importance of healthcare data mining.

2. LITERATURE REVIEW

Vadapalli et. al. (2022) studied on the consideration one of the most exciting medical endeavors of our day, precision medicine makes use of a patient's genetic makeup in conjunction with their environmental and lifestyle factors to improve the accuracy of disease diagnosis and treatment. One of the most intricate and data-rich aspects of precision medicine is the utilization of genetics. Using AI and ML techniques deftly, the current big challenge is to successfully integrate genetics into precision medicine that applies across varied populations, diverse diseases, and different ancestries. The purpose of this study was to examine and contrast the various AI/ML approaches employed in genomics and precision medicine with respect to their aims, methods, datasets, data sources, ethics, and gaps. We used

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

PubMed Central to find and index high-quality articles published in the recent five years. Our search was limited to publications that detailed the use of artificial intelligence and machine learning algorithms in statistical and predictive studies of gene variations and expression utilizing whole genome and/or whole exome sequencing, RNA-seq, and microarrays, respectively. We did not restrict our investigation to any one data source or disease in particular. Using the parameters of our review and comparison analysis, we were able to locate 32 distinct AI/ML methods used in variable genomics research, and we present extensively modified AI/ML algorithms for disease prediction.

Sebastiani et. al. (2022) inspected complex sicknesses including psoriatic joint pain (public service announcement), foundational lupus erythematosus (SLE), and rheumatoid joint pain (RA), accuracy medication is viewed as profoundly pertinent. Clinical and serological heterogeneity, alongside the big number of comorbidities that can include these illnesses, as well as the rising information on their pathogenesis and enhancements in early analysis, keep on restricting the chance of individualizing treatment for these patients, in spite of the thrilling number of new atoms produced for their treatment. Regardless of the limited number of treatment decisions, varying simultaneous organ contributions in these issues might require an alternate way to deal with care. With regards to numerous rheumatic infections, treat-to-target treatment is as yet the focal point of contemporary remedial methods.

Khan et. al. (2020) studied the term "personalized medicine" refers to a relatively new approach to healthcare that bases interventions on specific patient traits instead of "one-size-fits-all" protocols. In order to make sense of and build prognostic models from the data contained inside ever-increasingly complex epidemiological datasets, robust methodologies like statistical machine learning and artificial intelligence (AI) are becoming essential. Machine learning's accurate predictions made possible by this type of study pave the way for personalized medicine. Personalizing care for patients with spine disease can also be greatly assisted by other AI tools like computer vision and natural language processing. In this article, we will go over the latest developments in using AI to study spinal cord injuries and degenerative spine diseases. We detail research that used AI to construct reliable prognostic models, mine medical data for useful information using NLP, and assess functional status at a finer level using computer vision. We have changed the game in spine care by showing how these innovations can pave the way for more individualized therapy through a case study.

3. AI & ML IN HEALTH INTELLIGENCE, PRECISION MEDICINE AND RESOURCE MANAGEMENT

To facilitate the examination of dynamic secret elements in clinical information utilizing AI calculations, to get noteworthy hole based data about patients for early location and avoidance of protected messes like malignant growth, and to smooth out information sharing by creating productive correspondence across medical care units and logical labs, keen large information stages are fundamental. This will work on the quality and headway of medical care. Its likely

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

use in medical care has the makings of a game-changing development that could upset customized and populace medication while giving various computational benefits. Late years have seen a plenty of man-made intelligence and ML-based drives focused on sickness understanding, with the objectives of working on prescient conclusion and, likewise, directing therapy factors; for example, making infection affiliations in view of clinical signs, electronic wellbeing records (EHRs), and information created by wearable innovation. Exploring commitments and contrasting various computer-based intelligence and ML guaranteed arrangements, methods, conversations, and continuous models distributed during the most recent 5 years permitted us to get a total rundown of the scholarly arrangements that are as of now accessible. Segment "Hypothetical foundation of computer-based intelligence and ML" and areas "Models in medical care and approaches" zeroed in on the valuable commitments of the man-made intelligence and ML calculations examined. A thorough and custom fitted summation of the strategies given is what we offer. In light of everything, the audit research and the artificial intelligence/ML commitments fall into three principal gatherings: Medical services Asset The executives, Moral Contemplations, and Accuracy Medication.

4. AI ALGORITHMS USED IN PERSONALIZED MEDICINE

Machine learning and artificial intelligence have many applications in healthcare, particularly in the area of personalized medicine. This article discusses a few of these algorithms.

4.1. Naïve Bayesian

The Naïve Bayesian (NB) algorithm, which was devised by Thomas Bayes (1702–1761), facilitates the principled capture of uncertainty in a model by determining the probability of various possibilities. The algorithm is based on a probabilistic model. NB is currently utilized in a variety of systems, including text classification, recommender systems, and spam filtering. Additionally, it finds utility in the fields of medicine and meteorology. Because of this, it is also an effective method for making predictions and classifications. A few benefits of NB include its reduced training data requirement and its robustness against input data noise. Among the many drawbacks of NB, as pointed out by, are the following: inaccuracies caused by the assumption of class conditional independence; and so on. Some drawbacks of Naïve Bayes include the following: if a predictor is missing from the training data, NB will presume that the record containing the new predictor category has 0% chance of being correct.

4.2. Artificial Neural Network

According to, artificial neural networks (ANNs) have a wide range of potential medical applications, such as in the following areas: imaging, back pain, dementia, appendicitis, myocardial infarction, acute pulmonary embolism, arrhythmias, and mental disorders. According to, below are a few of the benefits of ANN: Both linear and non-linear models can be learned by neural networks. It is also possible to use statistics to evaluate the precision of models generated by neural networks. Neural networks can efficiently handle incomplete data

and noise. Neural network models are adaptable to changing conditions, like those in the healthcare industry, because they can be easily modified.

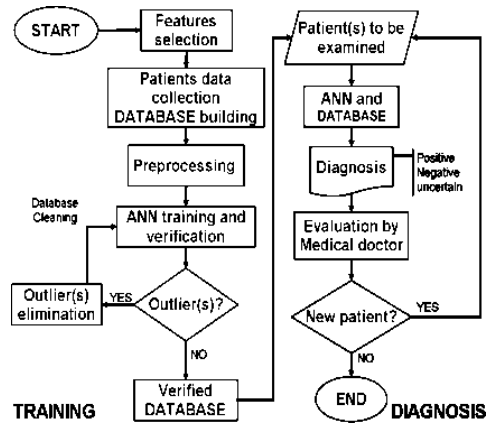


Figure 1: Fundamental steps in ANN-based medical diagnostic

5. CONCLUSION

The integration of AI and ML into healthcare has ushered in a new age of personalized medicine, which has the potential to revolutionize both the way patients are treated and the results they achieve from their treatments. Despite significant advancements in medical understanding, the healthcare system is nevertheless plagued by problems such as medication errors, delayed therapy, inaccurate diagnosis, and overtreatment, leading to poor patient outcomes and higher death rates. The focus on individual patient characteristics, as opposed to generic treatment regimens, in precision medicine has tremendous potential for resolving these challenges. By tailoring treatments to specific patient groups according to lifestyle, environmental, and genetic variables, precision medicine hopes to increase diagnostic accuracy and therapeutic efficacy. For early interventions and personalized treatment plans to be supported by integrating multi-omics data with clinical information, AI and ML are crucial. The importance of artificial intelligence and machine learning in creating precision medicine has been demonstrated by new studies, particularly in genomics. Studies have shown that AI/ML algorithms can be useful for analyzing genomic data to make prediction diagnosis for various diseases. This could lead to more targeted and effective treatments.

REFERENCES

- [1] Abràmoff MD, Garvin MK, Sonka M. *Retinal imaging and image analysis*. *IEEE Rev Bio-med Eng.* 2010;3:169–208.
- [2] Boosman F. "Whatever Machines Haven't Done Yet" [Internet]. *Udu.co.* 2018. [cited 2018 August 25]. Available from: <http://www.udu.co/blog/whatevermachines-havent-done-yet>.
- [3] Copeland B. *Artificial Intelligence: Definition, Examples, and Applications* [Internet]. *Encyclopedia Britannica.* 2018.. Available from: <https://www.britannica.com/technology/artificial-intelligence>

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

- [4] Khan, O., Badhiwala, J. H., Grasso, G., & Fehlings, M. G. (2020). Use of machine learning and artificial intelligence to drive personalized medicine approaches for spine care. *World neurosurgery*, 140, 512-518.
- [5] Kubota T. Algorithm Better at Diagnosing Pneumonia than Radiologists [Internet]. News Center. 2018.
- [6] Linn A. How Microsoft Computer Scientists and Researchers are Working to 'Solve' Cancer [Internet]. News.microsoft.com. 2018. Available from: <https://news.microsoft.com/stories/computingcancer/>. 2018 August 25
- [7] Michael R. Kosorok and Eric B. Laber Annual Review of Statistics and Its Application 2019 6:1, 263- 286.
- [8] Powles J, Hodson H. Google DeepMind and healthcare in an age of algorithms. *Health and Technol.* 2017;7:351–67.
- [9] Sebastiani, M., Vacchi, C., Manfredi, A., & Cassone, G. (2022). Personalized medicine and machine learning: A roadmap for the future. *Journal of Clinical Medicine*, 11(14), 4110.
- [10] Vadapalli, S., Abdelhalim, H., Zeeshan, S., & Ahmed, Z. (2022). Artificial intelligence and machine learning approaches using gene expression and variant data for personalized medicine. *Briefings in bioinformatics*, 23(5), bbac191.

BIOAVAILABILITY AND BIO- EQUIVALENCE STUDY DESIGN - A REVIEW

Ankur Yadav

Research Scholar

Pharmacology

Asian International University Imphal, Manipur

Abstract

One of the fundamental qualities of a medication is its bioavailability, which is the level of a given measurements that enters the foundational flow. The prescription has 100 percent bioavailability when given intravenously, by definition. Bioequivalence concentrates on think about the rate and level of retention of various multisource drug definitions with the trend- setter (reference) item. The thought behind these examinations is that restorative impacts ought to be comparable between two details assuming they show a comparative medication fixation time profile in the blood or plasma. The writing has a plenty of distributions communicating worry that clinical equivalency may not necessarily in all cases be ensured by the necessities now set up for the permitting of nonexclusive drugs. Medical services specialists have an exceptional trouble with regards to the accessibility of a few plans of a similar pharmacological fixing gave at a similar strength and in a similar portion structure. Upon genuinely critical bioavailability testing laying out bio-equivalency, future clumps of a similar item are considered bio-identical in view of in-vitro measurements such medication disintegration.

Keywords: Bioavailability, Bio- Equivalence, Study Design, Review, Pharmacokinetics.

1. INTRODUCTION

Bioavailability is the amount and pace of medicine in the foundational dissemination from a given portion. Bioavailability concentrates on measure medicine levels in plasma or blood after foundational infusion and screen it after some time. The fundamental strategy helps early medication advancement clinical preliminaries and bioequivalence examinations. Bioequivalence tests recognized two restorative prescriptions with a similar dynamic fixing. One medication might be interchangeable in the event that its two plans are restoratively equivalent.

Pharmacokinetics is the study of drug fixation in plasma and additionally metabolites in people and creatures after some time. Bioequivalence studies assess the expected in vivo biological equivalency of two exclusive drug details. Bioequivalent restorative medications ought to be same. A medication item is bioequivalent in the event that its degree and pace of retention are not statically significantly unique in relation to the reference item at a similar molar dose. Two definitions are bioequivalent on the off chance that their bioavailability is indistinguishable at a similar molar measurement. Different equivalency tests exist:

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

1. Comparative bioavailability studies assess dynamic prescription material in an open natural liquid like plasma.
2. Comparative clinical preliminaries
3. Comparative human pharmacokinetic studies

A chemically tantamount test prescription should go through bioavailability and bioequivalence tests to confirm restorative equivalence with a nonexclusive or reference medication. CDSCO is liable for guaranteeing drug item quality, viability, and security. Clinically comparative and interchangeable items with dynamic parts from various licensees should be evaluated for bioequivalence. Plan Y applications for novel meds ought to incorporate bioavailability and bioequivalence information, zeroing in on drug discharge from the drug portion structure and foundational retention.

2. LITERATURE REVIEW

Nagadurga, D. H. (2019) concluded that new drugs undergo in vivo bioavailability studies to determine absorption rate, extent, excretion, metabolism, and elimination half-life following single and successive doses. These crucial pharmacokinetic factors help set dosages. Examines the predicted in vivo biological equivalency of two proprietary medicinal products. So-called bioequivalent medications are believed to be same. Determine bioequivalence between reference, brand, and test or generic medications. In cross-over pharmacokinetic investigations, healthy volunteers receive each medication. Regular plasma samples are tested for parent drug or metabolite levels to compare the two medicines. Key pharmacokinetic characteristics are assessed using plasma concentration data to compare two formulations. Bioequivalence is proven if the ratio of geometric least square means of peak plasma concentration, area under curve of test and reference medications is 80–125% within 90% confidence range.

M. L. Chen, V. Shah (2001) analyzed Bioavailability and bioequivalence studies are essential to medicine advancement for novel and conventional medications. After endorsement, these examinations are urgent for both in the event of creation changes. Bioavailability and bioequivalence might be surveyed involving these three inquiries in numerous administrative examinations. What is the study's principal question? What tests can respond to the inquiry? How much certainty is expected for test results? This article talks about bioavailability and bioequivalence administrative science and FDA's direction for drug supports who need to demonstrate bioavailability or bioequivalence during advancement or endorsement.

J. Thirumaran (2013) concentrated on meds' principal characteristics incorporate bioavailability, the level of a measurement that enters the fundamental flow. Intravenous prescription bioavailability is 100 percent. Bioequivalence concentrates on think about the rate and degree of ingestion of multisource drug details to the pioneer (reference) item. Assuming that two definitions have comparative medication fixation time profiles in the blood/plasma, they ought to make comparative remedial impacts. Various articles recommend that conventional medication endorsement standards may not necessarily guarantee clinical likeness. Medical care experts are tested by the accessibility of various prescription details at a

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

similar strength and portion structure. After measurably huge bioavailability testing, future clusters of a similar item are considered bio-comparable in light of in-vitro drug disintegration.

Henriques (2023) The vast majority of their study and understanding utilize the normal bioequivalence method. Pilot studies are clearly more dependent upon fluctuation attributable to their restricted size. This exploration proposed substitute procedures to the normal bioequivalence system to decrease vagueness about study results and test detailing prospects. Many pilot BA/BE hybrid preliminaries were recreated utilizing populace pharmacokinetic displaying. Normal bioequivalence was utilized to survey each reproduced BA/BE try. The centrality of GMR, bootstrap bioequivalence examination, and number juggling (Amean) and mathematical (Gmean) mean f_2 factor strategies were inspected as elective investigations. A disarray framework evaluated strategy execution. To accurately survey test plan potential with a more modest example size, the Gmean f_2 factor with a cut-off of 35 was the most reasonable recreation approach. To improve on pilot BA/BE preliminary example size and investigation design, a choice tree is recommended.

3. BIOAVAILABILITY

How much a remedially dynamic drug that enters the fundamental flow and is in this manner open at the site of activity is estimated by its bioavailability. The dynamic parts in most of oral prescriptions are delivered in the gastrointestinal (GI) parcel and travel by means of the fundamental course to their site of activity. Subsequently, blood levels of the dynamic parts or potentially their dynamic metabolites give a solid sign of bioavailability and a marker for focus at the site of activity. A blood fixation time bend, got by rehashed estimations over a drawn-out timeframe, represents more than essentially the medicine's dynamic part delivery and ingestion.

Three essential pharmacokinetic qualities are utilized to assess bioavailability: the time it takes to arrive at the greatest focus (T_{max}), the most extreme blood fixation (C_{max}), and the region under the blood drug focus versus time bend (AUC).

4. BIOEQUIVALENCE

At the point when clearly showcased treatments with a similar pharmacological measurement might have changing remedial outcomes, bioequivalence acquired consideration during the past 40 years. Most variations were connected with lower plasma drug retention. There is as of now a great deal of proof that plasma fixation or medication levels influence drug reaction more than portion. In light of basic pharmacokinetic ideas and boundaries, bioavailability and bioequivalence studies are utilized overall to guarantee reliable quality and remedially viable execution of showcased measurements structures as proxies for costly, convoluted, and extended clinical preliminaries. Current bio equivalency tests are confounded, costly, and tedious. This is confounded by the requirement for a few sound workers and removing 10-20 blood tests from an inhabiting catheter after some time. Rehash after a waste of time,

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

supplanting reference and test tests in members. All should be artificially and measurably assessed. Fundamentally, the boundary 'region under the bend' might be comparative.

Bioequivalence items just show the medication available for use. Bioequivalence concentrates on contrast multisource drug detailing retention with the trend-setter (reference) item. Restorative impacts ought to be tantamount in the event that two plans have comparable blood/plasma drug fixation time designs. Bioequivalence studies are expected in these cases.

- The proposed business dose structure might change from urgent clinical preliminaries. Also, impressive changes in plan production might happen.
- Another nonexclusive is contrasted with the trailblazer's item.

Similar proof might require fasting and feast tests. Permit drug plan evaluation under 'focused on conditions' later. Competitive goods that are bioequivalent in fasting and fed conditions are more likely to be therapeutically equivalent. Based on human in-vivo bioavailability, one drug or supplement brand or dose form is bio-equivalent to a reference brand. In-vitro and animal studies cannot prove bio-equivalence. Human medicine bioequivalence requires bioavailability assessments. Drug bio-equivalence in target animals is required.

5. EXAMINING BIOEQUIVALENCY IN A POPULATION DEEMED "NORMAL AND HEALTHY"

Evidence of an innovative medicine's pharmacokinetic characteristics, effectiveness, and safety in both the target patient group and healthy volunteers is needed when one is produced. However, in order to minimise variability unrelated to product variations, bioequivalence investigations are often limited to healthy participants. In light of co-morbidities, concurrent prescriptions, and physiological variables like variations in first pass metabolism, stomach pH, and bacterial flora, it is unclear how the generic medication would function in the target patient population.

From a scientific standpoint, there is no reason to believe that variations in metabolism, which might influence how an active ingredient from a novel medication is absorbed in the body, won't also influence how an active ingredient from a generic medication is absorbed in the body.

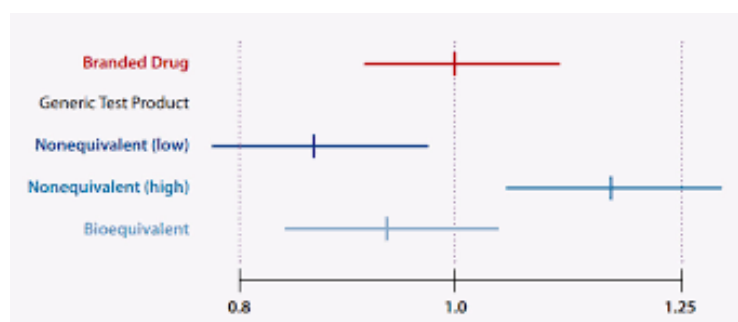


Figure 1: Bioequivalence confidence intervals

6. STUDY DESIGN AND CONDUCT

Study design and lead ought to meet EC rules for fitting clinical work on, including Morals Council reference. In most bioequivalence preliminaries, a 'test' detailing is contrasted and the norm/pioneer 'reference' definition in a gathering of typical, sound subjects (18-55 yr) who get the two medicines on the other hand in a hybrid style (two-period, two-treatment hybrid design), isolated by a 'waste of time' of essentially seven days. Each stage has an equivalent number of patients getting every treatment, which is randomized haphazardly. In this way, for two medicines An and B, one gathering gets Stomach muscle and the other BA. This forestalls grouping or period impacts. Three-period, three-treatment hybrid designs have practically identical distributions. A few prescriptions have high between subject leeway fluctuation. Hybrid designs are liked for bioequivalence studies in light of the fact that the intra-subject coefficient of variety (around 15%) is regularly much lower than the between-subject coefficient (generally 30%).

The hybrid design's primary advantage is that between subject inconstancy doesn't influence mistake fluctuation since medicines are looked at on a similar subject. On the off chance that the prescription or its metabolites have an extremely lengthy half-life, an equal gathering design might be suitable. In equal gathering design, people are arbitrarily allocated to bunches that get one treatment. In this manner, every member seeks one treatment. In an equal design, there are no grouping, period, extend, or dropout impacts, however the between subject fluctuation is high, lessening the test's responsiveness and requiring a bigger number of subjects than in a hybrid design. Both hybrid and resemble designs incorporate three centre measurable ideas: randomization, replication, and mistake control.\

7. CONCLUSION

To sum up, investigations on bioavailability and bioequivalence are essential to the assessment and authorization of pharmaceuticals. It is critical to evaluate medication absorption, systemic circulation, and therapeutic equivalency in order to guarantee the uniform effectiveness and quality of various pharmacological formulations. Standards for safety and effectiveness are crucially maintained by regulatory organisations like the Central Drug Standard Control Organisation (CDSCO). It is accepted that contemporary bioequivalence studies are costly and difficult, which has pushed researchers to look into other approaches for increased effectiveness. When testing in target patient groups with varying health profiles, possible variances in performance must be considered due to the focus on testing in a healthy population. The goal of study designs, which often include crossover approaches and excellent clinical practices, is to limit variability and provide solid scientific findings. All things considered, the meticulous planning and execution of these investigations helps ensure that trustworthy, medicinally beneficial pharmaceutical items are available for purchase.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

REFERENCES

1. Aruna, T., Yadav, C. V. B., Nagabhushanam, M., Bonthagarala, B., Reddy, D. N., & Ramakrishna, G. (2018). *Guidelines for bioavailability and bioequivalence studies: A review*. *Pharma Innov. J*, 7, 661-666.
2. Chen, M. L., Shah, V., Patnaik, R., Adams, W., Hussain, A., Conner, D., ... & Williams, R. (2001). *Bioavailability and bioequivalence: an FDA regulatory overview*. *Pharmaceutical research*, 18, 1645-1650.
3. Haidar, S. H., Kwon, H., Lionberger, R., & Yu, L. (2008). *Bioavailability and bioequivalence. Biopharmaceutics applications in drug development*, 262-289.
4. Henriques, S. C., Albuquerque, J., Paixão, P., Almeida, L., & Silva, N. E. (2023). *Alternative Analysis Approaches for the Assessment of Pilot Bioavailability/Bioequivalence Studies*. *Pharmaceutics*, 15(5), 1430.
5. Howland, R. H. (2010). *Evaluating the bioavailability and bioequivalence of generic medications*. *Journal of psychosocial nursing and mental health services*, 48(1), 13-16.
6. Kalantzi, L., Goumas, K., Kalioras, V., Abrahamsson, B., Dressman, J. B., & Reppas, C. (2006). *Characterization of the human upper gastrointestinal contents under conditions simulating bioavailability/bioequivalence studies*. *Pharmaceutical research*, 23, 165-176.
7. Mastan, S., Latha, T. B., & Ajay, S. (2011). *The basic regulatory considerations and prospects for conducting bioavailability/bioequivalence (BA/BE) studies—an overview*. *Comparative Effectiveness Research*, 1-25.
8. Nagadurga, D. H. (2019). *Bioavailability and bioequivalence studies. In Pharmaceutical Formulation Design-Recent Practices*. London, UK: IntechOpen.
9. Patel, J. (2006). *Bioavailability and Bioequivalence Study of Oral Drugs (Doctoral dissertation, Rajiv Gandhi University of Health Sciences (India))*.
10. Venkateswarlu, K., & Thirumaran, J. (2013). *Review on Bioavailability and Bioequivalence Studies*. *International Journal of Pharmaceutical Sciences Review and Research*, ISSN, 56-64.

RESEARCH AND DEVELOPMENT PLANS IN NEW EAR OF MODERNIZATION AND DIGITALIZATION

NEHA KAUSHIK
Ph.D

Asian International University Imphal, Manipur

Abstract

Based on an evaluation of the growth of digital government and the identification of significant obstacles, the study aims to determine the prerogatives for digital modernization in the new age of the public administration system. The study indicates that Delhi's digital government has advanced to a great degree. However, despite government agencies' recent focus on automation, the conversion of public services to electronic format has not yielded sufficient outcomes. The primary obstacles and rights to digital modernization of the public administration system are also faced in this era of Modernization. According to the study's conclusion, actively modernizing the public administration system digitally necessitates broadening the scope of techniques used to assess how government projects and programs are being implemented, including conducting an audit of the projects' efficacy and efficiency. The research emphasizes how crucial it is to strike a balance between ecological concerns, fair access to resources and services, and technology integration.

Keywords: *Development Plans, New Ear, Modernization, Digitalization, public administration system.*

1. INTRODUCTION

Most of our everyday activities rely on emerging digital and computer technology as the globe digitises. Modern technologies are used in socio-economic, environmental, sustainable, and climatic research to boost system productivity and efficiency.

Digitalization is the incorporation of technology into daily life. Digitization enables such integration. Digitization involves transforming physical data (sensors, textual material, etc.) and knowledge into a computer-readable format. Digitising centuries-old artworks, pictures, and videos has yielded useful results thanks to information technology. Digitalization advantages led to IoT-integrated equipment and sensors. IoT is a resilient network of physical items linked via the internet by embedded sensors, software, and other technologies that exchange and gather data. Big data is managed using real-time analysis, machine learning, and AI. The untapped potential of these huge data sets creates unique opportunity to accelerate the transition to more efficient and sustainable smart integrated cities.

Digitalization introduces new tools that must be balanced for sensible use and sustainability. Making well-informed choices to utilise resources and services more effectively impacts

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

sustainability and equitable access, but various problems must be addressed to attain these objectives. Electronic device development and manufacture deplete resources and generate e-waste (unwanted, non-working electronics towards or at the end of their "useful life") that is seldom recycled. Lifecycle consideration and e-waste recycling technology development are crucial. The need for greater infrastructure may exacerbate the gap between developed and developing areas. Infrastructure and fair internet access are needed to reduce inequities and poverty and give digital education to users. Finally, big-data sources' openness raises data security risks. Data security raises concerns about digital service safety and network integrity. These problems must be recognised but should not prevent digitalization from being used to sustainable challenges.

1.1. Modernization and Its Important

The dynamic process of modernization involves using new techniques, systems, and technologies to improve production, efficiency, and overall growth. Modernization, which includes improvements in infrastructure, social changes, economic reforms, political upheavals, and technology developments, is essential to promoting social progress, economic prosperity, and technological innovation. Societies and organisations may improve connection, compete worldwide, and adapt to the digital era by adopting modern strategies and modernising their infrastructure. Furthermore, via responsible and transparent government, modernization promotes political stability and, eventually, institutional confidence. In general, its significance is found in advancing advancement in the political, social, technical, and economic domains and guaranteeing relevance and adaptability in a world that is changing quickly.

1.2. Objectives of the study

- To carry out an investigation in order to determine Delhi's NISG VALUES between 2015 and 2022.
- To examine the New Era of Digitalization and Modernization

2. LITERATURE REVIEW

Jones, P., & Wynn, M. (2021) This research aimed to provide an exploratory evaluation of the approaches taken by the top players in the digital transformation space to sustainable development. As a result, the assessment of contemporary business thinking in that market is what gives the piece its uniqueness and worth. Using an inductive, qualitative methodology based on a review of public corporate reports, the research identifies six main sustainability topics that are actively supported and promoted. The article concludes that support and promotion of the circular economy may offer the best opportunity for digital technologies to meaningfully impact sustainable development, and that the current sustainability objectives of the technology companies are motivated as much by commercial reality as any altruistic motives.

Bastow, S., & Tinkler, J. (2006) Disaggregation, competition, and incentivization characterised the "new public management" (NPM) wave of public sector organisational restructuring. Many "leading-edge" countries have halted or reversed this trend, while others are still adapting to NPM. This decline is primarily due to NPM's substantially increased institutional and policy complexity's cumulative detrimental indirect effects on social problem-solving. The post-NPM regime's character is evolving. Digitization, needs-based holism, and reintegration are key to the current and future wave of change, and we suggest that IT-driven reforms are necessary. These improvements are part of "digital-era governance" (DEG), which promotes the reintegration of functions into government, the adoption of comprehensive and needs-oriented structures, and the digitalization of administrative processes. DEG offers a rare opportunity to modify many interconnected technological, organisational, cultural, and social aspects. There are numerous ways DEG may be embraced as a coherent phenomena and exploited successfully.

Peng, Y., & Jin, J. (2019) ICT is at the centre of the digital economy, which studied by him. This economy influences all facets of society in some way. The rise of educational technology to the information technology stage has resulted in the modernization of "Internet+ education" against the backdrop of the digital economy, ushering in a new era of contemporary online education. Combining technology with education to maximise learning is known as modernization teaching. It completely integrates the qualities of the Internet and the digital economy as a new teaching method that blends knowledge and instruction. Due to this feature, modernising college and university curricula from the standpoint of the digital economy presents both potential and unique obstacles.

A. A. Stokov (2020) The research looked at how education is becoming digital. The study's importance lies in education's distinctive role in post-industrial society. Human potential and preparation for social and ecological concerns are primarily influenced by educational system performance. Modern technologies, which modernise and enhance education, improve future specialised training, and bring education closer to science, are becoming more important in enhancing national education. These technologies also need a study of present teaching techniques and their consequences on society and particular social groupings. This situation warrants research on education digitalization and societal effects. This study tries to identify the main difficulties and predict the future of digital education.

3. RESEASRCH METHODOLOGY

3.1. Research Design

The mixed-methodologies study will use qualitative and quantitative methods. Qualitative approaches will examine key stakeholders' perspectives, attitudes, and experiences, while quantitative methods will analyze numerical data and trends.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

3.2. Data Collection

Create and distribute surveys to government officials, staff, and residents to collect quantitative data on digital government services and digital modernization's efficacy. Examine government papers, policies, and other documents to evaluate Delhi's digital modernization efforts. Interviews: To understand digital modernization's difficulties and prospects, interview government officials, IT specialists, and civil society members in semi-structured format. Focus Groups: Focus groups with people may reveal their digital public service expectations, concerns, and opinions.

3.3. Sampling

Stratified sampling ensures representation from varied government levels, agencies, and citizen populations. Choose participants based on their public administration digitization positions, responsibilities, and experiences.

4. DATA ANALYSIS

Since 2001, when India made its first effort to document the condition of e-government, it has swiftly changed over the last some years. The 2020 report emphasises how e-government growth is still on the rise globally. Several states received "very high" ratings in 2020, with National Institute for Smart Government (NISG) scores ranging from 0.75 to 1. In contrast, there were only ten of these states in 2015 and fifteen in 2020, Delhi included.

Table 1: The National Institute for Smart Government (NISG) conducted a research on Delhi from 2015 to 2022.

| | 2015 | 2020 |
|----------------|------|------|
| Very High NISG | 15% | 21% |
| High NISG | 34% | 37% |
| Middle NISG | 35% | 34% |
| Low NISG | 16% | 8% |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

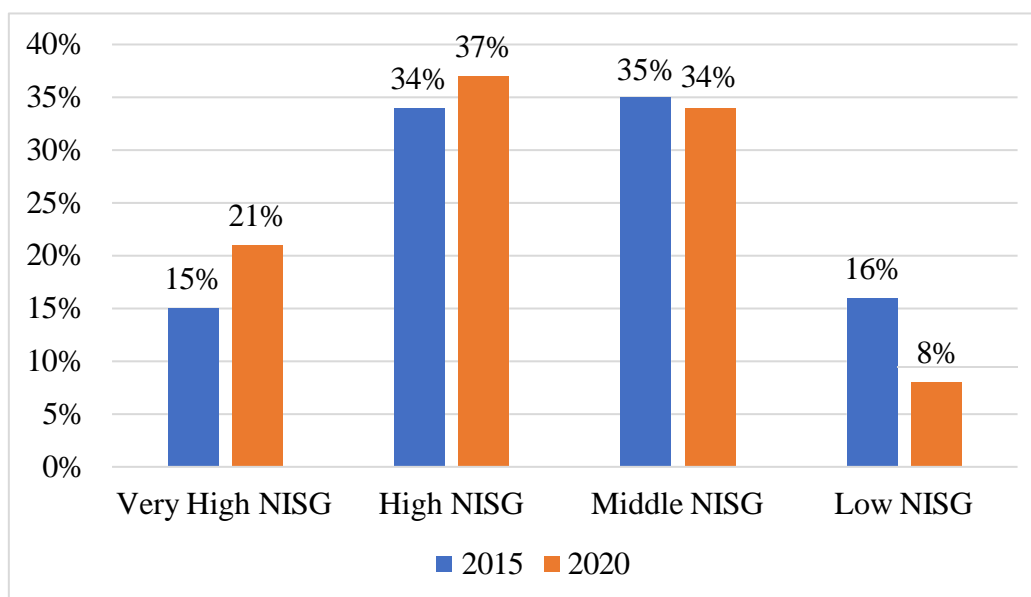


Figure 1:The National Institute for Smart Government (NISG) conducted a research on Delhi from 2015 to 2022.

According to the latest India "E-Government Survey 2020" report, Delhi ranks with a value of 0.7597 (Figure 2). The first three places in the ranking were taken since 2015 To 2017

Table 2:Dynamics of the Republic of Delhi's shifting standing in the e-government development ranking, 2015–2020

| | NISG values |
|------|-------------|
| 2015 | 0.4740 |
| 2016 | 0.5575 |
| 2017 | 0.6842 |
| 2018 | 0.7280 |
| 2019 | 0.722 |
| 2020 | 0.7595 |

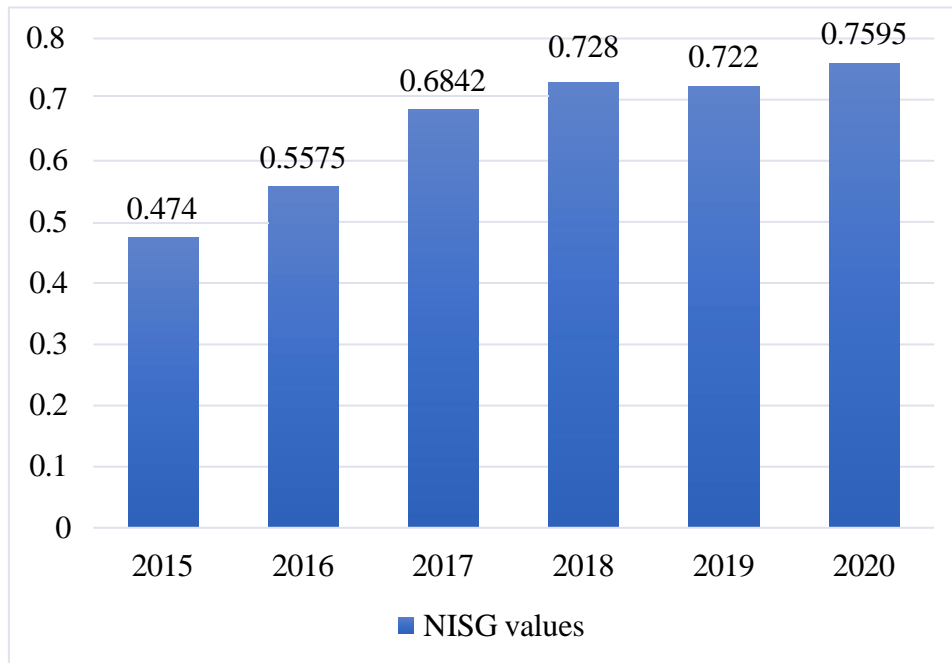


Figure 2:Dynamics of the Republic of Delhi's shifting standing in the e-government development ranking, 2015–2020

5. CONCLUSION

Digitalizing public administration is Delhi policy. Transforming the planet and meeting 2030 sustainable development objectives requires changing public self-governance. This entails modifying the State's role in public activities and meeting people's needs with civil society and the private sector. Digital governance and ICTs may include everyone in sustainability. The 2030 Agenda states "the diffusion of information and communication technologies, as well as global collaboration, have great potential to accelerate progress, remove digital barriers, and develop knowledge societies through, for example, scientific and technological innovation development in various fields" to do so. Digitization goes beyond tech. A complete strategy with rapid, dependable, accessible, and customised services is needed. Public sector modernization is lacking in many nations. Strategic thinking, legislation, and regulation must change if traditional regulation fails. Governments provide services, laws, and policies. This approach will enhance education and meet objectives. Authority, business, and civil society demands may be met with customised services. The study revealed that digital transformation involves state re-orientation, cross-sector collaboration, and new technologies. Strategic reforms, including complete digital project and initiative assessments, must be prioritised by policymakers to optimise societal benefits and implementation. Governments can empower people and promote global sustainability goals via inclusive and equitable development by combining technology with sustainability principles.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

REFERENCES

1. Aulia, D., Firman, F., & Harun, M. M. (2024). *Modernization of Education in The Era of Society 5.0*. *Jurnal Pendidikan Tambusai*, 8(1), 6701-6713.
2. Avedillo, J. G., Begonha, D., & Peyracchia, A. (2015). *Two ways to modernize IT systems for the digital era*. McKinsey & Company.
3. Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). *New public management is dead—long live digital-era governance*. *Journal of public administration research and theory*, 16(3), 467-494.
4. Jones, P., & Wynn, M. (2021). *The leading digital technology companies and their approach to sustainable development*. *Sustainability*, 13(12), 6612.
5. Kontić, L., & Vidicki, Đ. (2018). *Strategy for digital organization: Testing a measurement tool for digital transformation*. *Strategic Management*, 23(1), 29-35.
6. Peng, Y., & Jin, J. (2019, October). *Opportunities and Challenges Faced by College Modernization Teaching from the Perspective of Digital Economy*. In *2019 3rd International Conference on Economic Development and Education Management (ICEDEM 2019)* (pp. 141-144). Atlantis Press.
7. Rizki, D. F. (2023). *Strategic Marketing in the Era of Modernization*. Mutiara: *MultidisciplinaryScientifict Journal*, 1(9), 584-587.
8. Sokolova, N. G., Troyanskaya, A. I., & Glavatskikh, O. B. (2020, May). *Reflexive Modernization in the Era of Digital Economy*. In *2nd International Scientific and Practical Conference “Modern Management Trends and the Digital Economy: from Regional Development to Global Economic Growth” (MTDE 2020)* (pp. 638-642). Atlantis Press.
9. Stokov, A. A. (2020). *Digitalization of education: problems and prospects*. *Vestnik of Minin University*, 8(2), 15.
10. Yiannas, F. (2018). *A new era of food transparency powered by blockchain*. *Innovations: Technology, Governance, Globalization*, 12(1-2), 46-56.

IMPACT OF ONLINE SCHOOLS IN INDIA

Sikha Ram Re-
search Scholar
Education

Asian International University Imphal, Manipur

Abstract

Students want greater independence and intellectual freedom as they go up the academic ladder. They may undertake highly customized learning programs—possibly even college-level courses—with the aid of online learning. In-depth evaluations, practical activities, and real-world inquiry may all be very helpful in advancing their learning. Before deciding on a specialization, they might experiment with basic subjects from several disciplines to better understand their alternatives. Before entering college, these students may benefit from using online learning systems to develop their independence as learners. The purpose of this research was to comprehend how Indian professors and students are taught online. He also tried to comprehend the user's perspective and the particular difficulties this method of learning presents. The first research to examine the advantages and disadvantages of the new standard for at-home online learning is this one, which was put together from a sample of Indian educators and students. This research examines the benefits and drawbacks of online learning in relation to traditional classroom settings. This clarifies how to enhance your abilities to increase their effectiveness. Furthermore, this study offers a solid foundation for modifying or establishing frameworks, legislation, and policies related to education so that everyone has equitable access to resources.

Keywords: Impact, Online education, School, e-learning.

1. INTRODUCTION

E-learning is a method of teaching and learning that makes use of information and communication technology to facilitate teamwork and communication within educational materials. The degree and influence of e-learning fluctuate depending on where we are in life. This essay focuses on the state of e-learning in India now and what lies ahead. Here, we also contrast India's e-learning development rate with that of other industrialised nations. In India, e-learning has great promise, but adoption of it is happening extremely slowly.

E-learning consists of two main components or stages. E-learning is utilised for training at one level and for educational purposes at another. Only secondary and upper secondary education may make use of this instructional resource. It is utilised to teach staff members and improve their skill sets throughout the second phase. In comparison to the global industry, where e-learning is used at all levels, the Indian market is increasing at a relatively slow pace. The

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

simplest and quickest method of educating people in India is e-learning, if it can be implemented in rural regions. It is difficult to fit everyone in a particular institution or educational setting to get an education when we consider the population of India.

India is a large nation with a diverse population, educational system, tradition, language, and culture. We offer a range of schools, from those that use the Gurukul method to those with top-notch facilities. While some schools engage in in-house programmes for kids' physical and general development, other pupils continue to struggle to get basic school supplies like books and stationery. Due to international partnerships, a number of universities and institutions send their students abroad for orientation or study. Due to several factors such as social background, poverty, disparities in living standards, and the absence of teacher training programmes, there are significant disparities in the quality of education provided. The Indian education system is one of the biggest in the world and is well-established in the international education sector. In India, there are 10,30,996 schools total; of them, 1,77,812 are in rural areas and 8,53,184 are in urban areas. There were 907 universities in India as of March 31, 2019, of which 399 were state universities, 126 were recognised as universities, 48 were central institutions, and 334 were private universities. Despite the sheer quantity of schools, colleges, and universities, the educational system is continually growing and developing. Nonetheless, the Indian educational system has a great deal of untapped potential. Based on a five-year compound annual growth rate of around 20%, the online education industry is expected to reach a valuation of USD 18 billion by 2022.

Online education, or "online schooling," is an electronic, paperless educational system that makes use of technology and information. It combines technology with instructional services. It is using electronic technology to study academic content outside of the conventional classroom. We are aware that technology has almost taken over every aspect of our lives and is a game-changer.

1.1. Objectives of the study

- To raise the quality of instruction and learning via online learning.
- To see the websites that students believe are popular for online learning

2. LITERATURE REVIEW

Cojocariu et al., (2014) studied Technology and rapid advances in research have made distant learning simple. The majority of words, such as computer-mediated learning, blended learning, online learning, open learning, web-based learning, and m-learning, all refer to the capacity to utilise a computer linked to a network, which provides the opportunity to study from any location at any time, in any rhythm, and with any means.

Brazendale& Associates (2017) concluded that Due to improper learning attitudes, a lack of appropriate learning resources, increased student involvement in the classroom, a lack of self-discipline, and inadequate learning environments at some of their homes during self-isolation, both teachers and students are facing difficulties.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Chen and Sun (2016) did a study that analysed 47 published publications and research addressing online teaching and learning since 2008 using a qualitative content analysis technique. The main emphasis of their research is on the application of ideas, practices, and evaluations in the context of online learning. Well-designed course materials, stimulating interactions between teachers and students, well-prepared and fully supported teachers, the development of an online learning community, and the quick improvement of technology were some important requirements for successful online education.

Aguilera-Hermida (2020) investigated that the COVID-19 pandemic forced educators and learners to accept the digital nature of the online teaching-learning process. Bao was maybe one of the first researchers during the pandemic to explain how colleges have been switching from traditional classroom instruction to virtual instruction because to the exponential rise of COVID-19 cases. A variety of online channels, such as social media, videoconferencing software, and online educational platforms, have been used by the lecturers to offer course material. Teachers may exchange notes and multimedia materials with students on online learning systems like Blackboard and Google Classroom, enabling them to continue their normal studies. Through educational portals, students may turn in tasks, and instructors can monitor their progress.

Chatterjee and Chakraborty (2020) said that the use of videoconferencing platforms like Microsoft Teams, Zoom, and Google Meet has become more prevalent in the delivery of online courses and discussion forums. Actually, these platforms usually contain a number of helpful features and allow slideshows. Course materials have been made available on many universities' and higher education institutions' official websites.

Navarro and Shoemaker (2000) Regardless of the students' backgrounds, found that the learning results of students taking online courses were on par with or even better than those of those studying in conventional classrooms. The online learning experience left the student learners quite happy.

3. RESEARCH METHODOLOGY

3.1. Research Design

Students from various Indian schools will be randomly allocated to either an online education group or a conventional education group in this randomised controlled experiment (RCT).

3.2. Sampling strategy

To guarantee geographic variety, schools from various areas of India will be picked by a stratified random selection technique. Students from various grades and academic levels will be chosen at random from each school to take part in the research.

3.3. Sample size

We polled around 100 participants to get their opinions on how the online learning environment has affected them.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

3.4. Research Area:

In New Delhi, India, the study was carried out mostly in the vicinity of the local schools.

4. DATA ANALYSIS AND INTERPRETATION

We might infer from the diagram below that the bulk of our target audience is between the ages of 14 and 17. The information below indicates that the number of each gender—male and female—in the data are 56 and 44 respectively. The majority of respondents, as shown above, preferred offline learning over online learning.

Table 1: Demographic profile

| Categories | Sub-categories | Respondents | Percentage |
|-----------------------------------|----------------|-------------|-------------|
| Age Group | 10-13 | 22 | 22 % |
| | 14-17 | 55 | 55 % |
| | 17-20 | 18 | 18 % |
| | Above 20 | 5 | 5 % |
| Gender | Male | 56 | 56 % |
| | Female | 44 | 44 % |
| The mode of education they prefer | Online | 25 | 25 % |
| | Offline | 75 | 75 % |
| | Total | 100 | 100% |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

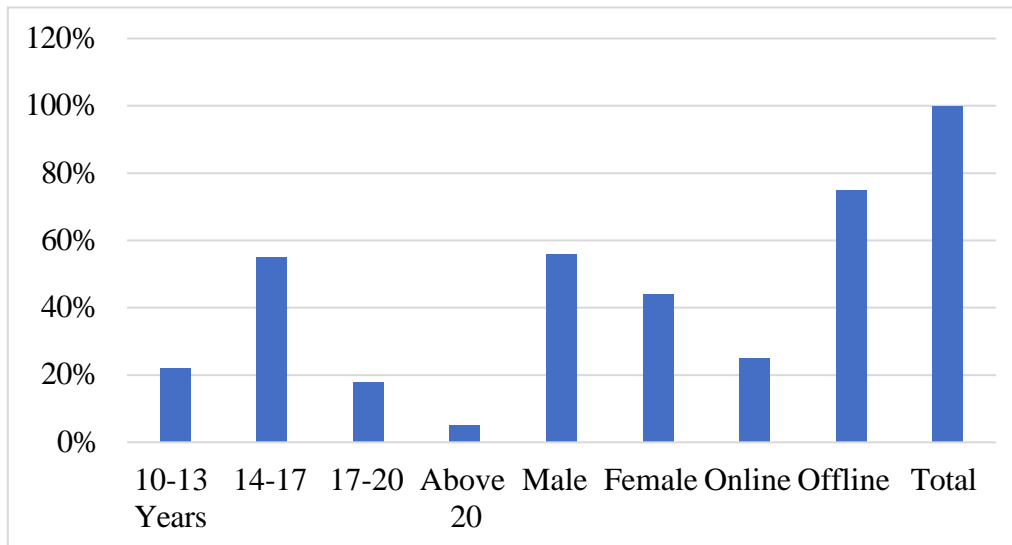


Figure 1:Demographic profile

According to the figure 2, the most used platform for online classes is YouTube then it is Zoom, some of them also used Google and others.

Table 2: Online platforms preferred by students for learning

| Online platforms | Respondents | Percentage |
|------------------|-------------|------------|
| Zoom | 20 | 20 % |
| Skype | 8 | 8 % |
| Google | 17 | 17 % |
| Microsoft teams | 3 | 3 % |
| Coursera | 10 | 10 % |
| YouTube | 40 | 40 % |
| Others | 2 | 2 % |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

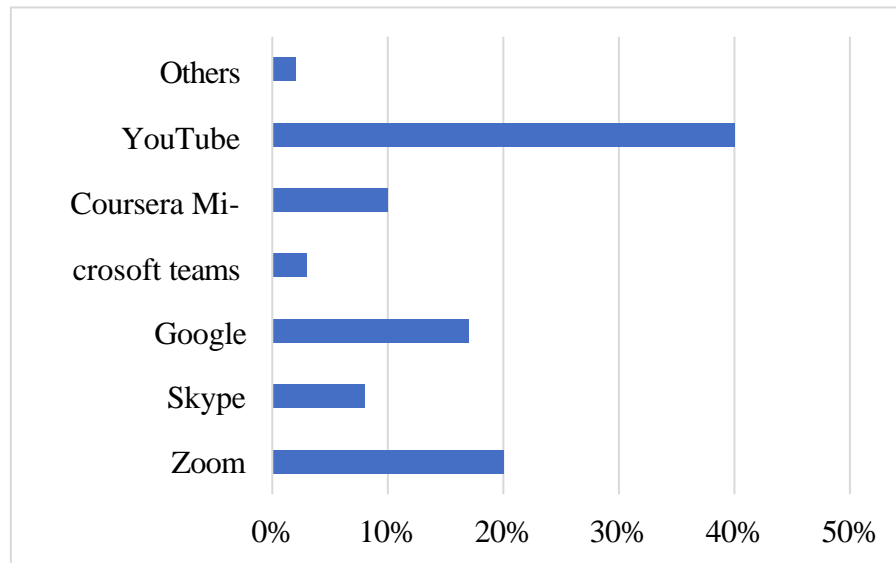


Figure 2: Online platforms preferred by students for learning

5. CONCLUSION

After the United States and China, India has the third-largest higher education system in the world in terms of enrollment. Since independence, the number of universities, university-level institutions, and colleges in India has increased dramatically, contributing to the country's higher education industry. The announcement that the government and universities would be offering lessons online came through swiftly. There's no denying that the way we educate will change more swiftly. Even yet, the most effective ways of teaching and learning have evolved as a result of technology. Teachers need to be creative in order to instruct their pupils successfully. Online learning led to a rise in students' academic performance. It is more advantageous than more conventional teaching approaches in various ways. A lot of students are lured to the flexible atmosphere, even if they have to pay for internet access. The aim of the research is to raise the quality of instruction and learning via online learning. Also, the study explores the websites that students believe are popular for online learning.

REFERENCES

1. Aguilera-Hermida, A. P. (2020). *College students' use and acceptance of emergency online learning due to COVID-19. International Journal of Educational Research Open, 1, 100011.*
2. Brazendale, K., Beets, M. W., Weaver, R. G., Pate, R. R., Turner-McGrievy, G. M., Kaczynski, A. T., Chandler, J. L., Bohnert, A., & von Hippel, P. T. (2017). *Understanding differences between summer vs. school obesogenic behaviors of children: The structured days hypothesis. International Journal of Behavioral Nutrition and Physical Activity, 14(1), 100.*

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

3. Chatterjee, I., & Chakraborty, P. (2020). *Use of information communication technology by Medical Educators AMID COVID-19 pandemic and beyond. Journal of Educational Technology Systems,*
4. Cojocariu, V.-M., Lazar, I., Nedeff, V., & Lazar, G. (2014). *SWOT analysis of e- learning educational services from the perspective of their beneficiaries. Procedia - Social and Behavioral Sciences, 116,*
5. Hu, S., & Gao, L. (2021). *Exploring the effectiveness of online teaching in higher education: A meta-analysis of empirical studies. Educational Research Review, 33,* 100355.
6. Kim, K. J., & Bonk, C. J. (2020). *The future of online teaching and learning in higher education: The survey says... Educational Technology, 60(6), 341- 345.*
7. Navarro, P., & Shoemaker, J. (2000). *Performance and perceptions of distance learners in cyberspace. American Journal of Distance Education, 14(2), 15–35.*
8. Nayak, J. K. (2020). *Online teaching-learning in Indian higher education during lockdown period of COVID-19 pandemic. Higher Education for the Future*
9. Singh, R., & Srivastava, P. (2021). *Exploring the challenges and benefits of online teaching during the COVID-19 pandemic in India. Journal of Education and Practice*
10. Sun, A., & Chen, X. (2016). *Online education and its effective practice: A research review. Journal of Information Technology Education: Research, 15, 157–190.*

THE USE OF TECHNOLOGY TO FACILITATE COLLABORATION AND INFORMATION SHARING IN HYBRID TEAMS

Abhijit Mukherjee

Research Scholar

Chemistry

Asian International University Imphal, Manipur

Abstract

An analysis is conducted on the factors that impact the adoption of technology in hybrid teams. These factors include organisational culture, team dynamics, leadership support, training, and security concerns. Case studies from the real world provide insightful information about how technology solutions are implemented in a variety of organisational settings. In a division of a modern assembling organization (N = 170), we completed a two-wave overview to research the interpersonal organization impacts of hybrid work. Our discoveries show that when direction searchers and counsels had various perspectives on how simple technology was to utilize, the previous was less disposed to stay with the last option. Counsel searchers' expanded remote work hours had a more critical effect. The examination offers observational bits of knowledge into how representatives' impression of hierarchical correspondence technology, when harmonious, influence their capacity to support guidance networks while working in hybrid conditions.

Keywords: Technology, Facilitate Collaboration, Information Sharing, Hybrid Teams.

1. INTRODUCTION

The advent of hybrid teams, which are formed of members who are both physically present at the workplace and members who are located remotely, has become a prevalent trend that is redefining organizational structures in the modern landscape of work. Due to the paradigm shift that has taken place, it is necessary to conduct a comprehensive analysis of the tools and techniques that are utilized to encourage cooperation and information sharing within such dynamic teams. One of the most important aspects of this investigation is the essential role that technology plays in overcoming communication hurdles, spanning geographical boundaries, and improving the overall efficiency of hybrid teams. To preserve productivity, encourage creativity, and keep a cohesive work atmosphere, it is essential to have a solid grasp of the symbiotic relationship that exists between technology and collaboration. Since an ever-increasing number of organizations are taking on adaptable work game plans, this understanding is turning out to be progressively significant. The motivation behind this study is to explore the horde of features that are associated with the usage of technology to improve

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

collaboration and information sharing in hybrid teams. The review tends to both the hypothetical establishments and the down to earth implications that are related with this evolving scene. The reason for this exploration is to make a critical commitment to the proceeding with conversation concerning the streamlining of hybrid team elements in the computerized period through a top to bottom assessment.

1.1. Facilitating Collaboration Meaning

The art of facilitating collaboration is organizing and directing individuals or groups to work together towards common goals. Fundamentally, facilitation is establishing a setting that encourages creativity, open communication, and teamwork. Competent facilitators are essential in organizing interactions, promoting inclusive decision-making, and handling conflicts in a constructive manner. They use communication strategies that work to encourage active listening and make all team members feel important. They also use technology to facilitate information sharing and improve collaboration. Finally, by promoting a culture of empowerment, creativity, and continuous improvement, facilitators help to create dynamic, high-performing teams where individuals co

2. LITERATURE REVIEW

Cheng, X. (2016) explained trust, which facilitates information sharing, is crucial to teamwork. In this work, we examine trust-building elements in hybrid teams that collaborate digitally and in person. We also provide a team trust development tool. They conducted instrument experiments with Chinese and Dutch student teams to explain exploratory outcomes. These data were analysed quantitatively and qualitatively. Finally, we analyse the trials to describe initial trust development in groups from both individual and group viewpoints in two cultural contexts.

T. Afflerbach (2020) found companies increasingly use virtual teams. Recently, hybrid virtual teams have grown, especially in Shared Services Organisations. Companies must overcome the obstacle to foster such teamwork. Virtual teams struggle to cooperate. Thus, Shared Services teams demonstrate the contextual issues most virtual teams face today: geographic isolation, subgroup creation, imposed communication technology use, and transient team makeup, all of which complicate interaction. It is unknown how the cooperation problem develops and how team members deal with distance, technology, and temporality in their daily job. Management control, the usual answer to the collaboration problem, is infamously problematic in this scenario due to virtual monitoring challenges. Thus, decentralised and constructive solutions, such as identification, trust, and peer monitoring, may be key to solving collaboration issues.

Cousins (2007) explored four problematic edges in hybrid teams: distance closeness, social consistency social variety, levelheadedness emotionality, and control-strengthening. Teams utilized three mental cycles to reference these incomprehensible edges: (a) incorporating to make collaborations between restricting pressures, (b) separating to explain differentiations and equilibrium compromises over the long run, and (c) polarizing to eliminate strains by

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

utilizing one component to decrease the impacts of another. Polarizing processes-kept up with logical inconsistencies as dualisms, while coordinating and separating processes-kept up with logical inconsistencies as reliant dualities. Our discoveries show how chiefs impact mental cycles that strangely accentuate distance and closeness, social consistency and variety, realism and emotionality, and control and strengthening, progressing vital inconsistency the executives.

PM Ralph (2022) presumed that telecommuting, remote-first teams, scattered teams, and hybrid (part-remote/part-office) teams are visualized as the Coronavirus pandemic influences programming experts and organizations. Explore programming teams' and associations' remote and hybrid work hardships. This drawn out, member perception, constructivist grounded hypothesis concentrates on investigations what telecommuting means for programming advancement. This study created programming team coordination hypothesis. From office to home impacted programming team coordination. However, bunch attachment and correspondence improve, doubt, nurturing, and bricolage prevent participation. Unfortunate coordination prompts mistaken assumptions, help demands, low team fulfilment, and hazy obligations. The issues reduce project achievement and push specialists to progress from Scrum to Kanban. Our discoveries recommend that far off programming organizations can help execution by empowering teamwork and supporting family and childcare.

3. RESEARCH METHODOLOGY

3.1. Participants

A global industrial manufacturing company's India HR department performed a two-wave study. 200 employees completed the surveys, with 92.5% in the first and 90.0% in the second. Response rates above 80% allowed independent networks for each wave. The ultimate sample was 170, with 25 leaving and 5 entering between surveys.

3.2. Procedure

Two waves of employee interaction surveys were conducted before and after COVID-19. First wave examined employees' social relationships and communication technology use perceptions. In the second wave, employees rated convenience of use and turnover intention.

3.3. Measures

The study examined advice-seeking ties by asking employees which colleagues they asked for help last week. A complete roster of colleagues with autocomplete was given to participants to avoid bias. A tie with j at time t was indicated by 1 in the network matrix, while no tie was shown by 0. Dependent variable: advice-seeking networks.

4. DATA ANALYSIS

The examinations' variable means, standard deviations, and relationships are displayed in Table 1.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Table 1: Mean, Standard Deviation, and Variable Connections

| S.No. | Variable | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-------|---|----------|-----------|-------|--------|-------|--------|------|-------|------|-------|
| 1. | Gender (Female) | 0.85 | 0.32 | | | | | | | | |
| 2. | Organizational tenure | 7.86 | 6.50 | −0.01 | | | | | | | |
| 3. | Organizational rank | 0.07 | 0.27 | −0.05 | 0.26** | | | | | | |
| 4. | Turnover intention | 1.73 | 1.10 | 0.03 | −0.10 | −0.10 | | | | | |
| 5. | Emotional exhaustion | 3.15 | 1.33 | −0.02 | −0.06 | 0.16 | −0.07 | | | | |
| 6. | Degree of remoteness | 2.16 | 0.60 | −0.03 | −0.04 | −0.04 | 0.02 | 0.04 | | | |
| 7. | Technology use | 5.11 | 1.16 | 0.01 | 0.06 | 0.12 | −0.04 | 0.16 | −0.01 | | |
| 8. | Perceived ease of use | 5.72 | 0.80 | −0.04 | −0.16 | 0.10 | −0.05 | 0.09 | 0.05 | 0.08 | |
| 9. | Outgoing advice-seeking ties to non-respondents | 0.50 | 1.32 | −0.06 | 0.07 | 0.03 | 0.20** | 0.04 | −0.01 | 0.03 | −0.07 |

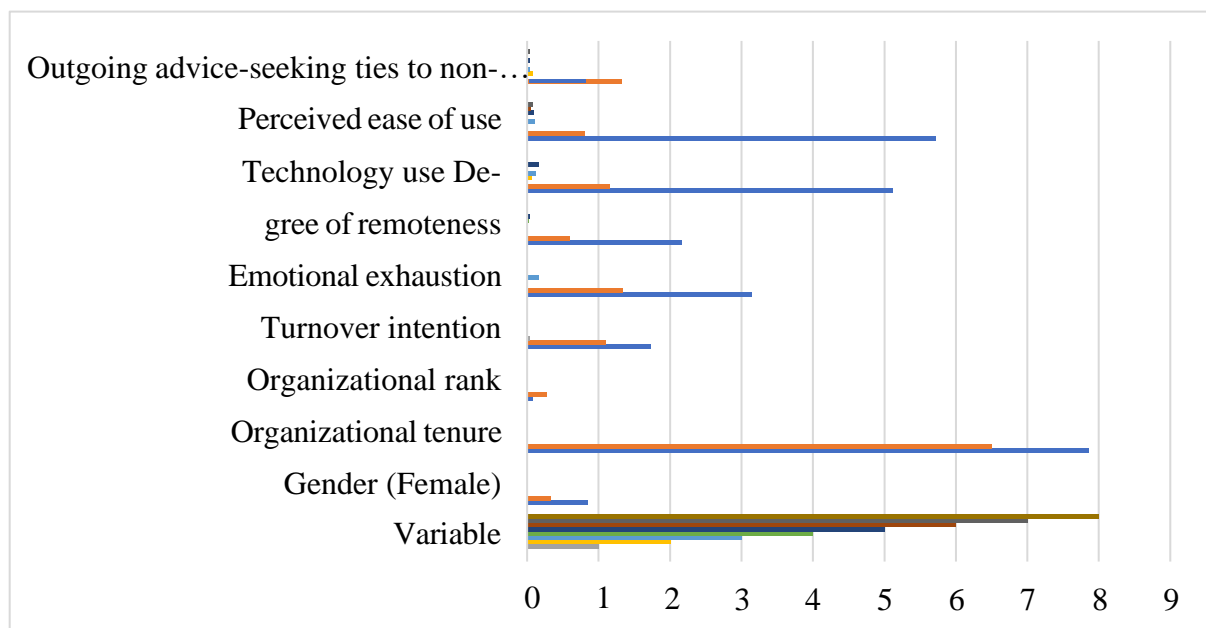


Figure 1: Mean, Standard Deviation, and Variable Connections

The two-wave counsel looking for organizations' clear measurements and their disparities are shown in Table 2. The discoveries show that there were 1,926 guidance looking for ties in T1 and 1,254 in T2. Somewhere in the range of T1 and T2, 493 exhortation looking for joins were

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

shaped, while 510 ties were cut off. When contrasted with an absolutely in-person working environment, representatives were less disposed to look for counsel from each other in the hybrid working environment, as confirmed by the general shrinkage of the guidance looking for network from T1 to T2.

Table 2: Counsel looking for connections shaped, maintained, and finished when the hybrid working environment change.

| | |
|-----------------|-------|
| Tie count in T1 | 1,926 |
| Tie count in T2 | 1,254 |
| Created | 493 |
| Dissolved | 510 |
| Maintained | 620 |
| Jaccard index | 0.36 |

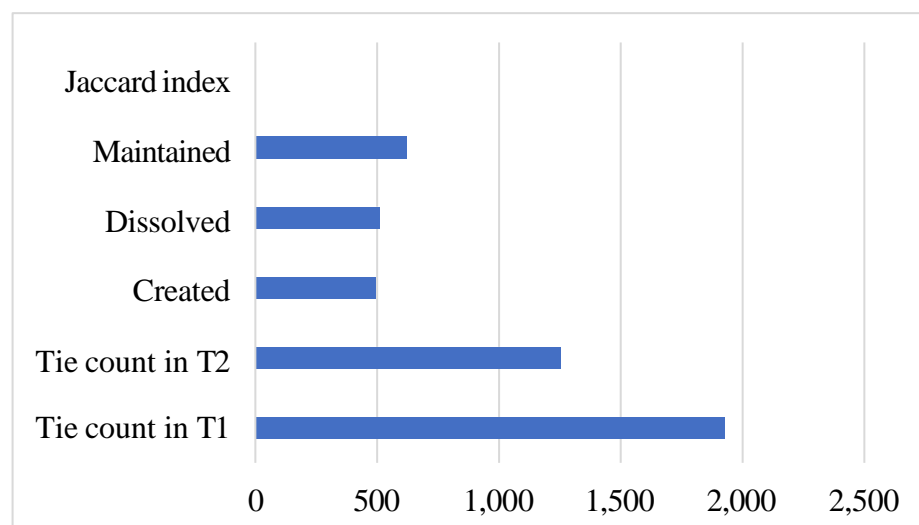


Figure 2: Advice-seeking relationships formed, sustained, and ended before and after the hybrid workplace change.

5. CONCLUSION

Early in the project, when they must create a team, when they define expectations and make plans, and during the delivery phase, when they may decide whether or not to collaborate with their team members on future projects, are the main times when participants seem to build trust. Remote work was abruptly adopted as a result of the COVID-19 outbreak. Lessons from this shift have led to an expansion of remote and hybrid work beyond the traditional office work norms that have been in place for decades in several industries. Employees with a variety of

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

work arrangements coexisting in an increasingly heterogeneous work environment is predicted to result from the trend towards greater flexibility in work locations. Our investigation of an organization that was moving from a fully in-person work model to a hybrid one yielded valuable insights on how the change affected information exchange as seen by the advice-seeking behavior of employees.

REFERENCES

1. Afflerbach, T. (2020). *Hybrid virtual teams in shared services organizations. Progress in IS.*
2. Cheng, X., Yin, G., Azadegan, A., & Kolfschoten, G. (2016). *Trust evolvement in hybrid team collaboration: A longitudinal case study. Group Decision and Negotiation, 25,* 267-288.
3. Choi, S. Y., Lee, H., & Yoo, Y. (2010). *The impact of information technology and trans-active memory systems on knowledge sharing, application, and team performance: A field study. MIS quarterly, 855-870.*
4. Cousins, K. C., Robey, D., & Ziguers, I. (2007). *Managing strategic contradictions in hybrid teams. European Journal of Information Systems, 16(4), 460-478.*
5. de Souza Santos, R. E., & Ralph, P. (2022, May). *A grounded theory of coordination in remote-first and hybrid software teams. In Proceedings of the 44th International Conference on Software Engineering (pp. 25-35).*
6. Denny, N., Mani, S., Nadella, R. S., Swaminathan, M., & Samdal, J. (2008). *Hybrid off-shoring: Composite personae and evolving collaboration technologies. Information Resources Management Journal (IRMJ), 21(1), 89-104.*
7. Hu, X. E., Hinds, R., Valentine, M., & Bernstein, M. S. (2022). *A "Distance Matters" Paradox: Facilitating Intra-Team Collaboration Can Harm Inter-Team Collaboration. Proceedings of the ACM on Human-Computer Interaction, 6(CSCW1), 1-36.*
8. Mirbabaie, M., Stieglitz, S., & Frick, N. R. (2021). *Hybrid intelligence in hospitals: towards a research agenda for collaboration. Electronic Markets, 31, 365-387.*
9. Neumayr, T., Jetter, H. C., Augstein, M., Friedl, J., & Luger, T. (2018). *Domino: A descriptive framework for hybrid collaboration and coupling styles in partially distributed teams. Proceedings of the ACM on Human-Computer Interaction, 2(CSCW), 1-24.*
10. Nissen, H. A., Evald, M. R., & Clarke, A. H. (2014). *Knowledge sharing in heterogeneous teams through collaboration and cooperation: Exemplified through Public–Private-Innovation partnerships. Industrial Marketing Management, 43(3), 473-482.*

ORGANIC COMPOUND THEORY AND ITS DRUG BENEFITS

Debopriya Sarkar

Research Scholar

Chemistry

Asian International University Imphal, Manipur

Abstract

One of the essential powers behind the drug revelation process in the drug business is as yet the capability that organic science plays. The points of interest of that job are, nonetheless, obviously changing as scientists manage the inexorably quick circle back of testing information that influences their day to day choices. This is valid in drug digestion and compound toxicology as well as in a few other significant regions where new engineered strategies and advances are opening up to manufactured and therapeutic scientific experts. In numerous pharma, biotech, and scholarly foundations, FBDD is a deep-rooted strategy for delivering novel compound leads and drugs. As well as noting two frequently asked concerns, this work underlines the rising requirement for organic science exploration to empower FBDD: "What are the compound qualities of a decent section?" and "Is FBDD restricted by organic blend?"

Keywords: Organic Compound, Drug, Organic Chemistry, FBDD.

1. INTRODUCTION

Most clever substance elements (NCEs) around the world are little atom drugs and helpful possibilities. A portion of these synthetics are accessible thanks to therapeutic and cycle physicists' skill and genius. Drugs like atorvastatin (1), ledipasvir (2), imatinib (3), AZT (4), and linezolid (5) have saved and drawn out endless lives, helping society, families, and companions. Stereochemistry, utilitarian gatherings, and system fluctuate by sub-atomic objective, influencing underlying intricacy. One ought to never mistake atomic multifaceted design for restorative worth. AZT was the principal HIV medication, and imatinib was the main kinase inhibitor for ongoing myeloid leukaemia. Each showed that minuscule compounds might mend extreme afflictions and drove dynamic areas.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Subsequent to combining every atom in the lab (presumably milligrams), protected, effective, and versatile techniques were created to deliver kilograms of dynamic drug fixing (Programming interface) that was integrated into measurement structures for patients. Critically, the venture group blended a compound to test a speculation right off the bat in the drug disclosure process. A restorative scientific expert needed to utilize organic science preparing and experience to imagine a compound, utilize suitable responses to give the ideal objective, and combine an adequate number of subsidiaries to upgrade drug-like competitor properties. Afterward, process scientists see as a protected, viable, and financially savvy method for disseminating gigantic measures of Programming interface for clinical turn of events and drug creation. These extraordinary meds could not have possibly been found without manufactured organic science and its trailblazers.

Because of their importance as study particles, organically dynamic compounds will keep on prodding substance response revelations. The fervour of Taxol, prostaglandins, leukotrienes, and topsy-turvy aldol combination during the 1970s and 1980s is all around recalled. A few educators, graduate understudies, and postdoctoral scientists who settled these difficulties found new drugs and synthetics. As of late, organic physicists have formulated proficient strategies to initiate C-H securities and fluorinate organic compounds, making complex restorative particles simpler to get to. Novel organocatalytic blend strategies permit us to acquire naturally dynamic enantiomers explicitly. The mainstreaming of these revelations shows their worth. Researchers required financing to do investigate. Likewise, with any speculation, the return was deferred yet huge. Government and industry need persistence and worth acknowledgment to focus on such a drawn-out objective.

1.1. The Significance of Organic Substances

- Because carbon is a component of all living things, organic molecules are significant.
- Although the building blocks of life, carbohydrates, proteins, and lipids, are organic substances
- They are the fundamental elements of several cycles that propel the planet. As an illustration, consider the carbon cycle, which involves the exchange of carbon between plants and animals during photosynthesis and cellular respiration.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- Organometallic compounds are created when organic chemicals interact with metals. These substances have significant industrial value. They serve as stabilizers, analysts, promoters, and catalysts.

2. DRUG DISCOVERY, MEDICINAL AND ORGANIC CHEMISTRY

Drug advancement and improvement envelop therapeutic and substance science notwithstanding drug disclosure. This covers the formation of conveyance strategies and details notwithstanding pharmacokinetic and pharmacodynamic property improvement. The improvement of novel drug conveyance frameworks, including liposomes and nanoparticles, which can build a drug's dissolvability and bioavailability, intensely depends on organic science. To expand a drug's viability and wellbeing, restorative scientific experts likewise endeavor to improve its pharmacokinetic includes, or its ingestion, dissemination, digestion, and discharge (ADME) qualities.

2.1. Drug Benefits in Organic Compound

- **Biological Activity:** Many chemical compounds display particular biological activities that can be utilized for therapeutic purposes, such as antibacterial, antiviral, anti-cancer, or anti-inflammatory properties. These activities can be harnessed for therapeutic applications.
- **Specificity:** Organic compounds can frequently be tailor-made to interact with certain biological targets, thereby reducing the likelihood of off-target effects and increasing the effectiveness of therapeutic interventions.
- **Bioavailability:** It is possible to construct organic compounds in such a way as to improve their absorption, distribution, metabolism, and excretion inside the body. This would result in an increase in the bioavailability of the compounds and an increase in their therapeutic effectiveness.
- **Diversification:** The immense chemical diversity of organic molecules makes it possible to generate a wide variety of medications that can be used to treat a variety of diseases and ailments.

- **Synthetic Accessibility:** It is possible to synthesize a huge number of organic compounds in an efficient and cost-effective manner, which makes it possible to produce large amounts of different medications for general usage.

3. CHEMISTRY CHALLENGES FOR FBDD

The "rule-of-three," which was first proposed 12 years ago, was one of the earliest methods to characterize a fragment's chemical properties. Other significant studies on fragment library design are also available. characteristics that are helpful to us. Before beginning synthesis, many of these can be easily computed or predicted. We always compute MW and lipophilicity (clogP) before selecting which fragments to add to our collection.

As an example, it presents a documented synthesis of a racemic dihydroisoquinolone⁸ that satisfies numerous requirements for a profitable fragment hit, such as cLogP=0.32 and MW=177 g mol⁻¹. From commercially available reagents, racemic dihydroisoquinolones can be obtained in two steps by RhIII-catalyzed C-H bond functionalization. Chromatography is used to separate the Regio isomers.

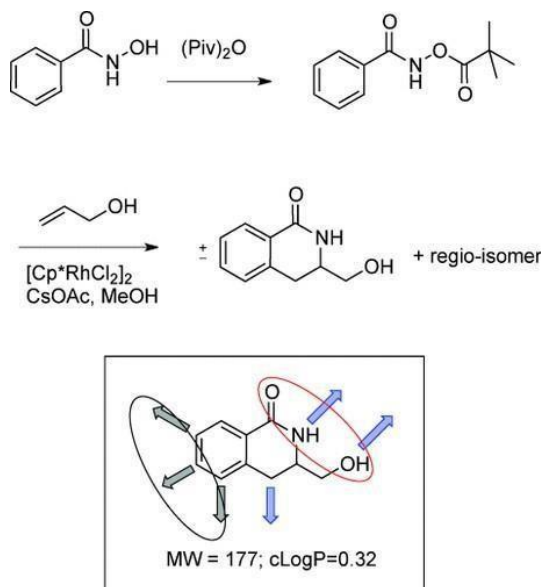


Figure 1: The bottom structure has fragmented MW and cLogP. Polar protein binding functionality: red circle; synthetically preceded fragment optimisation vectors without affecting the predicted binding pharmacophore: grey circle; implicit growth vectors: blue arrows.

4. ORGANIC CHEMISTRY FOR DRUG WORLD

Since organic compounds make up the majority of biological molecules in living systems, organic chemistry is extremely important. As a result, organic chemistry plays a critical role in the search for novel medication candidates that can be used to treat a wide range of illnesses. The goal of the organic chemistry course at the Faculty of Pharmacy was to prepare students for the medicinal aspects of diseases on a molecular level based on chemical structures by introducing them to the basics of "Drug World." In the pharmaceutical business, organic chemistry is extremely important for the discovery of new compounds and for its endurance as a major factor in the advancement of medication development. But the specifics of that work are clearly changing, not just because synthetic and medicinal chemists have access to new technologies and synthetic methods, but also because of advancements in a number of important fields, including biochemistry, pharmacology, metabolism, toxicology, and bioinformatics. As a result, with the ever-faster delivery of molecular assay data, pharmaceutical and medicinal chemists create a number of related arrangements that are intended to have an impact on their assignments regarding the creation of novel molecules for particular biological activities.

As we already know, organic chemistry is the study of how things, particularly atomic and molecular systems, are arranged, structured, behave, and react. Chemistry permeates every aspect of our existence, and life itself is the contemplation of an unbroken chain of biochemical reactions. Organic chemistry is widely present in everything from cell structure to complete organisms, and most materials used in human anatomy and physiology are organic. Organic molecules are present in vast quantities in all living things. Nucleotides are a specific type of organic molecule that are the starting point of life's evolution. Together, nucleotides make up the building blocks of life. Chemistry controls our identities, genetics, and the continuance of generations.

Pharmaceuticals, which can be either organic or inorganic chemical molecules, are used to treat a variety of ailments. However, the majority of medications are derived from organic structural characteristics. One well-known example is aspirin. It may be widely used as an analgesic in addition to its many other uses in many disorders related to the cardiovascular system. Chemically speaking, aspirin is an organic molecule known as acetylsalicylic acid, which has a simple structure and is inexpensive. Willow tree bark contains salicin, which is the precursor

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

to aspirin. However, the Kolbe process makes it simple to synthesis aspirin from phenol. In the upcoming course periods, as we work through the course's numerous text notes, we will encounter a number of advanced examples of "Drug World" together with their chemical and physical properties.

5. CONCLUSION

In conclusion, organic chemistry continues to be an essential component in the process of drug discovery and development. It has made a substantial contribution to the general advancement of medical research as well as the improvement of healthcare all over the world. Through its development, Fragment-Based Drug Discovery (FBDD) has brought to light the significance of having a comprehensive grasp of the chemical properties of compounds as well as the synthesis techniques that are necessary to manufacture them. In addition, the responsibilities of organic chemistry extend beyond the realm of drug development and embrace a variety of other domains, including biochemistry, pharmacology, and toxicology, which exemplifies the versatility and everlasting significance of organic chemistry. Organic chemistry will surely continue to be a driving force behind innovation and serve as a facilitator for the production of novel pharmaceuticals that can address a wide variety of medical requirements as we continue to unlock new technologies and approaches.

REFERENCES

1. AbAbraham, M. H., Ibrahim, A., Zhao, Y., &Acree Jr, W. E. (2006). A data base for partition of volatile organic compounds and drugs from blood/plasma/serum to brain, and an LFER analysis of the data. *Journal of pharmaceutical sciences*, 95(10), 2091-2100.
2. Abraham, M. H., Ibrahim, A., &Acree Jr, W. E. (2007). Air to liver partition coefficients for volatile organic compounds and blood to liver partition coefficients for volatile organic compounds and drugs. *European journal of medicinal chemistry*, 42(6), 743-751.
3. Baxendale, I. R. (2013). The integration of flow reactors into synthetic organic chemistry. *Journal of Chemical Technology & Biotechnology*, 88(4), 519-552.
4. Chuprina, A., Lukin, O., Demoiseaux, R., Buzko, A., &Shivanyuk, A. (2010). Drug-and lead-likeness, target class, and molecular diversity analysis of 7.9 million commercially available organic compounds provided by 29 suppliers. *Journal of chemical information and modeling*, 50(4), 470-479.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

5. Ghasemi, J., & Saaidpour, S. (2007). QSPR prediction of aqueous solubility of drug-like organic compounds. *Chemical and pharmaceutical bulletin*, 55(4), 669-674.
6. Lebon, F., Boggetto, N., Ledecq, M., Durant, F., Benatallah, Z., Sicsic, S., ... & Reboud-Ravaux, M. (2002). Metal-organic compounds: a new approach for drug discovery: N1-(4-methyl-2-pyridyl)-2, 3, 6-trimethoxybenzamide copper (II) complex as an inhibitor of human immunodeficiency virus 1 protease. *Biochemical pharmacology*, 63(10), 1863-1873.
7. Prakash, G., Paul, N., Oliver, G. A., Werz, D. B., & Maiti, D. (2022). C–H deuteration of organic compounds and potential drug candidates. *Chemical Society Reviews*, 51(8), 3123-3163.
8. Rytting, E., Lentz, K. A., Chen, X. Q., Qian, F., & Venkatesh, S. (2005). Aqueous and cosolvent solubility data for drug-like organic compounds. *The AAPS Journal*, 7, E78- E105.
9. Silverman, R. B., & Holladay, M. W. (2014). *The organic chemistry of drug design and drug action*. Academic press.
10. Vayá, I., Lhiaubet-Vallet, V., Jiménez, M. C., & Miranda, M. A. (2014). Photoactive assemblies of organic compounds and biomolecules: drug–protein supramolecular systems. *Chemical Society Reviews*, 43(12), 4102-4122.

IMPACT OF JHANSI IN INDIAN FREEDOM STORY

SNIGDHAJYOTI ROUTRAY

Research Scholar

HISTORY

Asian International University Imphal, Manipur

Abstract

This research paper examines Jhansi's significant influence on the story of India's freedom movement. Jhansi, which is in the state of Uttar Pradesh, became a crucial hub during the Indian Rebellion of 1857, which is also referred to as the First War of Independence. Under the brave leadership of Rani Lakshmibai, the queen, Jhansi emerged as a symbol of defiance against British colonial control. The study explores the historical background of Jhansi and examines its significance as a representation of bravery, defiance, and the unwavering spirit of freedom. The study analyses academic publications and historical narratives through a thorough literature review, clarifying the various ways that Jhansi affected Indian society both before and after the independence movement. It looks at how Jhansi sparked nationalist feelings, organized the populace, and left a resilient and enduring legacy. The study emphasizes how Jhansi influenced post-independence India's political discourse, cultural representations, and memorial customs. In the end, the essay highlights Jhansi's eternal relevance in the Indian liberation narrative, acting as a wellspring of inspiration and memory for future generations.

Keywords: Jhansi, Indian Rebellion 1875, Rani Lakshmi Bai, Uttar Pradesh, Historical Significance

1. INTRODUCTION

Jhansi, located in Uttar Pradesh, is a significant symbol of Indian history, representing courage, resistance, and the spirit of freedom. The city became a hub during the Indian Rebellion of 1857, also known as the First War of Independence. Rani Lakshmibai, the queen of the princely state of Jhansi, led the rebellion against British colonial rule. When the British annexed Jhansi, she refused to accept the decree and rallied her forces for freedom. The siege and subsequent battles became emblematic of the larger rebellion across India. Jhansi's bravery and sacrifice inspired generations to resist colonial oppression and fight for their rights. The city's legacy continues in independent India, with monuments, memorials, and cultural commemorations dedicated to her. Jhansi is a symbol of courage, resilience, and unwavering commitment to freedom, inspiring future generations to uphold the values of liberty, equality, and justice.

1.1 Background of Rani Lakshmi Bai

Rani Lakshmibai, born in 1828, was the queen of Maratha princely state of Jhansi in Uttar Pradesh, India. She was educated in various aspects of life and married Gangadhar Rao Newalkar in 1852. In 1857, the Indian Rebellion began in Meerut, and Lakshmibai increased her protection. In June 1857, the 12th Bengal Native Infantry seized the Star Fort of Jhansi, but the British officers massacred them. Lakshmibai refused to surrender and proclaimed her fight for independence. In 1858, British forces bombarded Jhansi, and defenders appealed to her childhood friend Taty Tope. Lakshmibai and her son escaped on horse Badal and joined Indian forces defending the city. British forces charged the Indian forces, killing 5,000 soldiers.

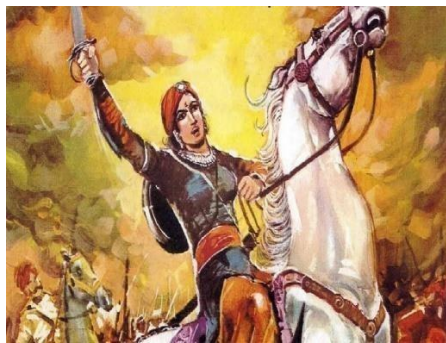


Figure 1: Rani Lakshmi Bai

1.2 History of Jhansi

Jhansi, a historical town in North India, is often associated with Queen Rani Lakshmi Bai, known for her bravery and valour. She played a significant role in restoring the Kingdom of Jhansi during the First War of Indian Independence, with her famous clarion cry "Main Apni Jhansi Nahin Doongi".

Origin of Jhansi - During ancient times, Bundelkhand occupied North Central India, with Jhansi, also known as Balwant Nagar, being a natural defense against enemies. The Chandelas ruled Jhansi until the 11th century, then under Raja Bir Singh Deo and Maharaja Chattarsal Bundela. Peshwa Baji Rao helped defeat the Mughal army, granting him governance of the 1/3 kingdom of Bundelkhand, including Jhansi. In 1817, the Marathas gained powers over Pune.

Jhansi Post Maratha Rule between 1817 to 1856 - Jhansi, a kingdom in Uttar Pradesh, was ruled by inefficient rulers, leading to British interference. The Doctrine of Lapse, passed by Lord Dalhousie, annexed rulers without legal heirs. Raja Gangadhar Rao adopted Damodar Rao, and the British forced Rani Lakshmi Bai and her son to retire for Rs 60,000 per annum.

Jhansi during 1858-1947 - Jhansi, a province of Gwalior state, was brought under British rule in 1858 and ceded to the princely state of Gwalior in 1861. It was later a province in Gwalior state and again under British rule in 1886. Jhansi played a significant role in India's freedom

struggle under Dewan Shatrugan Singh and Rani Kaushalya Devi, known as "Bundelkhand Gandhi."

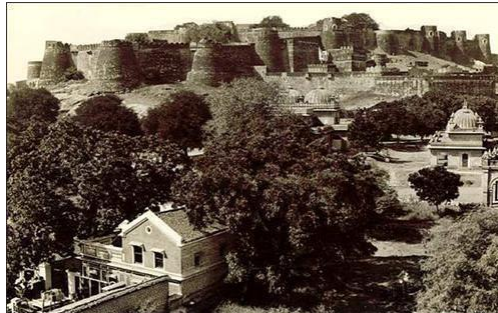


Figure 2: History of Jhansi

2. LITERATURE REVIEW

Srivastava (2021) examined the role of media in shaping public opinion and mobilizing support for the Indian freedom struggle. He emphasized the importance of media outlets in disseminating nationalist ideologies, organizing protests, and fostering collective identity. The literature review also discussed how British authorities attempted to control or suppress media messages challenging colonial rule through censorship and punitive measures. Overall, the review provided valuable insights into the intersection of media, propaganda, and resistance in India's independence struggle.

Ganie and Sisodia (2020) explored the significant role of women in India's independence struggle, highlighting their diverse participation in protests, organizing movements, and providing support. They also discussed the challenges faced by these women, such as societal norms, gender discrimination, and British repression. Their research contributed to a more comprehensive understanding of the complexities and dynamics of the movement, highlighting the often-marginalized narratives of women in India's freedom struggle.

Bhattacharya and Sachdev (2021) explored the role of women in India's freedom struggle, analyzing scholarly works and historical analyses. They explored women's contributions to political activism, grassroots mobilization, and cultural resistance. The review also discussed challenges faced by women, such as societal norms, gender discrimination, and colonial oppression. By highlighting women's pivotal role, the authors provided a nuanced understanding of the complexities and dynamics of the independence movement.

Basumatary and Rani (2022) evaluated the role of Indian women in India's freedom struggle, analyzing historical accounts and scholarly sources. They highlighted women's diverse participation in protests, boycotts, and resistance movements, as well as their roles as educators, organizers, and caregivers. The review also highlighted the lasting impact of women's contributions on Indian society and the importance of recognizing their role in shaping the nation's history. Overall, the study provided valuable insights into the multifaceted role of Indian women in the freedom struggle.

3. IMPACT OF JHANSI IN INDIAN SOCIETY

The impact of Jhansi on Indian society is profound and multifaceted, stemming primarily from its pivotal role during the Indian Rebellion of 1857, also known as the First War of Independence. Jhansi's resistance against British colonial rule inspired a sense of nationalism and unity among Indians across various regions and communities. The bravery and leadership of Rani Lakshmibai, the queen of Jhansi, became emblematic of the spirit of defiance against oppression and injustice. One significant impact of Jhansi on Indian society is its role in galvanizing the masses to challenge British authority. The events in Jhansi during the rebellion showcased the determination of ordinary Indians to resist colonial rule, sparking similar uprisings in other parts of the country. Jhansi thus became a symbol of resistance and patriotism, instilling a sense of pride and solidarity among Indians in their struggle for freedom.

Furthermore, the legacy of Jhansi and Rani Lakshmibai continues to inspire generations of Indians. Their story is celebrated in literature, folklore, and popular culture, reinforcing their status as national heroes. The courage and sacrifice displayed by the people of Jhansi during the rebellion serve as a reminder of the importance of standing up against tyranny and injustice, resonating with contemporary struggles for social justice and equality. Moreover, Jhansi's significance extends beyond its historical role in the freedom struggle. The city has become a pilgrimage site for nationalists and history enthusiasts, attracting visitors who seek to pay homage to its heroic past. Monuments, museums, and commemorations dedicated to Rani Lakshmibai and the rebellion serve as tangible reminders of Jhansi's enduring impact on Indian society. In essence, the impact of Jhansi on Indian society lies in its ability to evoke a sense of national pride, unity, and resilience. The city's defiance against colonial rule and the valour of its people continue to inspire Indians to uphold the ideals of freedom, justice, and sovereignty. Jhansi remains an indelible part of India's collective memory and identity, symbolizing the enduring spirit of independence and resistance against oppression.

4. LEGACY OF JHANSI IN INDEPENDENT INDIA

Jhansi, a city in post-independence India, has a significant political impact beyond its historical role in the freedom struggle. It serves as a symbol for political movements and parties, often invoked during campaigns to mobilize public support. The city's historical legacy also shapes regional politics in Uttar Pradesh, where political parties align themselves with the city's symbolism to appeal to voters. The city's historical significance also influences the allocation of resources and development projects, as governments strive to preserve and promote its heritage for political and economic gain. Jhansi's political significance is also evident in the commemoration of key historical events and figures, such as the Indian Rebellion of 1857 and Rani Lakshmi Bai's martyrdom. These commemorations serve as occasions for political leaders to reaffirm their commitment to freedom, democracy, and national unity.

Jhansi's political significance also fosters civic engagement and activism among its residents. The city's historical legacy inspires pride and responsibility among its citizens, motivating them to participate in political processes, advocate for their rights, and hold elected representatives

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

accountable. Civil society organizations and grassroots movements in Jhansi often draw upon the city's historical legacy to mobilize support for social justice, environmental conservation, and community development initiatives.

5. CONCLUSION

In conclusion, the narrative of Jhansi and Rani Lakshmibai has a profound impact on Indian society. It serves as a potent reminder of the importance of bravery, resiliency, and an unyielding dedication to independence. Throughout the course of India's history, Jhansi has been an essential component in the formation of the nation's collective identity, serving as a source of motivation for successive generations to resist oppression and fight for their rights. Jhansi has had a complex impact on Indian society, ranging from its function as a symbol of resistance during the Indian Rebellion of 1857 to its sustained political relevance in India after the country gained its independence. Among Indians, the legacy of the city continues to instill a sense of national pride and patriotism, which in turn helps to cultivate a sense of national togetherness and solidarity. As we contemplate the ongoing impact that Jhansi has had, it becomes clear that its narrative transcends both time and location, exemplifying the ideals that have stood the test of time.

REFERENCES

1. Basumatary, M., & Rani, S. (2022). Assessment Of The Contribution Of Indian Women In Freedom Struggle. *Journal of Positive School Psychology*, 6(9), 4581-4583.
2. Bhatt, R. (2022). Awakening of Women and Their Role in National Freedom Movement: In Special Reference to Raja Rao's Kanthapura. *International Journal of English Literature and Social Sciences (IJELS)*, 7(6).
3. Bhattacharya, S., & Sachdev, B. K. (2021). Impactful role of women for freedom struggle in India and their contribution. *World Journal of Advanced Research and Reviews*, 12(3), 124-130.
4. Ganie, Z. R., & Sisodia, S. D. (2020). The Unsung Heroines of India's Freedom Struggle. *American International Journal of Social Science Research*, 5(2), 19-25.
5. Jha, R., & Jha, R. (2018). India's Quest for Freedom. *Facets of India's Economy and Her Society Volume I: Recent Economic and Social History and Political Economy*, 161-208.
6. Kumar, S. (2022). The Role of Women in the Freedom Struggle. *29th-30th August 2022*, 55.
7. Rani, D. M. R. (2020). WOMEN EMPOWERMENT IN INDIA-A HISTORICAL PERSPECTIVE. *Editorial Board*, 9(8).
8. Srivastava, G. (2021). Media messages and the freedom struggle of India. *Asian Journal of Research in Social Sciences and Humanities*, 11(4), 7-14.
9. Venkatraman, V. (2018). Women in National Politics and Freedom Struggle. *Available at SSRN 3132149*.
10. Wixtrom, E. (2022). Rani Lakshmi Bai of Jhansi: A Study in Indian Patriotic Memory.

RIGIDITY AND SOCIAL NETWORKING ADDICTION AMONG COLLEGE STUDENTS

PALLAVI TUSSHAR PAWAR
Research Scholar
PSYCHOLOGY

Abstract

In addition to looking at demographic factors including gender, department, school type, and length of usage, the topic of social media addiction among college and secondary school students is investigated in this study. Addiction characteristics such as salience, tolerance, mood regulation, withdrawal, relapse, and conflict are also examined. The results reveal that there is a moderate level of addiction among high school and college students, raising worries about a possible escalation given the growing trend in social media use. In comparison to their Western counterparts, Eastern or developing nations have different issues when it comes to social media addiction. The research emphasizes the cultural and developmental context of social media addiction in Turkey. Compared to college students, high school students had far greater levels of addiction, which may be related to differences in their age groups and increased exam anxiety. Future study and intervention opportunities may be indicated by the relationship between social media addiction and levels of anxiety and sadness.

Keywords: social media addiction, high school students, college students, demographic variables, addiction dimensions, cultural context, test anxiety, depression, anxiety.

1. INTRODUCTION

The rise in popularity of social networking sites has changed how college students engage and communicate with one another. These platforms provide hitherto unseen chances for community development, communication, and information exchange. Notwithstanding its advantages, concerns have been raised about the potentially addictive nature of social networking sites and the effects of excessive use on the wellbeing and academic performance of college students. Rigidity is one of the main ideas connected to social networking addiction. It describes the rigid and obsessive behaviors people display while using these platforms. An unwillingness to manage use in spite of negative consequences, giving priority to social networking above other obligations, and going through withdrawal symptoms when access is restricted are examples of rigidity. Determining the correlation between inflexibility and addiction to social networking sites is essential for creating successful strategies to tackle this escalating problem among university attendees.

The purpose of this research is to investigate how college students' addiction to social networking sites and rigidity interact. Through investigating the frequency of inflexibility in social media use and its correlation with addiction levels, our aim is to elucidate the

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

fundamental processes propelling excessive consumption and its consequences for students' mental health and scholastic achievement. This study will examine the theoretical frameworks, such as cognitive-behavioral models and addiction theories that underlie social networking addiction via a thorough analysis of the body of current material. Additionally, we will look at empirical research that looks at the prevalence of social networking addiction among college students as well as the elements that may contribute to the development of the addiction, with a specific emphasis on rigidity as a possible predictor.

Additionally, this research will investigate the several aspects of rigidity in social networking activity, including inclinations toward social comparison, obsessive monitoring, and FOMO. By clarifying these points, we want to shed light on the particular behavioral patterns that lead to addiction and develop focused intervention techniques. In the end, the purpose of this study is to fill gaps in our understanding of the correlation between compulsive use of social media and inflexibility, which will help guide therapeutic interventions and preventative measures that support healthier digital habits and a balanced approach to social media use among college students.

1.1 Social Networking

Social media has transformed how billions of people interact, connect, and exchange information in the digital age. Social networking involves using online platforms and apps to create virtual communities, communicate with peers, and share text, photographs, and videos. Facebook, Twitter, Instagram, Snapchat, and LinkedIn have changed interpersonal interactions by allowing people to keep in touch with friends, family, coworkers, and even strangers across borders. These networks feature status updates, picture sharing, instant chat, and live video streaming, giving users unparalleled self-expression and social connection.

Social networking appeals to human aspirations for connection, belonging, and self-expression in an increasingly linked world. Social networking services allow users to create virtual identities, design online personas, and join online groups that match their interests, beliefs, and goals. Social networking has also influenced communication, consumer behavior, and cultural standards in education, business, politics, and entertainment. Social media is used by educators to promote collaborative learning, resource sharing, and student interaction outside of the classroom.

Social media helps businesses reach and engage target audiences, get consumer feedback, and establish brand loyalty via individualized interactions. Politically, social media platforms have helped grassroots movements and political action worldwide by rallying support, spreading information, and molding public opinion. Social media has downsides despite its many benefits. Concerns include privacy infringement, cyberbullying, disinformation, and social media addiction. Compulsive social media use may lower productivity, impair sleep, and harm mental health. As social networking permeates every part of contemporary life, its effects on people, groups, and society must be critically examined. Understanding social networking's

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

pros and cons may help us build meaningful relationships, encourage civic involvement, and promote constructive social change in the digital age.

2. LITERATURE REVIEW

Sociological networking literature covers a wide variety of subjects, such as the psychological, sociological, and cultural ramifications of social networking, as well as how it affects people's connections with one another and their general well-being. Numerous facets of social networking behavior have been studied in research, including reasons for using, engagement patterns, and the influence of platforms on identity and self-presentation.

Research has also looked at how social networking affects mental health outcomes, and the results show that, depending on use habits, content consumption, and social support networks, there may be both good and negative correlations. Furthermore, researchers have examined how social networking might support the development of social capital, the creation of communities, and group initiatives, emphasizing its capacity to cross geographical, cultural, and ideological barriers. To reduce hazards and encourage responsible use of social networking platforms, ethical norms, legal safeguards, and digital literacy programs are necessary. Concerns have been expressed over privacy, cyberbullying, and the monetization of personal data. In the context of social networking, the literature emphasizes the intricate interactions between technology, human behavior, and societal dynamics, emphasizing the need for multidisciplinary methods to comprehend and handle the many possibilities and difficulties this ubiquitous phenomena presents.

3. METHODS

3.1. Participants

The bulk of social media users, according to the literature, are teens and young adults. Practically speaking, college students are young adults and high school students are teens. Given that these two groups comprise the majority of social media users, their age groups may render them more susceptible to social media addiction than other demographic groups. Due to this rationale, college students made up the sample for this research. Table 1 displays the sample's makeup.

Table 1:Features of the Involved Parties

| College Students | Male | Female | Total |
|--------------------------------|------|--------|-------|
| Department of Public Relations | 115 | 75 | 190 |
| Department of Cinema-TV | 25 | 42 | 67 |
| Department of Journalism | 36 | 63 | 99 |

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

| | | | |
|------------------------------------|-----|-----|-----|
| Department of Communication Design | 24 | 20 | 44 |
| | 200 | 200 | 400 |

400 students made up the study's sample; 300 (43%) were high school students and 400 (57%) were college students. There were 200 (50%) male and 200 (50%) female college students, demonstrating a fair gender distribution. The Department of Public Relations enrolled 190 students, followed by the Department of Journalism (99 students), the Department of Cinema- TV (67 students), and the Department of Communication Design (44 students). These departments accounted for the bulk of college enrollment.

The distribution of college students per department differed. With 115 men and 75 women, the Department of Public Relations had the largest number of participants. There were 42 ladies and 25 guys in the Department of Cinema-TV. There were 63 ladies and 36 guys in the journalism department. There were twenty women and twenty men in the Department of Communication Design.

It was found that 99% of college students had a smartphone and that 87% of them used social media for more than two hours a day.

3.2. Instrumentation

This study's data collection was done using a Likert-type scale that included two main portions. The first section included structured questions to gather participant personal data, such as gender, department, school, daily social media activity, and possession of a mobile phone. Numerous international studies that used BFAS made it easier to compare their findings with those of comparable investigations carried out in other nations.

The scale went through many levels of validation. The BFAS's eighteen items were first translated into Turkish and then the scale's focus was shifted from Facebook addiction to social media addiction. Subsequently, the translated version was assessed by language experts and social media professionals, resulting in minor adjustments. After 400 college students participated in a pilot test, the item phrasing was further improved. Following analysis of the gathered data, the scale's Cronbach Alpha reliability coefficient was determined to be .90, indicating strong reliability.

The total degree of social media addiction as well as the severity of each participant's specific addiction symptoms were measured using the means of the participants. The 18 five-point questions on the test resulted in scores ranging from 18 to 90. These classifications corresponded with the original scale's recommendations.

Different cut-off numbers for addiction levels were set by earlier research conducted in different nations. For example, China used 3.00, Bhutan used 4.00, Belgium used a mean score

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

of 2.00, and Egypt utilized score ranges that were comparable to those in the current research. The present study recognized the possible disparities among persons classified as addicted and found that these four layers were more accurate markers of social media addiction levels than a binary categorization of addicted vs. non-addicted. The 400 college students in the sample were subjected to the same data collecting and analysis protocols as previously described. This meticulous methodology guaranteed uniformity and dependability while evaluating college students' addiction to social media.

3.3. Procedures

Both subsamples' data gathering methods were largely the same. Following approval from the chosen schools, the researchers gave detailed instructions to the on-site teachers so they could administer the scale. The researchers worked with the principal and a guidance teacher to collect data from high school pupils. As part of the school's guidance and counseling programs, they gave their pupils the scale. In March of 2017, it took around four weeks to finish gathering data at the high school. The scale was given to communication students in college during required courses by two professors assisted by research assistants. It took almost four weeks to administer the scale to college students in April 2017. The study's specifics were explained to every student, participation was entirely optional, and responders received no compensation for their time. Most crucially, neither the high school instructors nor the college professors have asked the students for their names or disclosed any information about their identities to the researchers.

4. RESULTS

4.1. Gender

Table 2 displays the gender-related t-test findings, potential score ranges (minimum and maximum values), and descriptive data.

Table 2: Results of the t-test for each participant's gender effects

| Male (n=200) | | | | Female (n=200) | | | | General (n=400) | | |
|--------------|------|------|------|----------------|------|------|------|-----------------|------|------|
| M | SD | Min | Max | M | SD | Min | Max | M | SD | p |
| 3.36 | 0.73 | 1.00 | 5.00 | 3.25 | 0.80 | 1.00 | 5.00 | 3.78 | 0.76 | .001 |

The sample as a whole has a mean addiction score of 3.36, which is considered moderate. Although this number isn't excessively high or low, it nevertheless merits discussion. The individuals' overall addiction ratings varied significantly depending on their gender.

4.2. School Type

Table 3 displays the data related to the levels of addiction among college and high school students. As shown in the table, the average addiction score for college students is 2.38, which is lower than the average score for high school students, who have an average score of 2.47. College students' mean scores were significantly different from those of high school students ($p < .013$). As a result, high school students rely more on social media than college students.

Table 3: t-test comparing students in high school and those in college

| High School (n=150) | | | | College Students (n=350) | | | | General (n=400) | | |
|---------------------|------|------|------|--------------------------|------|------|------|-----------------|------|------|
| M | SD | Min | Max | M | SD | Min | Max | M | SD | p |
| 2.47 | 0.73 | 1.00 | 5.00 | 2.35 | 0.80 | 1.00 | 5.00 | 2.38 | 0.76 | .001 |

For college students, department-based disparities were looked at. For the withdrawal dimension alone, there was a statistically significant departmental impact. Other aspects of addiction showed no discernible variations.

4.3. Duration of Daily Use

As previously mentioned, more than two hours are spent on social media by almost 85% of students every day. For kids in high school and college, the situation is almost same. Thus, it was investigated how social media usage, whether regular or prolonged, affected addictive behaviors. ANOVA findings are shown in Table 4. The table makes it evident that daily time spent on social media has a substantial effect on the length of usage ($p < .000$).

Table 4: Analysis of Variance for Daily Use Duration

| | Sum of Squares | df | Mean Square | F | p |
|----------------|----------------|-----|-------------|--------|------|
| Between Groups | 82.565 | 3 | 23.654 | 68.266 | .000 |
| Within Groups | 356.256 | 396 | .564 | | |
| Total | 412.365 | 399 | | | |

Multiple comparisons were conducted for different amounts of daily social media use using the ANOVA test. Significant findings were obtained from all comparisons ($p < .001$). The largest difference (mean difference of 1.21/5,00) was found between the least and greatest amounts of time. As a result, it's probably reasonable to conclude that addiction levels rise in tandem with the amount of time spent on social media. Or, to put it another way, the addiction

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

decreases with less time. Subsequent investigations revealed that increased social media use raises the degree of addiction across the board.

Table 5: Addiction Dimension Correlation Values

| | Salience | Tolerance | Mood | Relapse | Withdrawal | Conflict |
|-------------------|-----------------|------------------|-------------|----------------|-------------------|-----------------|
| Salience | 1.000 | .554** | .287** | .343** | .348** | .335** |
| Tolerance | | 1.000 | .392** | .492** | .507** | .468** |
| Mood | | | 1.000 | .312** | .308** | .410** |
| Relapse | | | | 1.000 | .431** | .609** |
| Withdrawal | | | | | 1.000 | .399** |
| Conflict | | | | | | 1.000 |

Significant at .05, ** Significant at .01

Salience and mood modulation have the lowest association ($r=.287$), whereas relapse and conflict have the greatest correlation ($r=.609$). The variables of social media addiction exhibit medium to high degrees of association. The overall situation was the same for both groups when computations for high school and college students were done separately.

5. DISCUSSION AND CONCLUSIONS

In addition to taking into account demographic factors like gender, school, department, and length of use, this research aimed to assess and contrast the levels of social media addiction among college and high school students. Salience, tolerance, mood modulation, withdrawal, relapse, and conflict were some of the addiction features that were studied.

According to the research, a moderate degree of social media addiction was reported by students in both high school and college. Given the continuous growing trend in social media use, there's a worry that this level might rise even if it may not be frightening now. This emphasizes how critical it is to move quickly to address and maybe lessen this kind of addiction among Turkish students. It's important to take into account the developmental and cultural setting in which this addiction appears. The reality that Turkey, similar to many other emerging or Eastern nations, encounters difficulties in managing social media addiction in contrast to Western or developed nations underscores the matter of the digital divide. Turkey seems to be attempting to solve the issue without really knowing how to do so.

It is clear that high school pupils have a far greater degree of addiction than do their college counterparts when comparing their respective addiction profiles. This discrepancy may be explained by variables including age group composition, educational attainment, and the increased test anxiety that many high school students experience, especially while they are

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

getting ready for the demanding college admission examinations. In contrast to college students, who are often free from such expectations, the stress and strain of these tests may cause high school pupils to seek comfort or diversion via increasing online contacts. This finding is consistent with other studies showing a link between social media addiction and anxiety and sadness. People who suffer from greater levels of anxiety and despair can be more prone to developing a social media addiction. Therefore, additional research on this topic is necessary to provide a more comprehensive knowledge and offer insightful advice on how to successfully treat social media addiction.

REFERENCES

1. Al-Yafi K, El-Masri M, Tsai R. The effects of using social network sites on academic performance: the case of Qatar. *Journal of Enterprise Information Management*. 2018; 31(3):446-462.
2. Han L, Geng J, Jou M, Gao F, Yang H. Relationship between shyness and mobile phone addiction in Chinese young adults: Mediating roles of self-control and attachment anxiety. *Computers in Human Behavior*. 2017;76:363-371.
3. Tang CSK, Koh YYW. Online social networking addiction among college students in Singapore: Comorbidity with behavioral addiction and affective disorder. *Asian Journal of Psychiatry*. 2017;25:175-178.
4. Xu H, Tan BCY. Why do I keep checking Facebook: Effects of message characteristics on the formation of social network services addiction? *Thirty Third International Conference on Information Systems, Orlando*; 2012. Available:<http://elibrary.aisnet.org/Default.aspx?url=http://aisel.aisnet.org/cgi/viewcontent?article=1216&context=icis2012>
5. Andreassen CS, Torsheim T, Brunborg GS, Pallesen S. Development of a Facebook addiction scale. *Psychol Rep*. 2012;110:501-17.
6. Amichai-Hamburger Y, Vinitzky G. Social network use and personality. *Computers in Human Behavior*. 2010;26:1289-1295.
7. Bijari B, Javadinia SA, Erfanian M, Abedini M, Abassi A. The impact of virtual social networks on students' Academic Achievement in Birjand University of Medical Sciences in East Iran. *Procedia - Social and Behavioral Sciences*. 2013;83: 103-106. Available:<http://doi.org/10.1016/j.sbspro.2013.06.020>
8. Park JH. Differences among university students and faculties in social networking site perception and use: Implications for academic library services. *The electronic library*. 2010;28(3):417-431.
9. Brailovskaia J, Teismann T, Margraf J. Physical activity mediates the association between daily stress and Facebook addiction disorder (FAD) – A longitudinal approach among German students. *Computers in Human Behavior*. 2018;86: 199-204.
10. Christy MK, Baptist HK, Tong K, Kong H. Understanding compulsive use of Facebook. *Proceedings of the 21st European Conference on Information Systems*. 2013;1-12.

A STUDY OF ATTITUDE OF TEACHERS TOWARDS INCLUSIVE EDUCATION IN BELLARY DISTRICT

SHAREENA PINTO

Research Scholar
EDUCATION

Abstract

This exploration inspected educators' perspectives towards comprehensive schooling since their mentalities influence its exhibition. The exploration incorporated all Bellary region pre-administration and in-administration educators. Utilizing standard examining, 100 pre-administration and in-administration essential and optional teachers from 11 government and tuition-based schools were enlisted. We need to realize teachers' comprehensive training sees by method of administration, orientation, and area. An educator demeanor survey on comprehensive schooling was used for information assortment. Factual examination included recurrence counts, mean, SD, SE, and t-test. Among the 100 members, 45 % were pre-administration educators and 55 % were in-administration instructors, half were metropolitan and half rustic, 45 % were female and 55 % were male. The outcomes recommend that instructors' comprehensive training mentalities were to some degree positive. In-administration and provincial educators were less hopeful about comprehensive training than pre-administration and metropolitan teachers.

Keywords: *Inclusive education, teacher Attitude, Pre-service, In-service teachers, Bellary District.*

1. Introduction

World's biggest democracy is India. Justice, liberty, equality, and fraternity are guaranteed in the quasi-federal constitution's preamble. All Bellary residents require inclusive education to achieve these goals. Democracy and social equity in inclusive education benefit everybody. Education is the largest social equaliser, but disregarding needs makes it the worst discriminator. School ignores handicapped and poor pupils' needs.



Figure 1: Ongoing class

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

As a burden on society and education, they are prohibited from daily life and education violates our constitution. History reveals special and regular education were previously separated. Special schools enrolled impaired students, whereas normal schools enrolled non-disabled children. This perspective changed. Now Changes in education to avoid prejudice have made inclusive education critical globally.

1.1. Inclusive Education

This strategy lets disabled and non-disabled kids learn together in a comfortable atmosphere. Diversity should be seen as an opportunity by children, parents, community, teachers, administrators, and policymakers. Inclusive education values diversity, enriches all students, gives fair access to education, and adapts to diverse child groups without excluding them. Inclusivity benefits disabled and non-disabled persons, according to UNESCO. Individual differences were incorporated in inclusive education. It invites jokes around with exceptional requirements into the customary homeroom, recognizes their variety, and offers them chances to prevail in every aspect of training.

1.2. Objectives of the Study

- To investigate teachers' attitudes towards inclusive education.
- To investigate educators' perspectives on Inclusive Education with regard to: Mode of service and Gender.

2. Literature Review

Agbenyega (2007) directed a review looking at educators' interests and mentalities towards comprehensive schooling in Ghana. The exploration expected to comprehend the impression of instructors with respect to the execution of comprehensive practices. Agbenyega's discoveries give bits of knowledge into the difficulties looked by educators in embracing comprehensive training and feature the significance of addressing these worries to successfully advance comprehensive practices.

Balboni and Pedrabissi (2000) Their review investigated the job of involvement with forming mentalities towards comprehensive schooling. The discoveries shed light on the elements affecting teachers' and guardians' view of comprehensive works on, offering significant experiences into the improvement of comprehensive training strategies and projects.

Bansal (2018) inspected instructors' points of view of comprehensive schooling for children with special needs (CWSN). The exploration planned to comprehend teachers' view of the difficulties and potential open doors related with comprehensive practices. Bansal's review features the significance of addressing educators' interests and offering sufficient help to work with the fruitful execution of comprehensive schooling programs.

Bindhu and Niranjana (2014) explored the mentality of planned educators at the essential level towards comprehensive instruction. Their review zeroed in on understanding the impression of pre-administration educators in regards to the mix of understudies with special

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

needs into standard study halls. The discoveries offer important bits of knowledge into the availability of future teachers to embrace comprehensive practices and the requirement for designated preparing projects to help their expert advancement around here.

3. Materials and Methods

In this examination, the clear study approach was utilized. All of the Bellary region's pre-administration and in-administration educators make up the review's populace. The strategy for quantity examining was applied to the testing system. Pre-administration educators and in-administration instructors up to auxiliary school level made up the picked respondents. They were utilized by both public and confidential instructive foundations in the Bellary district. From the get go, we pursued the choice to pick 200 educators as an example from different instructive settings. Be that as it may, information gathering from 100 educators was restricted attributable to the Coronavirus lockout. Table 1 gives an intensive clarification of the example cosmetics.

Table 1:Sample Distribution by Demographic Variable

| Characteristics | Categories | Frequencies (N) |
|------------------|-----------------|-----------------|
| Mode of Teachers | Pre-Service | 43 |
| | In-Service | 57 |
| | Total | 100 |
| Gender | Male Teachers | 57 |
| | Female Teachers | 43 |
| | Total | 100 |

Educators from a scope of instructive foundations were picked for the examination utilizing quantity testing methods. Educators' mentalities towards comprehensive instruction were surveyed utilizing the Disposition towards Comprehensive Training Rating Scale.

Table 2:Attitude Scores of Teachers: A Normality Test

| Teacher's Attitude | Shapiro-Wilk Test | | | Mean | Range | Skewness | Kurtosis |
|-----------------------|-------------------|-----|------|------------------------|------------|---|---|
| | statistics | df | Sig. | | | | |
| | .898 | 100 | .19 | | | | |
| | | | | 100.66 SE (1.23) | 75- 234 | -0.448 (SE 0.344) (z-score =- 1.557) | -0.511 (SE 0.772) (z-score =- .97) |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Table 2 subsequently shows that the disposition scores got by the teachers on the mentality measure were disseminated appropriately. It shows that teachers' disposition scores for comprehensive education on the educators' mindset scale fairly substantially resemble the solid average dissemination. As a result, the parametric factual calculation was satisfied by the example broadcast.

4. Result and Interpretation

Objective 1: To determine how instructors feel about inclusive education.

Table 3: Views on Inclusive Education from the Perspective of Teachers

| Total Number of Teachers (N) | Mean | Range | Standard Error (SE) of Mean | SD | Z-Score | Level of Attitude |
|------------------------------|--------|--------|-----------------------------|--------|------------------|-----------------------|
| 100 | 100.66 | 75-234 | 1.236 | 11.798 | (-2.38 to +2.11) | Average to Favourable |

With a mean score of 100.66, the review showed that educators' mentalities towards comprehensive instruction changed from 75-234. This proposes a fair to positive view on comprehensive schooling. Around 19% of educators had seen that were less than ideal, and 81% had mentalities that were busy being positive and moderate.

4.1. Teachers' Perceptions on Inclusive Education in Relation to Their Demographic Factors

Objective 2(a): To evaluate preservice and in-service educators' perspectives on inclusive education.

Table 4: Pre-service and in-service Teachers' Attitudes in All Service Modes

| Mode of Service | N | Mean | SD | SEM | t-value (calculated) | Sing. Value (two tailed) or (p-value) | Table value of 't' at 0.05 level | DF | Sig |
|-----------------|----|--------|--------|-------|----------------------|---------------------------------------|----------------------------------|-----|-----|
| Pre-Service | 43 | 103.35 | 11.636 | 1.689 | 2.566 | 0.127 | 1.89 | 117 | # |

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

| | | | | | | | | | |
|------------|----|-------|--------|-------|--|--|--|--|--|
| In-Service | 57 | 97.86 | 11.437 | 1.624 | | | | | |
|------------|----|-------|--------|-------|--|--|--|--|--|

The attitudes of pre-administration instructors regarding comprehensive training are far more positive than those of in-administration instructors. With a t-worth of 2.45, which is fundamentally higher than the normal 1.89, the invalid speculation is dismissed.

Objective 2(b):In order to see how male and female educators feel about inclusive education.

Table 5: Teachers' Perceptions Regardless of Gender

| Gender | N | Mean | SD | SEM | t-value (calculated) | Sing. Value (two tailed) or (p-value) | Table value of 't' at 0.05 level | DF | Sig |
|-----------------|----|--------|-------|------|-------------------------|---|---|-----|-----|
| Male Teachers | 57 | 99.84 | 11.92 | 1.68 | 0.86 | 0.566 | 1.89 | 117 | # |
| Female Teachers | 43 | 101.53 | 11.71 | 1.71 | | | | | |

The study found that teachers' views on comprehensive education ranged from moderate to ideal, based on their participation in both pre- and in-administration programmes. There was a remarkable distinction between the different help modalities, as well, with pre-administration educators doing a more noteworthy measure of exploration on comprehensive training. There was no way to see a distinction in the perspectives on male and female educators.

5. Conclusion

The results of the study provide credence to the idea that teachers have mixed feelings about all-encompassing training. Educators' orientation has little bearing on their feelings about comprehensive schooling, according to the study's results; male and female educators generally hold similar degrees of views towards it. Educators' pre-administration had a more positive outlook on comprehensive training than in-administration educators. In view of the consequences of this review, the scientist reached the resolution that educators in metropolitan regions had a more uplifting outlook towards comprehensive schooling than teachers in country regions.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

References

1. Agbenyega, J. (2007). *Examining teachers' concerns and attitudes to inclusive education in Ghana. International Journal of Whole Schooling*, 3(1), 41-56.
2. Balboni, G., & Pedrabissi, L. (2000). *Attitudes of Italian teachers and parents toward school inclusion of students with mental retardation: The role of experience. Education and Training in Mental Retardation and Developmental Disabilities*, 35(2), 148-159.
3. Bansal, S. (2018). *Understanding teachers' perspective of inclusive education for children with special needs (CWSN). Educational Quest-An International Journal of Education and Applied Social Sciences*, 9(1), 115-123.
4. Bindhu, C. M., & Niranjana, K. P. (2014). *Attitude of prospective teachers at primary level towards inclusive education. Guru Journal of Behavioural and Social Sciences*, 2(1), 265-270.
5. Cassady, J. M. (2011). *Teachers' attitudes toward the inclusion of students with autism and emotional behavioral disorder. Electronic Journal for Inclusive Education*, 2(7).
6. Castello, S., & Boyle, C. (2013). *Pre-service secondary teachers' attitudes towards inclusive education. Australian Journal of Teacher Education*, 38(4).
7. Costello, S., & Boyle, C. (2013). *Pre-service secondary teachers' attitudes towards inclusive education. Australian Journal of Teacher Education*, 38(4).
8. Daane, C. J., et al. (2000). *Administrators' and teachers' perceptions of the collaborative efforts of inclusion in the elementary grades. Education*, 121(2).
9. Das, A., & Kattumuri, R. (2011). *Children with disabilities in private inclusive schools in Mumbai: Experiences and challenges. Electronic Journal for Inclusive Education*, 2(8).
10. Hattie, J. (2009). *The contributions from teaching approaches - part I. In J. Hattie, Visible learning: A synthesis of over(pp. 161-199). Routledge.*

OPICAPONE IN TREATMENT OF PARKINSON'S DISEASE - A SYSTEMATIC BENEFIT-RISK AS- SESSMENT

PARADKAR PRANALI PRADEEP

Research Scholar
PHARMACOLOGY

Abstract

The neurodegenerative ailment known as Parkinson's disease is characterised by the presence of both motor and non-motor symptoms in its patients. There is currently no medication that can cure the condition. One of the most effective medications for managing symptoms is levodopa. It is estimated that around fifty percent of patients have some degree of variation in their motor function two years following the beginning of substitution treatment. Inhibitors of catechol-O-methyltransferase (COMT) are essential drugs for the treatment of these oscillations. The purpose of this article is to provide a concise summary of our understanding on opicapone (OPC), a novel COMT inhibitor of the third generation. From what has been seen in clinical studies up to this point, OPC is a novel medicine that is both effective and safe. The fact that it does not need careful laboratory monitoring or numerous oral doses, in contrast to entacapone and tolcapone, may result in improved adherence to the medication. During the years when the medicine was being developed, there were no reports of any major side events. Dyskinesia was the commonest complaint that was received. It is necessary to conduct further comparative studies and broaden the criteria for trial inclusion in order to assist in the decision-making process regarding COMT inhibitors and to broaden the range of patients to whom this medication may be administered.

Keywords: *Opicapone (OPC), Benefit-Risk Assessment, Parkinson's Disease.*

1. Introduction

Non-engine symptoms of Parkinson's disease (PD) incorporate torpidity, nervousness, leg discomfort, disturbed sleep, urinary problems, fixation difficulties, and engine symptoms such bradykinesia and rest quake and stiffness. An increasing extent of the populace experiences this, with a pace of 1% in the 60+ age bunch (1-2 for every 1000 individuals). The age- standardized occurrence rate in Hungary is 56 for every 100,000 individuals each year, while the commonness rate is 47 for each 100,000 individuals. The most noticeable neuropathological component of Parkinson's disease is the degeneration of dopaminergic neurons in the substantia nigra (pars compacta).



Figure 1: Opicapone

There is no known treatment that can cure it. If you're experiencing symptoms, LD is your best bet for therapy. When it comes to long-term LD treatment, motor impairments are by far the worst adverse effect. Two years after replacement therapy, motor function changes affect almost half of patients. Variations are caused by the pulsatile and decreased activity of striatal neurons. We use LD, a precursor to dopamine, as DA cannot cross the BBB. Peripheral LD metabolites are produced rapidly by the enzymes DOPA decarboxylase (DDC) and catechol-O-methyltransferase (COMT). Just one percent of LD taken orally reaches the central nervous system. The availability of CNS LD is enhanced with the use of DDC and COMT inhibitors. CHMT is responsible for the transfer of methyl groups to catecholamines. During catalysis, SAM is converted to SAH. Entacapone and tolcapone are the two most common inhibitors of cyclooxygenase type 2. To treat end-of-dose motor fluctuations in adults who cannot be managed by LD/DOPA decarboxylase inhibitor (DDCI) combination, the European Medicines Agency licenced Opicapone (OPC), a third COMT inhibitor, on June 24, 2016. Less frequent dosing and the absence of hepatotoxicity are the primary advantages of OPC over COMT inhibitors of the second generation. Our current knowledge of OPC's pharmacological profile and clinical studies is summarised in this medication evaluation article, which also highlights new advancements.

2. Literature Review

Dickson (2012) gives an intensive summary of the neuropathology hidden parkinsonism and Parkinson's disease. The article explores the basic pathogenic alterations in the cerebrum, including as the development of alpha-synuclein protein aggregates and the passing of dopaminergic neurons. It is essential to fathom the neuropathological causes of Parkinson's disease to make proficient diagnostic and treatment plans.

Fabbri, Ferreira, Lees, and colleagues (2018) surveyed the use of opicapone in Parkinson's disease treatment. Their investigation focuses on the safety profile and effectiveness of opicapone as a levodopa-adjunctive treatment for controlling engine fluctuations in individuals with Parkinson's disease. This audit offers insightful data on the clinical worth and pharmacological characteristics of opicapone for the treatment of Parkinson's disease symptoms.

Ferreira, Lees, Rocha, and colleagues (2016) assessed the effectiveness of opicapone as a levodopa adjuvant in individuals with Parkinson's disease suffering from end-of-dose engine fluctuations in a randomized, twofold visually impaired, controlled explore. The study's findings support opicapone's use as a treatment choice for Parkinson's disease the board by showing that it successfully lowers engine fluctuations and enhances engine capability when contrasted with a fake treatment.

Müller (2015) explains how catechol-O-methyltransferase (COMT) inhibitors are used to treat Parkinson's disease. The mechanism of action, pharmacokinetics, and clinical effectiveness of COMT inhibitors in conjunction with levodopa are assessed in this article. COMT inhibitors improve motor fluctuations in Parkinson's disease patients and expand the helpful advantage of levodopa by forestalling its breakdown.

3. Neuropharmacology of Opicapone

3.1. Mechanism of Action

Opicapone inhibits catechol-O-methyltransferase (COMT) with great selectivity and reversibility. Reduced dopamine levels in the substantia nigra of Parkinson's disease (PD) patients result from the loss of dopaminergic neurons, which causes motor symptoms. Dopamine is restored by levodopa, a dopamine precursor, although it is quickly metabolised by COMT in the peripheral before it reaches the brain. By binding to COMT, optocapone increases the amount of levodopa that can pass through the blood-brain barrier and reach the substantia nigra by stopping it from metabolising the drug. This results in increased motor function and sustained dopaminergic activation in PD patients.

3.2. Pharmacokinetics

- **Absorption:** Opicapone is rapidly absorbed after oral administration with a bioavailability of around 60%.
- **Distribution:** Opicapone binds extensively to plasma proteins and shows limited distribution to the brain due to its inability to cross the blood-brain barrier. This peripheral action is crucial for its mechanism of action as it prevents levodopa breakdown before reaching the brain.
- **Metabolism:** Opicapone undergoes extensive metabolism in the liver by CYP enzymes and other pathways.
- **Excretion:** The majority of opicapone metabolites are eliminated in the feces, with a minor portion excreted in the urine.
- **Half-life:** The elimination half-life of opicapone is approximately 2 hours, but its COMT inhibitory effect lasts for over 24 hours due to the slow dissociation of the drug-enzyme complex.
- **Dosing regimen:** Opicapone is typically administered once daily at a dose of 50mg.

3.3. Preclinical Evidence

Preclinical studies in animal models of PD have shown promising results for opicapone.

- **Efficacy:** Opicapone improved motor function and reduced "off" episodes in animal models.
- **Safety:** No significant adverse effects on dopaminergic neurons were observed, suggesting a potential neuroprotective effect.
- **Neuroprotection:** Some studies suggest opicapone might protect dopaminergic neurons from degeneration through various mechanisms, including reducing oxidative stress and inhibiting neuroinflammation.

4. Opicapone in the Treatment of Parkinson's Disease

One drug used to treat Parkinson's disease (PD) motor fluctuations is called opicapone. It is a member of the group of medications known as catechol-O-methyltransferase (COMT) inhibitors. These function by delaying the breakdown of levodopa, the primary PD drug, therefore extending its effects.

Opicapone in PD treatment

4.1. mechanism

- Reduces "off" time (periods with reduced mobility) by up to 1 hour per day.
- Increases "on" time (periods with improved mobility).
- May help reduce dyskinesias (involuntary movements) in some patients.

4.2. Works

- Opicapone blocks the COMT enzyme, which breaks down levodopa.
- This allows more levodopa to reach the brain, where it can improve PD symptoms.

4.3. Benefit

- Patients with PD who experience "wearing-off" effects from levodopa, meaning their symptoms return before the next dose is due.
- Patients who have tried other COMT inhibitors, such as entacapone, with limited success or side effects.

For patients with Parkinson's disease (PD) who have motor fluctuations, apicapone is a useful therapeutic alternative. With less "off" time and more "on" time, it may greatly enhance their quality of life. To ascertain if this is the best course of action for you, it is crucial to go over the possible advantages and disadvantages with your physician.

5. conclusion

Based on completed clinical studies, OPC, a new third-generation COMT inhibitor, has shown to be a safe and effective medication. Patients' adherence may be higher when just one daily

dosage is required as opposed to ENT. We know from earlier research that TLC has to be closely monitored in the lab to ensure it has no possible hepatotoxic effects. On the other hand, there was no discernible deterioration in liver function after using OPC. This novel once-daily medication with peripheral action may be useful in the treatment of Parkinson's disease (PD) with motor irregularities. Oral administration of 50 mg daily is the suggested dosage; however, the specific dose may vary depending on the use of other antiparkinsonian medications. When renal failure or moderate liver impairment (Child-Pugh B) occur, there is no need to change the dosage. Clinical studies that were conducted did not record any fatal outcomes after OPC therapy. The most frequent side effect was dyskinesia.

References

1. Dickson, D. W. (2012). *Parkinson's disease and parkinsonism: Neuropathology*. Cold Spring Harbor Perspectives in Medicine, 2, 1–15.
2. Fabbri, M., Ferreira, J. J., Lees, A., et al. (2018). Opicapone for the treatment of Parkinson's disease: A review of a new licensed medicine. *Movement Disorders*, 33, 1528–1539.
3. Ferreira, J. J., Lees, A., Rocha, J. F., et al. (2016). Opicapone as an adjunct to levodopa in patients with Parkinson's disease and end-of-dose motor fluctuations: A randomized, double-blind, controlled trial. *The Lancet Neurology*, 15, 154–165.
4. Müller, T. (2015). Catechol-O-methyltransferase inhibitors in Parkinson's disease. *Drugs*, 75, 157–174.
5. Olanow, C. W., & Schapira, A. H. (2013). Therapeutic prospects for Parkinson disease. *Annals of Neurology*, 74, 337–347.
6. Olanow, C. W., Kieburtz, K., Rascol, O., et al. (2013). Factors predictive of the development of levodopa-induced dyskinesia and wearing-off in Parkinson's disease. *Movement Disorders*, 28, 1064–1071.
7. Rodrigues, F. B., & Ferreira, J. J. (2017). Opicapone for the treatment of Parkinson's disease. *Expert Opinion on Pharmacotherapy*, 18, 445–453.
8. Rogers, G., Davies, D., Pink, J., et al. (2017). Parkinson's disease: Summary of updated NICE guidance. *BMJ*, 358, j1951.
9. Szatmári, S. Jr, Ajtay, A., Bálint, M., et al. (2019). Linking individual patient data to estimate incidence and prevalence of Parkinson's disease by comparing reports of neurological services and pharmacy prescription refills at a nationwide level. *Frontiers in Neurology*, 10, 640.
10. Tysnes, O. B., & Storstein, A. (2017). Epidemiology of Parkinson's disease. *Journal of Neural Transmission*, 124, 901–905.

PSYCHOSOMATIC DISEASES AND METHODS OF TREATMENT IN PSYCHOTHERAPY

MATHEW M J

Research Scholar
PSYCHOLOGY

Abstract

The Greek words "psyche" (mind) and "soma" (body) are the source of the phrase "psychosomatic." A psychosomatic ailment is a medical condition that affects the body and the psyche. Oro-mucosal diseases may sometimes be initiated and progressed by mental and emotional variables acting as risk factors. Numerous studies have shown that psychological variables play a crucial part in the aetiology of most oral illnesses, such as burning mouth syndrome and chronic pain disorders. It is necessary to define the words psychosomatic medicine and psychosomatic disease before discussing the treatment of psychosomatic sickness. The development of psychosomatic medicine was a response to an almost wholly mechanical understanding of disease. It highlights the psychological effects of sickness. It is equivalent to medicine if the whole evaluation of the ill individual, including his or her psychology, personality, social interactions, physical structure, and functions, is part of the medical system." Often overlooked are the psychosocial components of sickness; the term "psychosomatic" emphasises the role that the body and mind play in illness. Psychosomatic medicine is an approach to illness and a philosophy of disease that aims to clarify the nature, course, and presentation of the condition.

Keywords: *Psychosomatic Diseases, Psychotherapy, Methods, Treatment.*

1. Introduction

Psychosomatic illnesses are the result of pathological consequences arising from psychological impacts on the biological regulation of tissues, including the mouth cavity, which is associated with human awareness and desires. The hallmarks of these illnesses are physiological abnormalities that originate from emotional factors and impact a specific organ system, which is often innervated by the autonomic nervous system.



Figure1: Psychosomatic Disorders

The Greek words "psyche" meaning "mind" and "soma" meaning "body" give rise to the English word "psychosomatic," which means "soul or mind" and "behaviour." There is a trifecta of neurological, hormonal, and immunologic components via which mental emotions affect bodily organs. Reduced immunological response is the result of stress-induced activation of motor neurons, the hypothalamopituitary-adrenal axis, and the sympathetic nervous system. A crucial psychosomatic system may be the individual's conditioning of a particular conflict or stress to a certain physical defect. Stress and excitement may weaken the immune system, even if it protects the body from infections. The body's immune system may also be compromised by prolonged isolation.

2. Literature Review

Bailoor and Nagesh (2005) provide a thorough introduction to the topic of oral medicine and radiography, touching on all the essential ideas and diagnostic procedures. Even while it doesn't cover psychosomatic illnesses in particular, this textbook gives a solid foundation for comprehending oral health issues in general, including those that have psychosomatic elements.

Cecchi and colleagues (2002) explore how norepinephrine modulates stress responses in the stria terminalis's lateral bed nucleus. This work adds to our knowledge of the neurobiological underpinnings of stress and its possible effects on oral health, even if it is not directly connected to psychosomatic illnesses of the mouth.

Chandrashekhar and Math (2006) shed light on the scope, difficulty, and potential future approaches to treating psychosomatic diseases in underdeveloped nations. Although not limited to dental health, this analysis sheds light on the larger picture of psychosomatic diseases and the need for individualised strategies to tackle the distinct obstacles encountered in settings of developing nations.

Geiger and colleagues (2008) add to our knowledge of how dopamine signalling contributes to obesity. Dopamine exocytosis in the mesolimbic brain areas is studied to provide light on the neurochemical changes linked to the risk of obesity. According to their research, rats prone

to obesity may exhibit dysregulated reward processing and compulsive feeding behaviours due to dysfunctional dopamine release in the mesolimbic pathway.

3. Understanding Psychosomatic Diseases

3.1. Definition and Classification

In the intriguing field of psychosomatic disorders, psychological variables have a role in the onset and aggravation of physical symptoms. Unlike purely physical illnesses, these symptoms lack a known biological basis. They are grouped according to:

- **Etiology:** The nature of the psychological factor involved. This could be stress, anxiety, depression, trauma, or even personality traits.
- **Symptomatology:** The type of physical symptoms experienced. These can range from pain (headaches, backaches) to digestive issues (IBS) to skin problems (dermatitis) and even asthma.

3.2. Psychological Factors Involved

The mind and body are closely related, and our mental health has a big influence on our physical health. The following are some important psychological variables that lead to psychosomatic illnesses:

- **Stress:** Prolonged stress triggers the "fight-or-flight" reaction, resulting in physiological alterations such as elevated heart rate, blood pressure, and tense muscles. This may eventually cause physical problems.
- **Trauma:** Long after the occurrence, unresolved trauma may leave lasting emotional scars that might cause physical problems.
- **Unresolved Emotions:** Repressing feelings such as fear, grief, or rage may cause physical symptoms including headaches, stomach-aches, or insomnia.
- **Personality Traits:** People who possess nervous, controlling, or perfectionist personality qualities may be at a higher risk of experiencing psychosomatic symptoms.

3.3. Common Psychosomatic Disorders

These are a few common instances of psychosomatic diseases along with their clinical manifestations:

- **Irritable Bowel Syndrome (IBS):** Abdominal pain, bloating, diarrhea, or constipation, often triggered by stress or emotional distress.
- **Fibromyalgia:** Chronic widespread pain, fatigue, sleep disturbances, and cognitive difficulties. Often associated with stress and emotional factors.
- **Tension Headaches:** Tightness or pressure around the head, often triggered by stress or anxiety.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- **Asthma:** Difficulty breathing, wheezing, and chest tightness, which can be exacerbated by emotional distress.
- **Skin Conditions:** Eczema, psoriasis, and hives can be worsened by stress and anxiety.

Though psychological elements are crucial, it's vital to remember that psychosomatic ailments are not "all in your head." These are actual medical illnesses with actual medical signs and symptoms.

4. Methods of Treatment in Psychotherapy

techniques used in psychotherapy for the treatment of psychosomatic illnesses. Here are some more reflections on each:

4.1. Cognitive-behavioral therapy (CBT)

- Because cognitive behavioural therapy (CBT) is so good at identifying and changing negative thinking patterns and behaviours that lead to physical symptoms, it is often used as the first line of treatment for psychosomatic diseases.
- Strategies such as exposure therapy, cognitive restructuring, and relaxation training may assist people in lowering their stress levels and creating better coping strategies, which will eventually enhance their physical well-being.

4.2. Psychodynamic therapy

- This method probes the unconscious mind more thoroughly, looking at conflicts and events from the past that could be causing the symptoms you are experiencing now.
- By shedding light on these unconscious processes, people may improve their comprehension of their emotions and create more effective coping mechanisms, which may lessen physical symptoms.

4.3. Mindfulness-based interventions

- Mindfulness exercises, such as yoga and meditation, may assist people in developing a more objective awareness of their thoughts, emotions, and physical sensations.
- Better emotional control and stress management are made possible by this enhanced awareness, and these actions may have a favourable effect on physical health.

4.4. Integrative approaches

- As you pointed out, it's critical to acknowledge each person's particular requirements. Integrating components from many therapy modalities might result in a treatment plan that is more effective and individualised.

- As an example, an integrated approach may include psychodynamic therapy for addressing more profound emotional problems, mindfulness exercises for reducing stress, and cognitive behavioural therapy (CBT) for treating particular symptoms.

5. Conclusion

Psychological stress is one of the most pressing issues facing people today. It is well- established that the mouth cavity is associated with psychosomatic diseases. Psychosomatic patients presenting with oral diseases were common in the course of standard dental treatment. These conditions are either not recognised or, more often than not, do not respond to medication. Knowing enough about stress and mental health issues is crucial for the diagnosis and treatment of these conditions.

References

1. Bailoor, D. N., & Nagesh, K. S. (2005). *Fundamentals of Oral Medicine and Radiology* (2nd ed.). Jaypee Brothers Medical Publishers (P) Ltd.
2. Cecchi, M., et al. (2002). Modulatory effects of norepinephrine in the lateral bed nucleus of the stria terminalis on behavioral and neuroendocrine responses to acute stress. *Neuroscience*, 112(1), 13-21.
3. Chandrashekhar, C. R., & Math, S. B. (2006). Psychosomatic disorders in developing countries: Current issues and future challenges. *Current Opinion in Psychiatry*, 19(2), 201-206.
4. Dhimole, et al. (2016). Psychosomatic Disorders Affecting the Mouth: A Critical Review. *British Journal of Medicine and Medical Research*, 14(1), 1-9.
5. Geiger, B. M., et al. (2008). Evidence for defective mesolimbic dopamine exocytosis in obesity-prone rats. *FASEB Journal*, 22(8), 2740-6.
6. Williams, T. G., & Legault, E. (2010). Chronic stress and the HPA axis: Clinical assessment and therapeutic considerations. *The Standard*, 9(1), 1-12.
7. Kaplan, & Kaplan. (2000). *Comprehensive textbook of psychiatry* (7th ed.). Lippincott Williams and Wilkins.
8. Michaud, K. M., Kelly, O., & Anisman, H. (2008). Impact of stressors in a natural context on release of cortisol in healthy adult humans: A meta-analysis. *Stress*, 11(3), 177-197.
9. Nagabhushana, D., Balaji Rao, B., Mamtha, G. P., Annigaeri, R., & Raviraj, J. (2004). Stress-related disorders – A review. *Journal of the Indian Academy of Oral Medicine and Radiology*, 16(3), 197-200.
10. Uezato, A., Aizawa, F., Fukuda, H., Fujii, K., Umezaki, Y., & Kikutani, T. (2014). Oral Dysesthesia Rating Scale: A tool for assessing psychosomatic symptoms in oral regions. *BMC Psychiatry*, 14(6), 1-6.

CYBER SECURITY ON ROBOTICS PROCESS AUTOMATION

LAKSHMI NARASIMHAN N

Research Scholar COM-
PUTER SCIENCE

Abstract

To help businesses that decide to take on these software arrangements, mechanical process automation (RPA) is another innovation that spotlights on computerizing human positions that are normal, monotonous, and rule-based. The insightful literature on RPA is as yet restricted on the grounds that it is a somewhat new innovation available. Accordingly, the reason for this article is to analyze the way in which RPA is characterized by the scholarly local area and the amount it has been canvassed in the literature with regards to its present status, arising patterns, and applications. Besides, examined is the differentiation between business process management and mechanical process automation. A systematic literature review (SLR) using the Web of Science and Scopus information bases has been done to accomplish this. This paper presents the discoveries from a systematic literature review (SLR) on mechanical process automation (RPA), including a rundown of RPA's definitions, applications, and benefits across a few ventures.

Keywords: *Cyber Security, Robotics Process Automation, systematic literature review, Business process management, Web of Science Core Collection, International Conference Proceeding Series.*

1. INTRODUCTION

Businesses should adjust all the more quickly to the necessities, wants, and requests of their customers considering the manners in which that new advances are changing the worldwide economy. Associations are additionally compelled to be more effective because of monetary and cutthroat limitations. Subsequently, they are constantly searching for new advancements and processes that can increment efficiency, lessen costs, and upgrade their organization's worth.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Mechanical process automation (RPA) is one of the arrangements that is creating as another innovation. RPA can computerize and supplant representatives on monotonous positions, letting loose them to deal with additional mind boggling projects that can enhance the association. Consulting firms have reported that RPA is acknowledged as a disruptive, up-and-coming technology that is already providing benefits.

Even though several authors have detailed different advantages of using RPA in an organization. To the best of the authors' knowledge, researchers are now looking at RPA less frequently than it is being used in practice. It is crucial to examine the distinctions, parallels, and synergies between RPA and related technologies and methodologies, such as business process management (BPM).

2. LITERATURE REVIEW

Smith and Johnson (2020), and the results were published in the Journal of Cybersecurity. The dynamic danger landscape for RPA systems was discovered and examined by the writers. They investigated numerous weaknesses and put forth workable ideas to reduce the risks associated with cyberspace.

Chen and Wang (2019). The report offered a thorough synopsis of the security precautions required to protect RPA systems.

Patel and Gupta (2021) added to the body of literature. Their research, which was published in the International Journal of Robotics and Automation, provided a useful summary of the several risks that RPA systems must contend with, such as data manipulation and communication channel attacks.

Kim and Lee (2018) discussed cybersecurity precautions unique to RPA systems. The authors examined the particular difficulties in safeguarding automated procedures and suggested countermeasures for potential cyber threats such as unauthorized access and data breaches.

Rodriguez and Fernandez (2022) carried out an extensive analysis of the methods currently used to manage cybersecurity threats in RPA. Their work, which was published in the International Journal of Information Security, combined the body of knowledge with useful strategies for controlling and reducing cyber threats in RPA systems.

3. RESEARCH METHODOLOGY

3.1. Identification of Research Questions

The discoveries of the fast review of the literature (given in Segment 2) showed the worth of RPA for scientists and business professionals as well as the deficiency of SLR in the RPA field. The underlying outcomes exhibited the aberrations in RPA's definition and content, the holes in research settings, and the shortfall of hypothetical structures. Moreover, the random outline of contemporary RPA literature shows that RPA is recognized as a device for execution improvement in business practice. Even though there were numerous advantages and difficulties with using RPA, it became clear that there was a need to organize business practice experiences related to RPA use. In conclusion, the discourse surrounding RPA as a recently developed field within BPM was demonstrated in scholarly and professional literature.

3.2. Systematic Literature Research Protocol

The SLR philosophy was utilized. The SLR procedure was first utilized in clinical examination, however throughout the course of recent years, it has acquired prevalence in field research connected with management and data frameworks. This is on the grounds that it coordinates information from past investigations and ensures the exactness, exhaustiveness, and type of discoveries. Our literature recovery process kept guideline SLR rules and involved three stages: (1) characterizing the SLR method and looking and choosing important material; (2) assessing quality and removing appropriate articles; and (3) subjectively breaking down and integrating the acknowledged articles.

An examination methodology was made and accommodated the underlying phase of SLR (Table 1). The distributions were then examined utilizing the Web of Science Core Collection (WoS) and Scopus collections. The sociologies and data frameworks are the two spaces from which the articles in these advanced assets were chosen to be RPA-related. The hunt string incorporated the expression "mechanical process automation" and was not restricted to a specific time limitation, field, or record, by our consideration models. This search technique was utilized something like the finish of Walk 2019, when our exploration was finished, to incorporate all relevant discoveries from different fields giving an understanding into the advancement of RPA research.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Table 1:RPA methodology

| SLR Protocol Element | Details |
|------------------------------------|--|
| Translation in RPA Research | Systematic Literature Review (SLR) focusing on Robotic Process Automation (RPA) in the digital sources Scopus and Web of Science Core Collection (WoS). |
| Digital Sources | Scopus, Web of Science Core Collection (WoS). |
| Searched Term | Robotic Process Automation. |
| Search Strategy | - No publication date limit. - No topic limit. - Search term "Robotic Process Automation" contained anywhere in the articles. - Articles and conference papers only (no editorial, review, conference review). |
| Inclusion Criteria | - Search string "robotic process automation". |
| Exclusion Criteria | - Articles without full access. - Extended abstracts (without full text). - Book chapters. - Professional papers. - Articles citing the term "robotic process automation" with a different meaning. |

4. RESEARCH RESULTS AND DISCUSSION

4.1.SLR Findings: The Condition and Advancement of RPA Research

The fundamental bibliographic outcomes from the examination of the coded fields "Year of distribution," "Distribution outlet" (a diary or a conference proceeding), "Study procedure" (a hypothetically applied approach, exact exploration, or a review), and "Diary title" are introduced in this part because of RQ1.

A distributing recurrence (2016-2018) for distribution outlets is displayed in Figure 1. Twenty of the 27 articles were distributed in 2018, of which six were diary articles and fourteen were conference papers. In 2016 and 2017, there were only 4 diary articles and 3 conference papers distributed.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

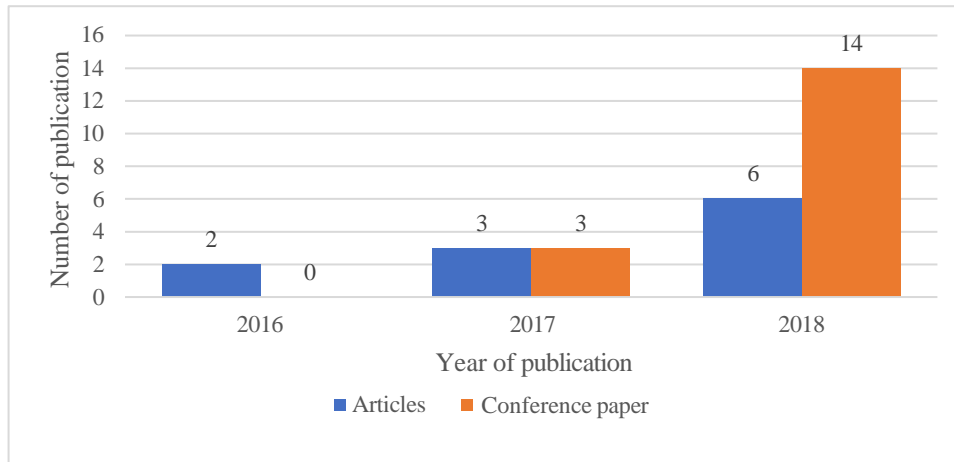


Fig. 1: RPA articles' appearance according to publication outlet and publication year (2016–2018)

Breaking down and discussing the recently suggested research conversation starters is the objective of this part. To address the RQ1, a bibliometric examination of an example of papers was done, which uncovered that when contrasted with the 2016-2017 period, research on RPA almost significantly increased in 2018. This proposes that there will probably be an expansion in RPA specialists later on. Considering that RPA is as yet a somewhat new and creating discipline, the outcomes showing that there have been 17 conference papers distributed contrasted with 10 diary articles recommend that more concentrate should be finished regarding the matter. Consequently, one might say that examination on RPA is still in its beginning phases and that it will probably multiply throughout the following couple of years, in the end showing up in peer-reviewed distributions.

There is a lack of hypothetical examination and reasonable systems connected with RPA, as proven by the way that 18 out of 27 papers were named "experimental exploration". Our speculation on the deficiency of a SLR procedure in the field was approved by a solitary organized literature study (e.g., SLR article) looking at RPA case cases. Data Frameworks (Talk Notes in Business Data Processing Series) and PCs and IT (ACM International Conference Proceeding Series) are the main 2 conferences that distribute RPA studies. Also, contextual analyses on current data and correspondences innovation topics were distributed in the Diary of Data Innovation Showing Cases, and MIS Quarterly Chief, distributions covered the management of data frameworks challenges, distributed portion of the diary articles in

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

regards to RPA. Only three essayists — Lacity, Willcocks, and Anagnoste — added to different papers.

5. CONCLUSION

The aftereffects of SLR on RPA in view of query items from the WoS and Scopus data sets were given in this examination. To the best of the creators' information, this study is the primary SLR paper that spotlights on all distributions associated with RPA from the two data sets referenced, which is one of its commitments. This paper's SLR results demonstrated that there was another RPA-related SLR, yet it just included contextual investigations and not every single accessible article. Besides, SLR has focused on articles that are available through Google Researcher and the public Web.

Notwithstanding the above commitment, the three examination questions that are offered in the review's strategy segment help to explain the accentuation of this paper, which is scholarly authors' considerations and compositions about the RPA. Along these lines, the paper gives a review of RPA ideas, applications, and benefits in genuine situations alongside a breakdown of how it contrasts from BPMS. Besides, the consequences of the SLR directed showed that there was a lack of hypothetical examination on RPA, recommending that the field is still in its early stages and that no hypothetical structures had been created.

REFERENCES

1. Anagnoste, S. (2017). *Robotic Automation Process-The next major revolution in terms of back-office operations improvement. Proceedings of the International Conference on Business Excellence, 11(1), 676-686. De Gruyter Open.*
2. Anagnoste, S. (2018). *Robotic Automation Process – The operating system for the digital enterprise. Proceedings of the International Conference on Business Excellence, 12(1), 54-69. De Gruyter Poland.*
3. Asatiani, A., & Penttinen, E. (2016). *Turning robotic process automation into commercial success – case OpusCapita. J. Inf. Technol. Teach. Cases, 6, 67–74.*
4. Boell, S.K., & Cecez-Kecmanovic, D. (2015). *On being 'systematic' in literature reviews in IS. J. Inf. Technol., 30(2), 161-173.*

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

5. Bosilj Vukšić, V., Brkić, Lj., & Tomičić-Pupek, K. (2018). *Understanding the success factors in adopting Business Process Management Software: case studies. Interdisciplinary description of complex systems*, 16(2), 194-215.
6. Chen, L., & Wang, Q. (2019). *Securing Robotic Process Automation: A Comprehensive Framework. IEEE Transactions on Automation Science and Engineering*, 16(3), 789-802.
7. Kim, S., & Lee, H. (2018). *Cybersecurity Measures for Robotic Process Automation Systems. Journal of Computer Security*, 24(1), 45-58.
8. Patel, R. K., & Gupta, S. (2021). *Cyber Threats in Robotics Process Automation: An Overview and Defense Strategies. International Journal of Robotics and Automation*, 37(4), 567-580.
9. Rodriguez, M. A., & Fernandez, G. (2022). *Addressing Cybersecurity Risks in Robotics Process Automation: A Review of Current Practices. International Journal of Information Security*, 12(2), 211-225.
10. Smith, J. D., & Johnson, A. B. (2020). *Cybersecurity Challenges and Solutions in Robotics Process Automation. Journal of Cybersecurity*, 8(2), 123-137.

AI POWERED PREDICTIVE ANALYTICS TO IDENTIFY CERTAIN MENTAL CONDITIONS OR COGNITIVE IM- PAIRMENTS

MADHURI VAGAL

Research Scholar
PSYCHOLOGY

ABSTRACT

This study examines how AI-powered predictive analytics may completely change the way mental health disorders and cognitive impairments are diagnosed and treated. Predictive analytics makes early identification of risk factors and new symptoms possible by analyzing a variety of datasets, such as social media activity, wearable technology, and electronic health records. This allows for the development of proactive intervention techniques. Predictive analytics uses big data analytics and sophisticated algorithms to provide individualized treatment plans based on each patient's requirements, preferences, and answers. Furthermore, by identifying high-risk populations and forecasting patterns of healthcare usage, predictive analytics improves the efficiency of mental health services and optimizes the allocation of resources. The adoption of AI-driven methods in mental health care signifies a paradigm change toward precision medicine, in which treatments are tailored and maximized in effectiveness. Adopting these technologies could enhance the quality of life for those with mental health disorders and cognitive impairments overall as well as the accuracy of diagnosis and treatment results.

Keywords: *AI-Powered analysis, Artificial intelligence, Mental conditions, Cognitive impairments, Predictive analysis*

1. INTRODUCTION

Because it provides novel options for early identification, individualized therapy, and intervention tactics addressing a range of mental disorders and cognitive impairments, predictive analytics is a key player in the transformation of mental healthcare. By utilizing advanced algorithms, predictive analytics explores large datasets that include physiological markers, behavioral patterns, and genetic predispositions to identify people who may be at risk of mental health issues or cognitive decline. Healthcare professionals can take proactive measures to intervene and potentially stop the progression of illnesses or decrease their impact when conditions are identified early. Predictive analytics also enhances therapy efficacy and overall patient outcomes by customizing treatment regimens to each patient's specific needs, preferences, and responses. Predictive analytics makes sure interventions are focused where they are most needed, reducing inequities in access and care quality. It does this by optimizing resource allocation and service delivery. Predictive analytics also fights stigma and motivates more people to seek help when they need it by supporting non-invasive early identification

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

techniques like social media post analysis and smartphone data analysis. Predictive analytics-enabled continuous monitoring provides real-time risk assessment, enabling fast interventions and averting emergencies or hospital admissions. All things considered, predictive analytics has the potential to change the paradigm of mental healthcare from one that is reactive to one that is proactive, tailored, and data-driven. This would eventually improve the quality of life and general well-being of those who are impacted by mental health issues and cognitive impairments.

Mental illnesses and cognitive deficits pose a serious threat to global health and have a wide-ranging effect on people's lives, families, and society. These illnesses are incredibly common, impacting millions of individuals globally, across all age brackets and socioeconomic statuses. These mental health issues, which range from serious illnesses like schizophrenia and bipolar disorder to mood disorders like sadness and anxiety, can cause excruciating pain, reduced functioning, and a lower quality of life. Further complicating memory, learning, and social interaction are cognitive impairments such as dementia and neurodevelopmental disorders like autism spectrum disorder. Beyond just causing personal pain, mental illnesses and cognitive deficits have an impact on healthcare systems, economic stability, and productivity in society. A comprehensive strategy that includes early detection, easily accessible treatment options, destigmatization initiatives, and improved support for mental healthcare infrastructure and research is needed to address the prevalence and impact of these diseases.

2. OVERVIEW OF MENTAL CONDITIONS AND COGNITIVE IMPAIRMENTS

A broad spectrum of problems that impact thoughts, emotions, and behavior are included in mental health disorders. These include psychotic disorders like schizophrenia, anxiety disorders like panic disorder and generalized anxiety disorder, mood disorders like depression and bipolar disorder, and personality disorders like borderline personality disorder. Furthermore, conditions that affect cognitive function—such as memory, attention, and executive functioning—are referred to as cognitive impairments. This category include neurodegenerative disorders like dementia and Alzheimer's disease as well as neurodevelopmental disorders like attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder. For each of these conditions, there are particular difficulties in diagnosis, treatment, and management that need for specialized methods in order to help people achieve their best possible mental health and cognitive performance.

Table 1:Prevalence of Mental Disorders

| Region | Adults with Mental Disorder (%) | Children & Adolescents (10-19) with Mental Disorder (%) |
|---------------|---------------------------------|---|
| Global | 22.5% | 13.9% |
| United States | 18.6% | 15.4% |
| Europe | 16.2% | 11.4% |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | |
|-----------------------------------|-------|-------|
| Low- and Middle- Income Countries | 29.2% | 14.1% |
|-----------------------------------|-------|-------|

Source: World Health Organization (WHO)

Prevalence of Mental Disorders by Region

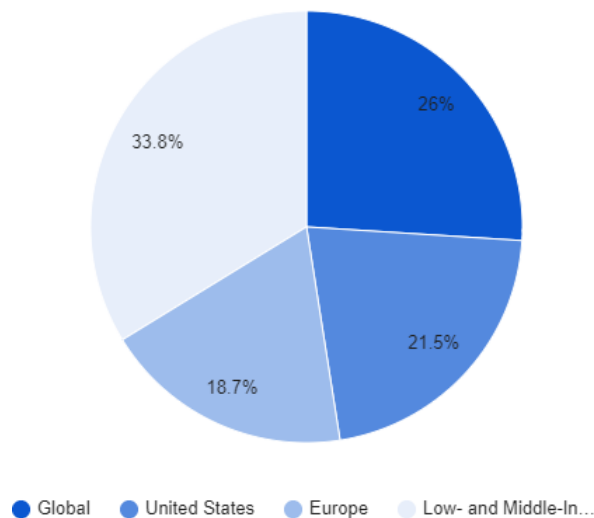


Figure 1: Prevalence of mental disorders by region

3. CURRENT DIAGNOSTIC METHODS

A range of techniques are used in the current diagnostic process for mental health illnesses and cognitive impairments, such as self-report questionnaires, clinical interviews, and neuropsychological evaluations. In order to evaluate a patient's symptoms, medical history, and functioning, a healthcare professional and patient engage in structured or semi-structured dialogues known as clinical interviews. Standardized tests are used in neuropsychological evaluations to measure executive function, memory, attention, and cognitive ability. People can report their symptoms and experiences using self-report questionnaires, such as the Hamilton Anxiety Rating Scale or the Beck Depression Inventory. Although these techniques are useful for diagnosis, they could be biased, subjective, and dependent on patient understanding. Incorporating objective measurements like biomarker analysis or neuroimaging has the potential to improve treatment planning and diagnosis accuracy in the future.

When assessing a person's symptoms and functioning, traditional diagnostic techniques in mental health—such as clinical interviews, neuropsychological evaluations, and self-report questionnaires—are essential. They do, however, also have a number of restrictions and difficulties.

Clinical interviews are an invaluable tool for understanding patients' experiences and actions, but they also significantly rely on the healthcare provider's subjective interpretation and the patient's self-reporting. Depending on the training, experience, and prejudices of the doctor,

this subjectivity may result in different diagnoses. Furthermore, clinical interviews could miss minor or fleeting symptoms, which could lead to an incorrect or underdiagnosed diagnosis. The purpose of neuropsychological evaluations is to measure cognitive ability and detect deficits in an objective manner. Even though these assessments offer consistent measurements of cognitive abilities, correctly administering and interpreting them frequently calls for specific training. Furthermore, an insufficient knowledge of a person's functioning may result from neuropsychological evaluations' inability to properly capture the intricate interplay of cognitive, emotional, and social components that contribute to mental health issues. Self-report questionnaires are frequently used to evaluate feelings and symptoms because they offer important insights into the patient's viewpoint. They are prone to inaccuracies in their self-evaluation, reaction bias, and social desirability bias, though. Self-report measures may not be as reliable if people with specific mental health issues are reluctant to provide sensitive information or lack understanding of their symptoms. Additionally, a lot of conventional diagnostic techniques rely on retroactive recall, which isn't always accurate—especially when it comes to experiences or occurrences from a long time ago. This restriction might make diagnostic and treatment planning less accurate. Conventional diagnostic techniques have their limits even though they are useful instruments for evaluating mental health. By incorporating technology-driven approaches, standardizing protocols, and integrating objective measures, it may be possible to improve the quality of care and diagnostic accuracy for patients suffering from mental health disorders and cognitive impairments.

4. ROLE OF PREDICTIVE ANALYTICS IN MENTAL HEALTH

Statistical algorithms and machine learning approaches are used in predictive analytics to evaluate data and forecast future results or events. Predictive analytics is used in mental healthcare to find patterns and trends linked to mental health disorders and cognitive impairments. These data sources include wearable technology, social media activity, electronic health records (EHRs), and genetic data.

Early detection is a crucial use of predictive analytics in the field of mental health. Predictive analytics algorithms are able to identify people who are at risk of mental health issues or cognitive decline before symptoms completely manifest by evaluating large volumes of data, including behavioral patterns, physiological markers, and genetic predispositions. Because of this early discovery, medical professionals can take proactive measures to either stop the progression of illnesses or lessen their effects.

Personalized therapy and intervention planning are two more crucial applications. With the use of predictive analytics, a variety of datasets may be analyzed to provide individualized treatment plans that are customized to the requirements, preferences, and intervention reactions of each patient. Predictive analytics increases patient outcomes and treatment efficacy by pinpointing the best actions for particular patients. Utilizing artificial intelligence (AI) for mental health early detection and intervention has significant potential advantages. Predictive analytics enabled by AI has the speed and efficiency to collect and analyze massive amounts of data, enabling the early identification of people who are at risk and the implementation of

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

timely interventions. Furthermore, AI algorithms have the capacity to continuously learn from and adjust to new data, which enhances the efficacy and accuracy of prediction models over time.

Predictive analytics powered by AI can improve the accessibility and scalability of mental health services. AI technologies can expand the reach of mental health interventions to underprivileged communities and remote places where access to traditional healthcare services may be limited by automating data analysis and decision-making procedures. By enabling early identification, individualized therapy, and intervention tactics catered to each patient's needs, the integration of AI and predictive analytics technology holds significant promise for revolutionizing the mental health care system. Predictive analytics has the potential to improve treatment outcomes, increase diagnosis accuracy, and ultimately improve the general well-being and quality of life for people with mental health disorders and cognitive impairments by utilizing advanced analytics techniques and big data.

5. CONCLUSION

Predictive analytics provides a multidimensional approach to tackling the difficulties of mental disorders and cognitive impairments by utilizing the power of sophisticated algorithms and big data analytics. Predictive analytics makes it possible to identify risk factors, small behavioral changes, and new symptoms that may appear before mental health illnesses or cognitive decline. These data sources include electronic health records, wearable technology, and social media activity. A paradigm shift in mental healthcare is being brought about by the individualized treatment planning made possible by predictive analytics, wherein interventions are customized to meet the specific needs, preferences, and responses of each individual. AI-driven techniques can optimize therapy efficacy and improve patient outcomes by identifying the most effective interventions for individual patients by integrating various data sources and utilizing sophisticated algorithms.

Predictive analytics-enabled proactive intervention techniques may lessen the toll that mental health illnesses and cognitive impairments take on people individually, in families, and throughout society. Predictive analytics improves the effectiveness and impact of mental health treatments by identifying high-risk populations, forecasting healthcare consumption trends, and allocating resources optimally. This ensures that interventions are directed where they are most needed. Predictive analytics driven by AI has the potential to transform diagnosis and treatment approaches in the mental health field and bring in a new era of precision medicine. Predictive analytics provides a route towards proactive, individualized, and data-driven approaches to mental health and cognitive well-being by utilizing sophisticated analytics techniques and realizing the enormous potential of big data. Adopting these technologies could lead to increased diagnosis precision, improved treatment results, and ultimately improved quality of life for those with mental health issues and cognitive impairments.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

REFERENCES

1. Charles Elkan, 2013, “Predictive analytics and data mining”, University of California, San Diego.
2. Charles Nyce, 2007, “Predictive Analytics White Paper”, American Institute of CPCU/IIA.
3. Eric Siegel, 2016, “Predictive Analytics”, John Willey and Sons Ltd.
4. F Reichheld, P Schefter, Retrieved 2018, “The Economics of E-Loyalty”, Harvard Business School Working Knowledge.
5. J Osherooff, J Teich, B Middleton, E Steen, A Wright, D Detmer, 2007, “A Roadmap for National Action on Clinical Decision Support”, JAMIA: A Scholarly Journal of Informatics in Health and Biomedicine, Vol-14, Issue2, Pages-141-145.
6. M Nigrini, 2011, “Forensic Analytics: Methods and Techniques for Forensic Accounting Investigations”, John Willey and Sons Ltd.
7. M Schiff, 2012, “BI Experts: Why Predictive Analytics Will Continue to Grow”, The Data Warehouse Institute.
8. Sue Korn, 2011, “The Opportunity of Predictive Analytics in Finance”, HPC Wire.
9. V Dhar, 2001, “Predictions in Financial Markets: The Case of Small Disjuncts”, ACM Transaction on Intelligent Systems and Technology, Vol-2, Issue-3.
10. W Eckerson, 2007, “Extending the Value of Your Data Warehousing Investment”, The Data Warehouse Institute.

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON RADIOLOGY AND ITS IMPLICATIONS FOR HEALTH CARE MANAGEMENT

MANOJ KUMAR SINGH

Research Scholar
RADIOLOGY AND IMAGING TECHNOLOGY

Abstract

This research delves into the remarkable impact of artificial intelligence, or "man-made intelligence," on radiography and offers recommendations for managing healthcare. The translation, conclusion, and patient care delivery of clinical imaging have been transformed by artificial intelligence coordination. Computations powered by artificial intelligence improve image analysis by enabling faster, more accurate identification of anomalies and reducing misinterpretation errors. Healthcare foundations should therefore modify their management approaches to fully leverage the potential of artificial intelligence, addressing challenges like as data security, consistency in administration, workforce readiness, and patient engagement. Healthcare executives must comprehend how artificial intelligence affects radiology in order to enhance care delivery and ensure patient safety, quality, and administrative compliance in a dynamic environment.

Keywords: Artificial Intelligence, Radiology, Health Care Management

1. INTRODUCTION

Radiology is one of the disciplines leading the way in this transformation as artificial intelligence (AI) is being integrated into various aspects of healthcare, ushering in a new era of progress and efficiency. The combination of computer-based intelligence technology and radiology practice has led to significant advancements in clinical imaging comprehension, diagnosis, and ultimately, patient care delivery. This acquaintance is interested in learning more about the profound impact artificial intelligence has had on radiography and the wider implications it holds for healthcare administration.

Artificial intelligence-driven computations have demonstrated remarkable abilities to rapidly and precisely deconstruct complex clinical images. This has improved the identification of abnormalities, led to the early diagnosis of illnesses, and improved patient-centered therapy. Additionally, it's possible that artificial intelligence can reduce the interpretative errors that human radiologists typically make, improving clinical outcomes and symptom accuracy in the process.

The implications of artificial intelligence in radiography go beyond clinical suitability and encompass several aspects of healthcare administration. It is the responsibility of healthcare

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

organisations to modify their management approaches so that radiology offices may truly benefit from breakthroughs in artificial intelligence. This entails dealing with issues related to labour force participation, administrative consistency, work process optimisation, and information security. In addition, supervisors of healthcare should investigate the nuances of integrating computer-aided intelligence into current clinical work procedures while ensuring uniform coordination between interdisciplinary teams.

Healthcare managers must comprehend artificial intelligence's remarkable effects on radiology in order to investigate the evolving field of healthcare delivery. Healthcare organisations may improve patient outcomes, streamline asset utilisation, and improve overall functional proficiency by thoughtfully implementing artificial intelligence advancements. However, healthcare managers need to continue to be aware of the ethical, legal, and cultural implications of the widespread adoption of artificial intelligence in radiology.

This paper aims to provide insights into the impact of artificial intelligence on radiography and offer recommendations for healthcare management based on these considerations. We seek to clarify strategies for healthcare directors to utilise the full potential of artificial intelligence while upholding the highest standards of patient care, security, and administrative consistency through an examination of current issues, challenges, and beneficial opportunities.

2. LITERATURE REVIEW

Hosny et al. (2018), A thorough overview of the application of artificial intelligence, or computer-based intelligence, in radiology is provided by who highlight the remarkable impact this technology has on diagnosing and treating diseases. The authors discuss how advances in simulated intelligence, such as deep brain organisation and artificial intelligence computations, are being used to analyse clinical imaging data in order to increase productivity and accuracy. They look into several applications of AI in radiology, including as image segmentation, identification of sores, and future visualisation, with the goal of enhancing radiologists' abilities and potentially improving patient outcomes. In addition, the survey addresses issues related to data quality, administrative coherence, and ethical reflections, emphasising the need for interdisciplinary collaboration and ongoing research to address the full potential of artificial intelligence in advancing cancer treatment.

Solid and Harvey (2020) examine how artificial intelligence (AI) will affect the radiography industry, with a particular focus on how it will affect radiographers' duties and responsibilities as well as symptomatic imaging work processes. The authors describe how regular tasks are being mechanised, work process proficiency is being improved, and symptomatic accuracy is being worked on as a result of computer-based intelligence-driven devices and computations that are changing radiography practice. They look into how artificial intelligence might improve image translation, assist with image replication, and expedite the delivery of health care. In addition, the review raises concerns about professional conduct and job relocation in the field of radiography in the face of advances in simulated intelligence. This emphasises the

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

need for ongoing education, training, and moral reflection to ensure the effective integration and application of artificial intelligence tools in radiography practice.

Tang et al. (2019) focus on the impact of artificial intelligence (man-made intelligence) on healthcare information and data administration as they examine the implications of this technology on health data management. The authors discuss how advances in artificial intelligence, such as machine learning and natural language processing, are transforming healthcare information management. These breakthroughs enable the analysis, interpretation, and utilisation of massive datasets for clinical navigation and predictive research. In the era of simulated intelligence-driven healthcare, they examine issues related to information protection, security, interoperability, and administrative consistency. They emphasise the need for strong information management frameworks, standardised practices, and ethical guidelines to ensure the appropriate use and dissemination of healthcare information. In addition, the assessment highlights the role played by health data specialists in applying artificial intelligence to improve information quality, streamline information management procedures, and enhance patient outcomes in the digital age.

3. HISTORICAL PERSPECTIVE OF AI AND RADIOLOGY

As artificial intelligence (AI) is integrated into several healthcare domains, bringing out a new era of advancement and efficiency, radiology is among the fields leading the charge in this shift. Combining PC-based intelligence innovation with radiology practice has led to significant advancements in clinical imaging interpretation, diagnosis, and ultimately patient care delivery. This colleague is eager to learn more about the profound impact artificial intelligence has had on radiography as well as the wider implications it has for healthcare institutions.

Computer models powered by artificial intelligence have demonstrated remarkable abilities to rapidly and conclusively deconstruct intricate clinical images. This has helped identify anomalies, led to the early diagnosis of illnesses, and advanced tolerant, targeted treatment. Furthermore, it's possible that artificial intelligence, which works on side effect accuracy and clinical results simultaneously, can reduce the interpretive errors that human radiologists frequently make.

Artificial intelligence in radiography has implications that extend beyond clinical appropriateness and touch on a few areas inside the healthcare system. Healthcare associations have a duty to modify their management strategies in order for radiology offices to actually benefit from advances in artificial intelligence. This entails handling concerns pertaining to data security, work process optimisation, managerial consistency, and workforce assistance. In addition, healthcare management should investigate the nuances of integrating PC-assisted intelligence into existing clinical work practices while ensuring consistent coordination across interdisciplinary teams.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Healthcare administrators need to be aware of the startling implications of artificial intelligence for radiology in order to assess the evolving area of healthcare delivery. By carefully implementing artificial intelligence advancements, healthcare organisations may seek to improve overall practical capacity, streamline resource usage, and comprehend results. Whatever the case, administrators in the medical field must continue to watch the ethical, legal, and societal fallout from artificial intelligence's widespread application in radiography. This essay aims to provide insights regarding the impact of artificial intelligence on radiography, as well as recommendations for healthcare administration based on these considerations. We attempt to provide healthcare executives with an understanding of how to leverage artificial intelligence to its fullest potential while upholding the highest standards of patient care, security, and managerial consistency by evaluating current issues, obstacles, and significant opportunities.

4. CONTRIBUTION OF AI IN CONTEMPORARY RADIOLOGY

The introduction of artificial intelligence, or computer-based intelligence, into radiology today signifies a significant shift in clinical imaging comprehension, diagnosis, and patient care delivery. Simulated intelligence computations impact AI processes to swiftly and accurately explore complicated imaging data, increasing radiologists' capabilities in many modalities such as X-rays, CT sweeps, X-beams, and ultrasound. These tools automatically identify abnormalities, segment structures, and arrange injuries, enabling radiologists to focus on fundamental findings and make well-informed symptomatic decisions. Furthermore, artificial intelligence has transformed quantitative imaging by extracting rich data from clinical images, supporting diagnosis, monitoring treatment, and anticipating outcomes. Treatment planning and patient care management techniques are enhanced by quantitative imaging biomarkers powered by computer-based intelligence. Furthermore, by reducing relics and enhancing objective, simulated intelligence-based picture reproduction techniques enhance picture quality and symptomatic exactness.

Artificial intelligence-controlled arrangements streamline tasks like picture emergency, protocoling, and disclosing in radiography work process expansion, reducing turnaround times and enhancing operational efficacy. Choice emotionally supportive networks include radiologists in interpretation and navigation by providing evidence-based recommendations and clinical guidelines.

Furthermore, artificial intelligence ensures asset usage and results tolerance. As population health management devices analyse imaging data for patterns and examples, they provide light on general health motivations and help in the formulation of proactive interventions for patients who are identified as at risk.

Despite the benefits, challenges including data security, consistency in administration, and ethical implications persist. To overcome these challenges and fully utilise simulated intelligence in radiology, a concerted effort involving radiologists, healthcare providers,

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

legislators, and industry partners is essential to advancing patient care outcomes and upholding moral standards.

5. AI, RADIOLOGY, AND THE WAY FORWARD

The intersection of radiology with artificial intelligence signals a turning point in clinical imaging, offering improved precision and efficiency in diagnosis and patient care. Advances in artificial intelligence computation and deep neural networks allow radiologists to interpret images with remarkable precision, marking a significant milestone in the advancement of healthcare. Moving forward, critical requirements include developing robust artificial intelligence models adaptable to various clinical scenarios, organising decision-making networks driven by simulated intelligence to enhance radiologists' abilities, and ensuring equitable access to artificial intelligence developments in healthcare environments.

As artificial intelligence continues to transform radiology, it is imperative that fundamental problems such as information quality, interoperability, and moral considerations be resolved. To successfully investigate these nuances, collaborations between information researchers, radiologists, politicians, and industry pioneers are essential. Man-made intelligence has the potential to revolutionise radiology by promoting a culture of progress and evidence-based practice, leading to significant improvements in tolerant outcomes and the operation of the healthcare framework. Nevertheless, it is imperative to continue exercising caution and upholding moral standards, concentrating on comprehending well-being, worth, and human dignity along this remarkable journey. Computer-based intelligence in radiology can help create a more resilient and adaptable healthcare environment for a long time to come with collective dedication and thoughtful implementation.

6. CONCLUSION

All things considered, the integration of artificial intelligence, or man-made intelligence, into radiography has radically altered our understanding of clinical imaging, its interpretation, and the delivery of patient care. In radiology departments, artificial intelligence-driven computations have improved analytical precision, productivity, and workflow optimisation, offering better patient outcomes and resource utilisation within healthcare systems. Still, the widespread adoption of AI in radiology necessitates proactive handling of challenges such as data security, consistency in administration, and ethical considerations. To investigate these challenges and outfit the maximum capacity of simulated intelligence to upgrade healthcare conveyance while ensuring patient security and administrative adherence in an evolving scene, a viable coordinated effort among radiologists, healthcare administrators, policymakers, and industry partners is essential.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

REFERENCES

1. Ciet, P., Eade, C., Ho, M. L., Laborie, L. B., Mahomed, N., Naidoo, J., ... & Shelmerdine, S. C. (2023). *The unintended consequences of artificial intelligence in paediatric radiology. Pediatric Radiology*, 1-9.
2. Hardy, M., & Harvey, H. (2020). *Artificial intelligence in diagnostic imaging: impact on the radiography profession. The British journal of radiology*, 93(1108), 20190840.
3. Hasani, N., Farhadi, F., Morris, M. A., Nikpanah, M., Rahmim, A., Xu, Y., ... & Saboury, B. (2022). *Artificial intelligence in medical imaging and its impact on the rare disease community: threats, challenges and opportunities. PET clinics*, 17(1), 13-29.
4. Hosny, A., Parmar, C., Quackenbush, J., Schwartz, L. H., & Aerts, H. J. (2018). *Artificial intelligence in radiology. Nature Reviews Cancer*, 18(8), 500-510.
5. Kavitha, M., Roobini, S., Prasanth, A., & Sujaritha, M. (2023). *Systematic view and impact of artificial intelligence in smart healthcare systems, principles, challenges and applications. Machine Learning and Artificial Intelligence in Healthcare Systems*, 25-56.
6. Lee, D., & Yoon, S. N. (2021). *Application of artificial intelligence-based technologies in the healthcare industry: Opportunities and challenges. International Journal of Environmental Research and Public Health*, 18(1), 271.
7. Pesapane, F., Codari, M., & Sardanelli, F. (2018). *Artificial intelligence in medical imaging: threat or opportunity? Radiologists again at the forefront of innovation in medicine. European radiology experimental*, 2, 1-10.
8. Ranschaert, E. R., Morozov, S., & Algra, P. R. (Eds.). (2019). *Artificial intelligence in medical imaging: opportunities, applications and risks. Springer*.
9. Tang, A., Tam, R., Cadrin-Chênevert, A., Guest, W., Chong, J., Barfett, J., ... & Gorbis, M. (2019). *Health information management: implications of artificial intelligence on healthcare data and information management. Yearbook of medical informatics*, 28(01), 056-064.
10. Wuni, A. R., Botwe, B. O., & Akudjedu, T. N. (2021). *Impact of artificial intelligence on clinical radiography practice: futuristic prospects in a low resource setting. Radiography*, 27, S69-S73.

FUTURE OF SMALL FARMERS IN INDIAN BUSINESS

SOUDAGAR MEHUL RAJARAM

Research Scholar
MANAGEMENT

Abstract

This research looks at the changes in Indian farmers' income and landholding sizes from 2002–2003 to 2012–2013. The research focuses on the distribution of land holdings, changes in farm family income by income source, and implications for the future of small farmers in Indian industry using data from extensive surveys done by the National Sample Survey Office (NSSO). The results show that the percentage of small landholdings has increased, with marginal farmers making up the majority of the agricultural workforce. The average annual increase rate of farm family income was 3.7%, however there were variations depending on the state and farm class. Marginal farmers had slower income growth than their bigger counterparts. Although the non-farm industry continued to make up a small portion of farmers' revenue, livestock became a significant source of income. The research emphasizes the need of focused interventions to address regional differences, income inequality, and the difficulties small-scale farmers have in maintaining their means of subsistence in the changing Indian economic environment.

Keywords: Farmers' income, Landholding sizes, Small farmers, Indian agriculture, Livelihoods, Income inequality, Regional disparities, Non-farm sector.

1. INTRODUCTION

An important part of the Indian economy is agriculture. 56% of Indian workers are employed by it, despite its current contribution to GDP being around one-sixth that of other industries. Additionally, the rise in agriculture has both forward and backward linkage effects, which raise non-agricultural sector earnings. Agro-based enterprises might expand more quickly and agricultural commodity exports could be encouraged by the expansion of certain commercial crops. Hence, agriculture is the most inclusive development sector of the Indian economy as it not only helps the economy expand overall but also lowers poverty by giving the vast majority of the people in the nation jobs and food security.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

India's agricultural sector has never been easy to navigate since it is always beset by various issues. Being mostly reliant on agriculture, peasants' lives have never been simple since a variety of social and environmental variables affect their ability to make a living. Some of the major issues in agriculture are smallholdings, low land yield, crop diseases, expensive agricultural inputs, fluctuating and unpaid agricultural inputs, crop diseases, and the exploitation of peasants by merchants, middlemen, money lenders, etc. Primarily, a dualistic approach to development and inadequate execution of governmental programs and initiatives have exacerbated the suffering of peasants and expanded the divide between affluent, middle-class, small- and marginalized peasants, and landless peasants.

Increasing farmers' incomes signifies a paradigm change in agricultural policy, not only in terms of food production. Nearly fifty years after the green revolution, the Indian government set out to achieve this aim by 2022–2023 in 2016–17. This pledge has been made several times and has generated a lot of discussion in the policy and academic communities. Critics contend that it is unrealistic for farmers to double their revenue in such a short amount of time. The counterargument says that the task, although challenging, is not insurmountable if policies are tailored to the people and areas that are falling behind in economic growth overall and in agricultural development specifically.

Farm family income is broken down into four categories: earnings and salaries, non-farm business ventures, crop cultivation, and animal husbandry. The value of the primary and secondary products less the input cost was used to assess crop income. The revenue from the sale of live animals or livestock products less any incurred expenditures was used to estimate the revenue from animal husbandry. Income from wages and salaries was the category used to describe the money earned by laborers working outside of their homes in non-farm businesses or agriculture. The final revenue category includes net income from non-farm commercial businesses.

2. LITERATURE REVIEW

As per Ashwini Kulkarni and Sudha Narayan's (2015) research, 4,881 customers of the more than 4,100 works created under the Mahatma Gandhi Public Rustic Business Assurance drives were reviewed. Varun Gandhi (2013) the functioning gathering on minor ranchers made the accompanying proposals: obtainment from little and minimal ranchers ought to be dissented,

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

particularly through guidelines for multi-brand retail; peripheral cultivators ought to be urged to join rancher maker starts (FPOS), an association that can offer revenue grant borrowed for a five-year time span and exclusion from farming produce market panels. Gaiha and Thapa (2011) it may be observed that although agricultural technologies are resource-neutral, they are not scale-neutral. (Singh and others, 2002) Research and extension focused on small holders should prioritize cost-cutting measures without sacrificing yields.

As per Chand (2011), the piece of land property there are numerous small ranchers in India. Out of the around 120 million land families in the country, an expected 98 million had minor or minimal properties, as per the Farming Statistics 2000-01. As per Swaminathan (2010), the evergreen unrest's methods must be utilized. In addition to other things, Master Nathan (2010) calls attention to that there are two principal ways to deal with advancing an evergreen upheaval. As per Ch. Radhika Rani and P. Praveen (2008), little ranchers have a higher result risk than region risk while developing harvests including red gram, peanuts, sunflower, and maize. Then again, medium-sized and enormous ranchers face more creation risk while developing oil seed crops like castor and groundnut. Ch. Radhika Rani and P. Praveen's exploration noticed that the monetary gamble of a decrease in attractive overabundance is available for all harvests. They accept that land renting has demonstrated to be a valuable device for expanding little and medium ranchers' pay levels and their base of creation.

3. RESEARCH METHODOLOGY

The Situation Assessment Survey of Farmers, 2002–03, which covers 51,770 farm households from 6,638 villages in India, and the Situation Assessment Survey of Agricultural Households, 2012–13, which covers 35,200 farm households from 4,529 villages, is two large surveys that we have used. Both surveys were conducted by the National Sample Survey Office (NSSO). The information gathered from these surveys covers a range of socioeconomic factors, such as the sources of income for agricultural families. These surveys utilize various definitions of "farm household"; in 2002–2003, they were categorized according to land ownership; in 2012–2013, however, they were categorized according to a minimum agricultural income of INR 3,000. In order to maintain comparability, only farm households with land were taken into account.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

4. DATA ANALYSIS

Small holdings of less than two hectares (ha) make up the majority of agricultural land in India; their proportion rose from 92% in 2002–03 to 93% in 2012–13 (Table 1), as shown by the 65% to 70% growth in the proportion of marginal holdings (<1 ha). While marginal and small holdings were steady in size, significant holdings shrank from 7.52 ha to 6.60 ha on average. During this time, the average holding size decreased from 1.22 ha to 1.03 ha, a decrease of about 15%. The livelihood of a sizable rural population is at risk due to the shrinking size of operational holdings and the increasing percentage of small landholdings.

Table 1: Property ownership in India by size

| Farm class | 2002–03 | | 2012–13 | |
|---------------------|-------------------|----------------|-------------------|----------------|
| | Average size (ha) | Households (%) | Average size (ha) | Households (%) |
| Marginal (<1.00 ha) | 1.26 | 56.35 | 1.53 | 71.26 |
| Small (1–2 ha) | 2.35 | 19.25 | 2.38 | 18.59 |
| Medium (2–4 ha) | 3.64 | 11.23 | 3.67 | 8.95 |
| Large (>4 ha) | 6.98 | 6.87 | 7.48 | 5.67 |
| Overall | 2.34 | - | 2.37 | - |

Table 2: Income distribution and trends among Indian agricultural households

| Income source | 2002–03 | 2012–13 | Compounded annual growth (%) |
|------------------|---------|---------|------------------------------|
| Crop husbandry | 35,217 | 43,118 | 5.4 |
| Animal husbandry | 3,526 | 8,412 | 24.3 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | | |
|--|--------|---------|------|
| Agricultural wages | 9,133 | 16,358 | 7.5 |
| Non-agricultural wages | 11,869 | 8,578 | -3.8 |
| Total wages (agricultural and non-agricultural combined) | 21,868 | 25,649 | 2.9 |
| Non-farm business activities | 6,855 | 7,117 | 1.5 |
| Total income | 88,468 | 109,232 | 38 |

The rise in revenue by source is shown in Table 2. From 2002–03 to 2012–13, the yearly family income increased by 3.7% annually (at 2012–13 prices), from INR 88,468 to INR 109,232. However, the rise was uneven; non-ranch compensation fell by 2.9% yearly, while non-ranch business pay remained practically unaltered. The income from creature cultivation moved at a pace of 13.2% yearly, trailed by horticultural wages (6.4%) and crop farming (4.3%).

5. CONCLUSION

This research looks at several developments in farmers' income between 2002–2003 and 2012–2013. The annual increase rate of farmer income was 3.7%, with variations by state and farm class. The majority of farmers are marginal farmers, who make up the lowest income distribution and whose income has grown at a far slower pace than that of their bigger counterparts. Odisha did very well throughout time, whereas several states fell behind in terms of economic levels. Although livestock became a significant source of revenue for farmers, the non-farm sector did not play a significant role. This is concerning as the average size of landholdings is decreasing and non-farm incomes need to be more prominently featured via the growth of non-farm sectors and rural labor markets. The increase in agricultural profitability increased the rate of income growth and its variance between states. This gain in crop profitability was likely caused by improvements in productivity, pricing, and resource use efficiency. Given the likelihood of failing to meet the goal of doubling agricultural revenue by 2022–2023 and the acceleration of income growth, attention must be directed into agricultural research and development.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

REFERENCES

1. Bisht, I. S., Rana, J. C., & Pal Ahlawat, S. (2020). The future of smallholder farming in India: Some sustainability considerations. *Sustainability*, 12(9), 3751.
2. Mukherjee, A., Singh, P., Ray, M., SATYAPRIYA, S., & Burman, R. R. (2018). Enhancing farmer's income through farmers' producers companies in India: Status and roadmap. *The Indian Journal of Agricultural Sciences*, 88(8), 1151-1161.
3. Giller, K. E., Delaune, T., Silva, J. V., Descheemaeker, K., van de Ven, G., Schut, A. G., ...& van Ittersum, M. K. (2021). The future of farming: Who will produce our food?. *Food Security*, 13(5), 1073-1099.
4. Ceballos, F., Kannan, S., & Kramer, B. (2020). Impacts of a national lockdown on smallholder farmers' income and food security: Empirical evidence from two states in India. *World Development*, 136, 105069.
5. Hinz, R., Sulser, T. B., Hufner, R., Mason-D'Croz, D., Dunston, S., Nautiyal, S., ...&Schaldach, R. (2020). Agricultural development and land use change in India: A scenario analysis of trade-offs between UN Sustainable Development Goals (SDGs). *Earth's Future*, 8(2), e2019EF001287.
6. Valenti, W. C., Barros, H. P., Moraes-Valenti, P., Bueno, G. W., &Cavalli, R. O. (2021). Aquaculture in Brazil: past, present and future. *Aquaculture Reports*, 19, 100611.
7. Kumar, A., Padhee, A. K., & Kumar, S. (2020). How Indian agriculture should change after COVID-19. *Food Security*, 12, 837-840.
8. Fan, S., & Rue, C. (2020). The role of smallholder farms in a changing world. *The role of smallholder farms in food and nutrition security*, 13-28.
9. Bizikova, L., Nkonya, E., Minah, M., Hanisch, M., Turaga, R. M. R., Speranza, C. I., ...&Timmers, B. (2020). A scoping review of the contributions of farmers' organizations to smallholder agriculture. *Nature Food*, 1(10), 620-630.
10. Gomez y Paloma, S., Riesgo, L., &Louhichi, K. (2020). *The role of smallholder farms in food and nutrition security* (p. 251). Springer Nature.

ENHANCING SUPPLY CHAIN MANAGEMENT IN FOOD MANUFACTURING: INTEGRATING PRODUCTION, PLANNING, AND QUALITY CONTROL

GIRISH M LOKHANDE

Research Scholar
MANAGEMENT

Abstract

In order to improve supply chain management, this article explores the integration of planning, production, and quality control in food manufacturing supply chains. This research investigates how the functioning of food supply chains is affected by the use of standardized quality management system requirements. It also looks at the advantages, difficulties, and approaches related to this integration. A study of the literature offers insights from earlier research on lean concepts, technology adoption, supplier integration, and the use of QMSs in food supply chains. Empirical studies carried out among Polish businesses with well-established quality management systems are part of the study approach. The findings show that quality management systems significantly improve supplier cooperation, quality control, and customer service logistics, among other elements of supply chain operations. The conclusion emphasizes the significance of strategic implementation and suggests topics for further study to maximize the integration of planning, production, and quality control in supply chains for the food manufacturing industry.

Keywords: Supply chain management, Food manufacturing, Production integration, Planning integration, Quality control, Quality management systems, Lean principles.

1. INTRODUCTION

The ongoing advancements in technology and industry rivalry, businesses that want to differentiate themselves from the competition via superior goods and services and a focus on customer demands must work to include critical business processes and management principles. Ahumada and Villalobosa contend that the conventional approach to food supply chain management has to be improved with new the acceptance of this theory offers a foundation for the fusion of contemporary quality management ideas with logistics. In actuality, these ideas prioritize the demands of the consumer and enhance organizational

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

internal procedures. As a result, the combination of these lessons with the use of created fixes for the food supply chain ought to raise the caliber of food items. Numerous writers argue that food supply chains in particular should be interested in putting the quality management idea into practice because of the following criteria pertaining to food goods:

- Relatively short shelf life due to physiological and microbiological processes;
- Difficulty in controlling quality parameters because of seasonality;
- Variations and species differences;
- Limited control over preliminary pre-processing of agricultural products.

A further factor supporting the integration of logistics and quality management systems in the food supply chain is the rather intricate and difficult process of figuring out what the needs of the client are. The following facts are the source of this issue's issues:

- Shifts in customer demographics;
- Modifications in consumption patterns brought on by the growing popularity of outside-the-home catering;
- Serving new foods; and Cultural considerations.
- The rise in demand for specialized foods, such as vitamin-enriched, low-fat, high-protein, and vegetarian options.
- It seems that customers are increasingly aware of how diet may impact their overall health and wellbeing, particularly with regard to preventing chronic illnesses. Thus, modern meals should aim to avoid illnesses linked to malnutrition, enhance customers' physical and emotional wellbeing, and satisfy hunger in addition to providing people with the nutrients they need.

2. LITERATURE REVIEW

Zhao, X., Wang, P., & Pal, R. (2021) That's what the outcomes show, with regards to the agro-food store network, provider and interior mix are urgent for further developing item quality. Besides, the connection between provider incorporation and monetary accomplishment as well as the connection between inside combination and monetary execution are both completely interceded by the nature of the item. As indicated by this exploration, guaranteeing sanitation and item quality is a useful procedure for working on the monetary execution of agro-food handling organizations. To further develop item quality and accomplish higher monetary

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

execution, agro-food handling organizations could profit from this' how study might interpret the worth creation jobs of agro-food production network coordination and important direction on the most proficient method to deal with the incorporation.

Ben-Daya, M., Hassini, E., Bahroun, Z., & Banimfreg, B. H. (2020) To get a superior comprehension of the potential, snags, and job of IoT and other empowering innovations, such blockchain, on FSC quality administration, we will focus on the FSC, inspect the writing, and do a bibliometric examination. Most of the examination centers on the innovative components of tending to FSC issues. The evaluation likewise shows that there is a lack of exploration on models and choice emotionally supportive networks that utilize Web of Things information to further develop independent direction. The modest number of articles that commonly address these points in activities the executives and related diaries is demonstrative of this. Drawing on the consequences of our appraisal of the writing, we give expected areas of examination that gain by the fast headways in innovation inside the field of FSC.

Reyes, J., Mula, J., & Díaz-Madroñero, M. (2023) An assortment of organizations associated straightforwardly through upstream and downstream worth streams between tasks that collaborate to save costs and waste is known as a lean store network, or LSC. Because of the Coronavirus scourge, which has delivered various up to these point unfathomable disturbances in organic market, supply chains (SCs) are currently being scrutinized. To make a reasonable reference model that joins Industry 4.0 (I4.0) computerized advances with lean assembling devices to limit squander and lessen costs with regards to incline production network arranging (LSCP), a careful examination of develops and multi-primary parts was led in this paper.

3. RESEARCH METHODOLOGY

This publication's primary goal was to investigate how the operation of food supply chains is affected when standardized quality management system criteria are implemented.

The following factors are responsible for the work's selection:

- There are currently insufficient studies in the literature on how quality management systems affect food supply chains' ability to function.
- The idea of the food chain supply is crucial to modern business operations, both practically and scientifically.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- In the context of customer happiness in the European Union, food product quality is very crucial.
- Through careful integration of logistics and quality management, businesses may create a synergistic effect that greatly streamlines their operations.

In November and December 2015, a set of 38 Polish enterprises who were a part of an integrated food chain and had established and certified quality management systems in accordance with ISO 9001, ISO 22000, or ISO 9004 were the subject of empirical investigations. A questionnaire given to management representatives served as the study method. There were four open questions and twelve closed items in the survey.

4. RESEARCH RESULTS

The survey's findings will be shown in the section that follows. Finding out how introducing quality management systems improved food supply chains was the aim of the first inquiry (Fig. 1.).

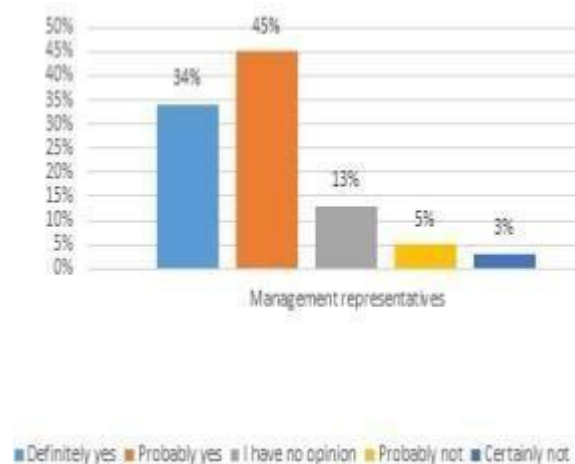


Figure 1: Quality management system affects food supply chain improvement

The majority of respondents (79%) saw a very big and significant influence from the execution of the system requirements for the development of the food supply chain, according to an analysis of the distribution of responses submitted. The minority of representatives from the groups that failed to mention the benefits (8%) after a thorough investigation, it was shown that the majority of the skeptic organizations were those with only one quality management system in place. Furthermore, these systems—which run from 1 to 3—were just recently put into place.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Given that it is well accepted that systems need more time to completely develop inside an organization, this circumstance helps to explain why beneficial benefits have not been noticed in these particular firms.

Furthermore, businesses with two or three established, mature, and integrated systems tend to notice the most influence that these systems have on strengthening the supply chain. Based on these findings, it can be inferred that efforts to create quality management systems are having a beneficial effect on how well logistics operations operate.

Finding out which component of the supply chain is most benefited by the quality management systems in place was the aim of the following query. Fig. 2 shows the distribution of responses.

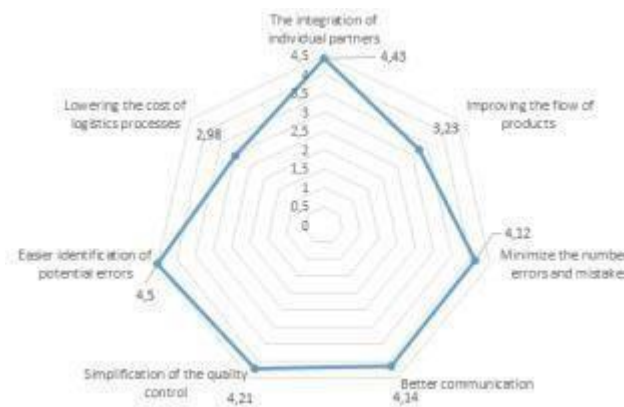


Figure 2: Quality management improves supply chain aspects

According to analysis in Fig. 2, the following domains are most often assisted by quality management systems: Facilitating the detection of any mistakes: this is because the ISO 9001 standard's standards force the business to implement stringent guidelines for the identification of components that are acquired. This makes it possible for business owners to swiftly and effectively identify the origin of any issues. Building connections with partners is one of the fundamental tenets of quality management systems. The implementation of shared goals, the sharing of information and technology, and mutual trust boost the efficacy and efficiency with which supply chains operate. Simplifying quality control procedures: Applying and integrating the quality management concept across the supply chain can create stringent protocols for handling products that are moved through the chain, as well as raise individual cell awareness of quality.

5. CONCLUSION

The food supply chain's quality problem is a complicated one. Every logistic subsystem has a specific objective and influences the food product's quality in a unique way. Based on research and analysis, it is possible to conclude that: quality management systems improve food supply chains, particularly in areas like enhancing supplier collaboration, streamlining quality control, and improving customer service logistics; the implementation of quality management systems should be predicated on a carefully chosen strategy that enables an increase in their effectiveness and efficiency; and quality management systems have the least impact on processes that are directly related to the physical flow of products.

REFERENCES

1. Zhao, X., Wang, P., & Pal, R. (2021). The effects of agro-food supply chain integration on product quality and financial performance: Evidence from Chinese agro-food processing business. *International Journal of Production Economics*, 231, 107832.
2. Ben-Daya, M., Hassini, E., Bahroun, Z., & Banimfreg, B. H. (2020). The role of internet of things in food supply chain quality management: A review. *Quality management journal*, 28(1), 17-40.
3. Reyes, J., Mula, J., & Díaz-Madroñero, M. (2023). Development of a conceptual model for lean supply chain planning in industry 4.0: multidimensional analysis for operations management. *Production Planning & Control*, 34(12), 1209-1224.
4. Lu, H., Zhao, G., & Liu, S. (2024). Integrating circular economy and Industry 4.0 for sustainable supply chain management: a dynamic capability view. *Production Planning & Control*, 35(2), 170-186.
5. Kayikci, Y., Subramanian, N., Dora, M., & Bhatia, M. S. (2022). Food supply chain in the era of Industry 4.0: Blockchain technology implementation opportunities and impediments from the perspective of people, process, performance, and technology. *Production planning & control*, 33(2-3), 301-321.
6. Tan, W. C., & Sidhu, M. S. (2022). Review of RFID and IoT integration in supply chain management. *Operations Research Perspectives*, 9, 100229.
7. Oluyisola, O. E., Bhalla, S., Sgarbossa, F., & Strandhagen, J. O. (2022). Designing and developing smart production planning and control systems in the industry 4.0 era: a methodology and case study. *Journal of Intelligent Manufacturing*, 33(1), 311-332.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

8. Burke, H., Zhang, A., & Wang, J. X. (2023). Integrating product design and supply chain management for a circular economy. *Production Planning & Control*, 34(11), 1097-1113.
9. Razak, G. M., Hendry, L. C., & Stevenson, M. (2023). Supply chain traceability: A review of the benefits and its relationship with supply chain resilience. *Production Planning & Control*, 34(11), 1114-1134.
10. Foster, S. T., & Gardner, J. W. (2022). *Managing quality: Integrating the supply chain*. John Wiley & Sons.

UNVEILING THE EMERGING TRENDS IN CLOUD COMPUTING

MAKWANA JIGNESH CHANDULAL
Research Scholar
IT

ABSTRACT

The landscape of cloud computing is shifting toward a multi-cloud approach, which is a strategy in which enterprises utilize numerous cloud providers in order to reduce costs, improve agility, and strengthen resilience and security. With this shift in strategy, firms are able to select services that are personalized to their requirements while avoiding being locked in with a particular provider. Despite the fact that there are obstacles like as management complexity and governance concerns, firms who are able to successfully navigate these complexities stand to enjoy enormous benefits, such as increased efficiency and creativity. When it comes to efficiently managing different cloud systems, the abstract underlines the significance of careful planning, competent individuals, and solid governance frameworks. In the end, adopting a multi-cloud approach provides businesses with the opportunity to achieve sustained success in the ever-changing digital landscape of the digital landscape of the future.

Keywords: *Cloud computing, Trends, AI, Hybrid, Virtual machine.*

1. INTRODUCTION

Cloud computing is a new and exciting way to handle data and software for future platforms through the use of remote servers and the Internet. When it comes to providing infrastructure over the Internet, cloud computing makes use of virtualization technology, multi-tenancy, web services, and more. Using multi-tenancy is crucial when developing Software as a Service (SaaS) applications. In a multi-tenancy lease, different apps run on the same server. Any Virtual Machine (VM) application that communicates over the Internet via web services can take advantage of virtualization's abstraction of autonomous hardware. The utilization of cloud computing services can greatly benefit scientific and engineering researchers by meeting their resource demands, increasing research productivity, lowering computational costs, and producing better findings.

In order to meet the requirements for quality of service (QoS), service providers concentrate on allocating resources according to demand. The quality of service (QoS) in cloud computing is the extent to which the platform, infrastructure, and applications that run on it are available, consistent, and efficient. Important roles are played by both cloud consumers, who look to providers for top-notch services, and cloud providers, who must strike a balance between operational quality of service (QoS) and cost rates. However, there are service-level

agreements (SLAs) that define service-level objectives and pecuniary consequences for SLA violations, making it difficult to determine the appropriate trade-off.

The ability to rent adaptable resources (infrastructure, platforms, and software) as a service based on consumption is made possible through cloud computing. The exponential growth of cloud computing has caused a sea change in the IT sector. A large number of complicated servers housed in massive server farms have been established as a result of the rapid growth of distributed computing. These server farms release a lot of carbon dioxide into the atmosphere and use a lot of power. According to the literature, cooling and computing are two major areas that might significantly reduce energy use. Workload scheduling or virtual machine allocation for energy conservation. The term "cooling" refers to the process of reducing the heat dissipation of a physical machine by means of several methods.

2. CURRENT STATUS OF CLOUD COMPUTING

Using Quality of Service (QoS) and Focus of Study (FoS) as criteria, this section delves into the historical development of energy-related activities. Several EAAs enhance the cloud environment by enhancing usage, responsiveness, performance, and other quality of service (QoS) metrics.

A model for minimizing cloud energy consumption was developed in 2018 by Huda Ibrahim using Integer Linear Programming (ILP). An approach to arranging workloads dynamically is the main emphasis. Applying an adaptive evolutionary algorithm yields near-optimal scheduling decisions while also reducing energy use. Based on the data that is input, the algorithm determines the schedule for the fundamental job arrangement. It is necessary to do the calculations on the list of received tasks before introducing the new arrangement of tasks. The list is built based on the requested and available capacities of the assets that can execute each assignment.

Singh presented a resource provisioning and scheduling method based on Particle Swarm Optimization (PSO) in 2017 with the goal of reducing energy usage and resource utilization, among other metrics such as execution cost, time, and SLA. For more efficient use of resources and less power usage overall, Leila Ismail developed a method for scheduling tasks that is conscious of energy consumption in the cloud in 2016.



Figure 1: Trends in cloud computing

3. THE RISE OF SERVERLESS COMPUTING: DEMOCRATIZING DEVELOPMENT AND OPTIMIZING SCALABILITY

With its revolutionary scalability and democratizing impact on development, serverless computing is experiencing explosive growth. With pay-per-use models promoting cost efficiency and doing away with overprovisioning, developers can concentrate on code rather than server management. Simple serverless operations reduce development hurdles, and automatic demand-based scaling makes sure apps can easily handle surges. But there are still obstacles. New tools are needed for debugging complicated serverless architectures, and there is a concern about vendor lock-in. To make the most of serverless computing, developers should follow best practices and use vendor-agnostic solutions. This will allow them to design scalable, agile apps at the lowest possible cost. With its alluring trio of advantages, serverless computing is causing a stir in the app development industry:

- Ease of use
- Scalability
- Cost-effectiveness

Serverless computing eliminates the need to pay for unused resources, which can be a significant boon for businesses dealing with unexpected workloads, by charging only for the time that code actually runs. Say goodbye to the hassles of server management! Your team can concentrate on the code itself because providers take care of everything else.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

You can also automate scaling. There is no need to manually scale when using serverless services; they automatically adapt to demand. Looking to cater to a massive user base? Of course! Serverless architectures are ideal for applications with unexpected or fast-growing workloads because of how easily they handle huge workloads.

However, scalability and efficiency aren't the only goals of serverless. Plus, it's easy for developers to use. Put all concerns about infrastructure aside and concentrate on producing top-notch code. Because of this, development becomes easier, time to market decreases, and teams are able to release features more quickly through iteration and the use of pre-built components and simplified deployment.

4. AI AND MACHINE LEARNING IN THE CLOUD BY TRANSFORMING INSIGHTS AND DRIVING INNOVATION

Although the cloud has always been about reach and scalability, the addition of AI and ML is like adding a supercharged brain to the system. Imagine massive data centers that were formerly only used for processing numbers, but are now a hive of AI algorithms. They can sort through massive amounts of data, uncovering hidden patterns and automating processes that would have taken years for human teams to complete. Businesses can now be empowered in ways never previously imaginable by this powerful combination of intelligence and scalability. Gut instinct decision-making is a thing of the past. Real-time analysis of large data sets by AI-powered tools provides a clear picture of what's working, what isn't, and what's next. This makes data-driven decision-making possible, enabling companies to anticipate trends, streamline processes, and remain innovative. Furthermore, cloud-based machine learning technologies are like having an army of helpers for engineers. By automating repetitive processes like data cleansing and model training, they can concentrate on truly new work. However, it goes beyond internal productivity. AI can change consumer experiences as well. Think about chatbots that can comprehend your inquiries and provide tailored answers, or websites that know what you need before you even say it. This degree of personalization encourages strong loyalty and engagement, converting clients into fans. Not to be overlooked is security. As devoted sentinels defending your data against constantly changing cyber dangers, machine learning algorithms are skilled at identifying abnormalities and risks in real-time. Of course, there are still difficulties. Data privacy worries are legitimate, and it takes work to identify qualified experts who can use this authority. But a revolution is about to happen with the way AI and ML are incorporated into cloud platforms. For companies ready to embrace this revolutionary wave, the opportunities are boundless in this dynamic ecosystem that is ripe for innovation and disruption.

5. HYBRID AND MULTI-CLOUD ENVIRONMENTS BYNAVIGATING THE COMPLEXITY FOR OPTIMAL SOLUTIONS

Businesses are increasingly adopting multi-cloud strategies and eschewing single-cloud solutions, resulting in a drastic change in the cloud environment. Imagine not depending on one general contractor, but rather having access to the best tools from multiple specialists. That's the core of multi-cloud computing, where companies use different cloud service providers to match their unique requirements. Organizations' perspectives on their IT infrastructure are changing as a result of this trend, which is being driven by the need for flexibility, cost effectiveness, and innovation. A multi-vendor ecosystem is emerging in the cloud space, propelled by the "best-of-breed" methodology. Companies are selecting suppliers based on their strengths: AWS's cost-effectiveness, Azure's AI know-how, and Google Cloud Platform's proficiency with containerization. This releases their adaptability, enabling companies to take advantage of cutting-edge solutions from a variety of vendors and adjust to shifting needs. Furthermore, multi-cloud improves resilience by distributing workloads throughout platforms, lowering the chance of downtime, and guaranteeing business continuity even in the event of an outage. Ultimately, it lessens reliance on a single vendor, allowing companies greater control over their cloud future and the ability to negotiate better prices. Without a doubt, multi-cloud computing is the way of the future, and companies that embrace this tactical change stand to gain from increased resilience, cost savings, and flexibility. The multi-cloud environment has many advantages, but it also has drawbacks. The challenge of navigating such a diversified environment comes from the need for strong tools and competent staff to manage different platforms, prevent data silos, and guarantee seamless operations. Additionally, meticulous planning and execution are needed to maintain consistent data governance across many platforms. Finally, to achieve a thorough and consistent security posture, safeguarding this complex environment requires attention to detail and specialist knowledge. Despite these difficulties, multi-cloud computing has indisputable potential benefits, making it an attractive option for companies prepared to make the necessary investments to get over these obstacles.

Cloud computing is about to undergo a major metamorphosis into a multi-cloud paradigm as enterprises begin to see the strategic benefits of using several cloud providers at once. By avoiding vendor lock-in and utilizing the variety of offerings from several suppliers, this strategy optimizes costs by giving enterprises the freedom to selectively select services and solutions that best suit their unique requirements. Adopting a multi-cloud strategy also improves agility, allowing for quick adjustments in response to shifting market dynamics and technology breakthroughs. Businesses can enhance their resilience and security posture by dispersing their infrastructure across several clouds. This reduces the risk of cyber threats and downtime by utilizing diverse security measures and redundancy. To guarantee smooth integration and operation, managing diverse cloud environments comes with a number of challenges that must be overcome. These challenges call for careful planning, knowledgeable staff, and strong governance structures. However, the multi-cloud strategy offers substantial advantages for companies that can successfully navigate these difficulties, such as increased

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

productivity and creativity as well as long-term success in the ever-changing digital environment of the future.

6. CONCLUSION

Unquestionably, the demand for flexibility, cost efficiency, and increased resilience is driving the future of cloud computing towards a multi-cloud paradigm. Companies are seeing more and more the strategic benefits of using several cloud providers at once to minimize the risks associated with vendor lock-in and customize services and solutions to their unique requirements. Adopting a multi-cloud strategy improves security and resilience by using redundancy and a variety of security measures, as well as agility in responding to market trends. However, maintaining several cloud systems can be complicated, necessitating careful planning, knowledgeable staff, and strong governance frameworks. Despite these difficulties, multi-cloud computing offers benefits like increased productivity and creativity that make it an investment well worth making for companies positioned to prosper in the rapidly changing digital market.

REFERENCES

1. C. Hsu, S.Chen, C.Lee, H. Chang, K. Lai, K. Li, C.Rong, "Energy – Aware Task consolidation Technique for cloud computing", published in IEEE 3rd International Conference on Cloud Computing Technology and Science, pp.115-121, 2011.
2. Dzmitry Kliazovich, Pascal Bouvry, Yury Audzevich, Samee Ullah Khan, "GreenCloud: a packet-level simulator of energy-aware cloud computing data centers," 2010 IEEE Global Telecommunications Conference, 2010, pp. 1-5, doi:10.1109/GLOCOM.2010.5683561.
3. Gill, S. S., Buyya, R., Chana, I., Singh, M., & Abraham, A. (2018). BULLET: Particle Swarm Optimization Based Scheduling Technique for Provisioned Cloud Resources. *Journal of Network and Systems Management*, 26(2), 361-400.
4. Gill, Sukhpal Singh, and Rajkumar Buyya. "A Taxonomy and Future Directions for Sustainable Cloud Computing: 360 Degree View." arXiv preprint arXiv:1712.02899 (2017).
5. Ibrahim, Huda, Raafat O. Aburukba, and Khaled El- Fakih. "An Integer Linear Programming model and Adaptive Genetic Algorithm approach to minimize energy consumption of Cloud computing data centers." *Computers & Electrical Engineering* (2018).
6. Ismail, Leila, and Abbas Fardoun. "Eats: Energy-aware tasks scheduling in cloud computing systems." *Procedia Computer Science* 83 (2016): 870-877.
7. Karthikeyan, R., and P. Chitra. "Novel heuristics energy efficiency approach for cloud Data Center." *Advanced Communication Control and Computing Technologies (ICACCCT), 2012 IEEE International Conference on.* IEEE, 2012.
8. Singh, Sukhpal, and Inderveer Chana. "A survey on resource scheduling in cloud computing: Issues and challenges." *Journal of grid computing* 14, no. 2 (2016): 217-264.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

9. Singh, Sukhpal, and Inderveer Chana. "EARTH: Energyaware autonomic resource scheduling in cloud computing." *Journal of Intelligent & Fuzzy Systems* 30,no. 3 (2016): 1581-1600.
10. Singh, Sukhpal, Inderveer Chana, Maninder Singh, and Rajkumar Buyya. "SOCCER: self-optimization of energy-efficient cloud resources." *Cluster Computing* 19, no. 4 (2016): 1787-1800.

IMPACT ASSESSMENT OF VOCATIONAL EDUCATION AND SKILL DEVELOPMENT TRAINING FOR HEALTHCARE PROFESSIONALS

Neetu Dubey

Research Scholar
EDUCATION

Abstract

This research looks at how MMVTI's vocational training programs affect people with disabilities in India. A total of 265 individuals from five different Indian areas who finished the training programs between 1999 and 2009 were surveyed. The participants suffered from a variety of physical limitations, such as loss of external muscular capacity, spinal cord injuries, deformities from medical surgery, impairments from various physiological problems, and more. The job status of the participants both before and after the training sessions, as well as their demographic details such sex, marital status, family size, and educational attainment, are the main subjects of the study. The study encompasses many occupational training programs, such as Medical Coding and Billing, Healthcare Administration, Pharmacy Technician, Nursing Assistant, and Medical Transcription. The findings indicate that 60% of the participants—40% of females and 60% of males—were actively looking for work after finishing the training programs, either through self-employment alternatives or the official labor market. The study also sheds light on participants' work situations in various training programs, including their degrees of official employment, self-employment, and unemployment.

Keywords: Healthcare Workforce Development, Vocational Education, Skill Development Training, Impact Evaluation, Professional Competency.

1. INTRODUCTION

Professional schooling alludes to the sort of instruction or preparing that prepares students for a specific exchange, vocation, or occupation. Through both study hall and work environment guidance, Professional Schooling and Preparing (VET) ensures expertise improvement in different professional disciplines. It remembers guidance for everything from painstaking work to farming, mechanics to the clinical field. Its will probably assist understudies with becoming

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

free. Understudies need to view professional training as a beneficial other option. Very much planned professional schooling and preparing projects can be urgent in making the legitimate personality, disposition, and range of abilities for the work market in the consistently advancing universe of work. This is true not only for the mass of students but also for adults who need to retrain or upskill in fields like healthcare, where many patients suffer at the hands of inexperienced staff. The paramedics, technicians, and nursing staff are the other significant internal stakeholders. There have been many instances when workers who lacked training or expertise caused fatalities or infrastructural damage. Such encounters lower the overall quality of healthcare services and leave the patient with negative feelings.

Vocational education and skill development training for healthcare professionals have become indispensable in response to the dynamic changes in the healthcare industry. As such, their impact on filling skills gaps, improving patient care, fostering career advancement, and satisfying labor demands should be evaluated. These programs are essential for filling skills gaps, guaranteeing individualized, evidence-based procedures, and providing professionals with the most recent knowledge and competences to provide high-quality treatment. Moreover, funding this kind of training not only improves patient care but also helps professionals advance their careers by providing chances for skill development and specialization. Evaluating their influence is essential to matching training to industry demands and equipping practitioners to handle the demands of contemporary healthcare. In general, assessing the effects of skill development and vocational education for healthcare workers is critical to maximizing staff preparedness and enhancing patient outcomes.

2. LITERATURE REVIEW

Paposa, K. K., & Kumar, Y. M. (2019) investigated the connection and influence of employee job satisfaction with training and development strategies. The study's participants were restricted to faculty members working at technical education institutions in Nagpur, Maharashtra, India. 360 faculty members were gathered as a sample size to symbolize the whole world. A confirmatory framework was used for the research in order to investigate the causal relationship between the variables under investigation. The findings showed that among faculty members of technical educational institutions, training and development techniques and work satisfaction were positively correlated. The study not only offers empirical support for the significance of training and development practices, but it also has management implications

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

for technical educational institutions. Educational institutions should properly analyze their training needs to ensure that the right training and development practices are implemented, fostering a learning environment that ultimately helps employees be more satisfied with their jobs by fostering the development of their individual and organizational skills.

In order to provide some insight on how the educational system and TVET might adapt to the problems brought about by a worldwide disruption like COVID 19, Majumdar, S., & Araiztegui, I. (2020) reflect on the continuing concerns. With some examples to back them up, the article makes recommendations for short-, medium-, and long-term activities. A series of suggestions meant to further the discussion are included at the conclusion. The COVID-19 pandemic has had a significant impact on hundreds of thousands of people's health, taken lives in several regions of the globe, interrupted education and training, and put many economies in danger of going into recession. It has, nonetheless, also forced people and organizations in the fields of business, education, public government, and community development to think creatively. To get through the crisis, governments are using tactics and plans that they have never used before. Organizations are venturing into unfamiliar territory. The strategies and solutions that we now see are generally in line with how ready businesses, governments, and communities are to address the problem from various angles.

An outline of what innovation headways have meant for work qualities is given by Lager, P., and Mulder, R. H. (2020), alongside suggestions for work requests and consistent professional schooling and preparing (CVET). The accompanying requests about research are tended to: What effect are new innovations having on the idea of work? What impacts does this have on continuous work related instruction and preparing? Advances are portrayed as mechanical, electrical, or computerized instruments that affect how well work exercises are finished. Social science and brain research are two fields that think about these innovations. A hypothetical system was made and statements about the associations among innovation and parts of the working environment like intricacy, independence, and significance were produced. These thoughts included upskilling and task-based approaches. By glancing through information bases from the disciplines of brain research, humanism, financial matters, and instructive science, an exhaustive assessment of the writing was completed. The consideration measures were fulfilled by 21 examinations. A learning climate part outline model was utilized to gather experimental data and decide its suggestions for work requests and CVET. Research proposes

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

that psychological work and intricacy are rising, especially while utilizing mechanized frameworks and robots. Various reports show a decrease in physical work.

In open auxiliary emergency clinics in Lagos State, Nigeria, Nwogbe, O. A., and Haliso, Y. (2020) analyzed the contribution of clinical experts in continuous expert turn of events. For this review, a multistage testing approach and a study research configuration were utilized. 356 clinical experts (112 specialists, 32 drug specialists, and 212 attendants) made up the example. An efficient poll that the scientist self-created was utilized to accumulate the information. The inquiries were created utilizing the consequences of the writing audit and were adjusted from normally involved polls on tolerant wellbeing in clinics, mobile and local area drug stores, nursing security rehearses, CPD expert and ability skill, and territorial rules for proceeding with clinical schooling from the World Wellbeing Association. The examination exclusively included clinical specialists working in grown-up broad short term offices. The outcomes showed that specialists take part in formal CPD (doing research, distributing, or peer diary survey) at a $M = 2.11$, though casual CPD (gatherings, courses, and in-administration preparing) at a $M = 3.09$. Attendants' cooperation in casual CPD is ($M = 2.30$) and CPD ($M = 1.78$), though drug specialists' support is ($M = 3.10$) and formal CPD ($M = 1.89$). These information show that respondents would in general pick less tedious, work-based ways to deal with limit building, taking part for the most part in unstructured proceeding with proficient improvement exercises as opposed to following an orderly, proficient, and high-level way to deal with limit building.

The extraordinary job of innovation the executives in specialized professional schooling (TVET) and its complex effect on abilities improvement, program quality, flexibility, employability, and industry pertinence are investigated in Manubag, M., Kilag, O. K., Peñalosa, B., Timtim, J. M., Padilla, J. B., and Abendan, C. F. (2023). Through a comprehensive examination of the literature and a meta-analysis, it reveals a wealth of information that sheds light on the significant ramifications of skillfully incorporating technology into TVET. Results show a strong positive link between improved skill development and effective technology management practices, highlighting the critical role technology plays in equipping students with the necessary capabilities for today's industry.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

3. RESEARCH METHODOLOGY

Members A sum of 265 crippled people who partook in the MMVTI preparing program somewhere in the range of 1999 and 2009 were looked over five changed Indian locale. The members' actual inabilities included impedances from a scope of physiological issues, distortions because of restorative medical procedure, spinal rope wounds, loss of outer muscle capability, disabilities from various persistent diseases, and that's just the beginning. The members' lives had encountered these impediments at different moments (e.g., mishap, disease, ailment or inherent). At the point when the members signed up for the professional preparation program, they were all jobless.

Table 1: Participants' numbers, distributions, and demographics

| Variables | Number | Percentage |
|-----------------------|--------|------------|
| Sex | | |
| Female | 104 | 40 |
| Male | 161 | 60 |
| Marital status | | |
| Single | 133 | 52 |
| Married | 125 | 45 |
| Separated / divorced | 7 | 3 |
| Family size | | |
| Small (1-4) | 95 | 35 |
| Medium (5-8) | 141 | 52 |
| Large (>9) | 29 | 13 |
| Education | | |
| Illiterate | 23 | 6 |
| Primary education | 59 | 22 |
| Secondary education | 88 | 34 |
| SSC pass | 44 | 18 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | |
|------------------|----|----|
| HSC pass | 24 | 9 |
| Higher education | 27 | 11 |

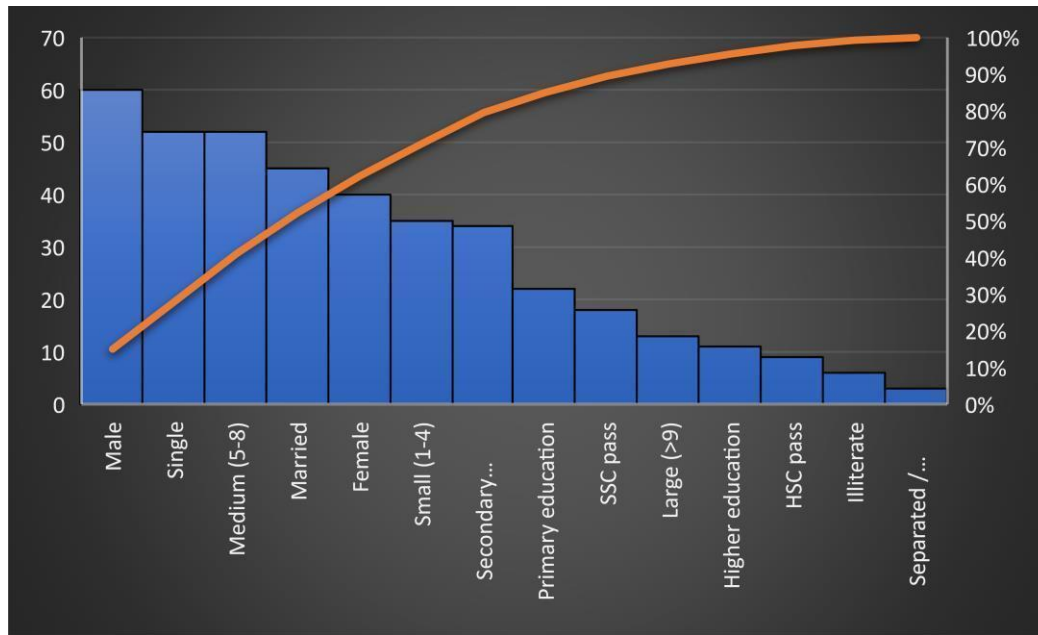


Figure 1:Participants' numbers, distributions, and demographics

3.1. Design

Table 2 presents the training length and entry requirements for various vocational courses offered at MMVTI for individuals with disabilities. The table includes the number of persons with disabilities enrolled in each course, the entry requirements, and the duration of the training program.

Table 2: Training Length and Trades at MMVTI for Various Persons with Disabilities

| Course | No. of persons with disabilities (n=265) | Entry requirement | Duration |
|----------------------------|--|-------------------|----------|
| Medical Coding and Billing | 68 | Minimum SSC | 3 |
| Nursing Assistant Training | 51 | VIII | 4 |

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

| | | | |
|--------------------------------|----|---|---|
| Pharmacy Technician Training | 9 | V | 3 |
| Medical Transcription Training | 46 | V | 1 |
| Healthcare Administration | 91 | V | 2 |

For the Medical Coding and Billing course, 68 persons with disabilities are enrolled, with a minimum entry requirement of SSC (Secondary School Certificate) and a duration of 3 months. Nursing Assistant Training has 51 enrolled participants with a minimum entry requirement of VIII (8th grade) and a training duration of 4 months. Pharmacy Technician Training has 9 enrolled participants with a minimum entry requirement of V (5th grade) and a training duration of 3 months. Medical Transcription Training has 46 enrolled participants with a minimum entry requirement of V (5th grade) and a training duration of 1 month. Healthcare Administration has the highest enrollment, with 91 participants, and requires a minimum entry requirement of V (5th grade) with a training duration of 2 months.

4. RESULTS AND DISCUSSION

There are four parts for the results. Evaluations of the impact of the MMVTI programs on participants overall and on employment rates in the future are shown in the first section. The perspectives of people who were unable to get job and the obstacles they encountered are covered in the second part. The opinions of individuals who did get work are examined in the third part, along with the impact it had on their life. A report on the opinions of individuals who obtained employment and the difficulties they encountered at work is included in the last part.

4.1. Effect of the Training Course

As per Table 3, after the preparation, 60% of the 265 members with handicaps — 40% of the 104 female members and 60% of the 161 male members — looking for a job, either in the authority work market or by means of independent work).

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Table 3: Job Status of Persons with Disabilities

| Course | Employed | | Unemployed |
|--------------------------------|----------|-------------------|------------|
| | Formal | Self – employment | |
| Medical Coding and Billing | 24% | 40% | 36% |
| Nursing Assistant Training | 2% | 51% | 47% |
| Pharmacy Technician Training | 22% | 44% | 34% |
| Medical Transcription Training | 34% | 15% | 51% |
| Healthcare Administration | 78% | 22% | 0% |

Based on Table 3, 60% of the 265 individuals with disabilities, comprising 40% of the 104 female members and 60% of the 161 male members, are seeking employment either in the formal job market or through self-employment opportunities. For the Medical Coding and Billing course, 24% are formally employed, 40% are self-employed, and 36% are unemployed. For Nursing Assistant Training, 2% are formally employed, 51% are self-employed, and 47% are unemployed. For Pharmacy Technician Training, 22% are formally employed, 44% are self-employed, and 34% are unemployed. For Medical Transcription Training, 34% are formally employed, 15% are self-employed, and 51% are unemployed. For Healthcare Administration, 78% are formally employed, 22% are self-employed, and none are unemployed.

5. CONCLUSION

The lives of people with disabilities have been profoundly impacted by the vocational training programs provided by MMVTI, especially in terms of their job results. 60% of the participants in the survey said they were looking for job after finishing the program, demonstrating a significant willingness to enter the workforce through chances for official employment or self-

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

employment. The examination of work status across various courses revealed variable employment success levels; the greatest formal employment rate was found in healthcare administration (78%), followed by medical transcription training (34%). The greatest percentage of self-employment, 51%, was found in the nursing assistant training program, demonstrating the possibility for people with disabilities to start their own businesses. All things considered, the findings point to the importance of vocational training programs in enabling people with disabilities to secure fulfilling jobs and enhance their quality of life. To further understand the long-term effects of these initiatives and determine ways to increase their efficacy, more study is required.

REFERENCES

1. Abrassart, A., & Wolter, S. C. (2020). *Investigating the image deficit of vocational education and training: Occupational prestige ranking depending on the educational requirements and the skill content of occupations*. *Journal of European Social Policy*, 30(2), 225-240.
2. Beer, P., & Mulder, R. H. (2020). *The effects of technological developments on work and their implications for continuous vocational education and training: A systematic review*. *Frontiers in psychology*, 11, 918.
3. Brasaitė, I., Kaunonen, M., Martinkėnas, A., Mockienė, V., & Suominen, T. (2016). *Health care professionals' skills regarding patient safety*. *Medicina*, 52(4), 250-256.
4. Dettaille, S. I., Heerkens, Y. F., Engels, J. A., van der Gulden, J. W. J., & Van Dijk, F. J. H. (2013). *Effect evaluation of a self-management program for Dutch workers with a chronic somatic disease: a randomized controlled trial*. *Journal of Occupational Rehabilitation*, 23, 189-199.
5. Dumaua-Cabauatan, M., Calizo, S. C., Quimba, F. M. A., & Pacio, L. C. (2018). *E-Education in the Philippines: The case of technical education and skills development authority online program (No. 2018-08)*. *PIDS discussion paper series*.
6. Edirippulige, S., & Armfield, N. R. (2017). *Education and training to support the use of clinical telehealth: a review of the literature*. *Journal of telemedicine and telecare*, 23(2), 273-282.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

7. Mahmut, Ö. Z. E. R. (2020). *The contribution of the strengthened capacity of vocational education and training system in Turkey to the fight against Covid-19. Yükseköğretim-Dergisi*, 10(2), 134-140.
8. Majumdar, S., & Araiztegui, I. (2020). *Technical vocational education and training: Reflections on the issues facing TVET and its potential in the time of COVID-19. Scholarly Technical Education Publication Series (STEPS)*.
9. Manubag, M., Kilag, O. K., Peñalosa, B., Timtim, J. M., Padilla, J. B., & Abendan, C. F. (2023). *Empowering Skills Development: Exploring the Role of Technology Management in Technical Vocational Education Enhancement. Excellencia: International Multi-disciplinary Journal of Education* (2994-9521), 1(5), 195-208.
10. Mason, G. (2020). *Higher education, initial vocational education and training and continuing education and training: where should the balance lie?. Journal of Education and Work*, 33(7-8), 468-490.
11. Nakar, S., & Olssen, M. (2022). *The effects of neoliberalism: Teachers' experiences and ethical dilemmas to policy initiatives within vocational education and training in Australia. Policy Futures in Education*, 20(8), 986-1003.
12. Nwogbe, O. A., & Haliso, Y. (2020). *Continuing Professional Development Assessment of Healthcare Professionals in Public Secondary Hospitals in Lagos State, Nigeria. Information Impact: Journal of Information and Knowledge Management*, 11(1), 26- 39.
13. Paposa, K. K., & Kumar, Y. M. (2019). *Impact of training and development practices on job satisfaction: A study on faculty members of technical education institutes. Management and Labour Studies*, 44(3), 248-262.
14. Suresh, A. (2018). *Impact Evaluation of Skill Development Programme by St. Xavier's Community College, Trivandrum*.
15. Wilson, N. W., Couper, I. D., De Vries, E., Reid, S., Fish, T., & Marais, B. J. (2009). *A critical review of interventions to redress the inequitable distribution of healthcare professionals to rural and remote areas. Rural and remote health*, 9(2), 1-21.

A COMPREHENSIVE INVESTIGATION INTO EMPLOYEE COMMITMENT IN DELHI'S TRAVEL SECTOR

UMAKANTA DAS

Research Scholar

COMMERCE AND MANAGEMENT

Asian International University Imphal, Manipur

Abstract

India's unique culture and heritage attract travelers, resulting in a tremendous expansion in the tourism sector in recent years. As key partners in the tourism business, travel organizations promote destinations to tourists. Travel agency personnel produce, market, and sell vacation packages to tourists. Employees must be efficient to generate and market tourist travel packages. Many variables affect staff productivity, including "employee engagement". Employee engagement is the most talked-about topic across industries worldwide, and companies are doing intense research to measure and understand employee engagement. Academic research is also evolving, but research on employee engagement in travel organizations in India is limited. This research measures employee engagement in travel organizations and examines if demographic parameters like gender, age, and tenure affect engagement.

Keywords: *Employee commitment, Travel sector, Work engagement, Organizational loyalty, Job satisfaction, Employee retention.*

1. INTRODUCTION

Families and companions travel, making tourism friendly. UNWTO defines tourism as "the exercises of people traveling to and satisfying in places outside their standard climate for not more than one successive year for recreation, business and different purposes not connected with the activity of a movement compensated from within the spot visited". The travel and tourism industry offers types of assistance. Travel and tourism includes transportation, food administrations, lodging, social administrations, amusement and the executives, visit administrators and travel organizations, show administrations, and a lot more vacationer administrations (tourism hardware, visa processing and issuance). Just ideal interaction between these sectors gives sightseers a "travel insight". Travelers should manage intermediaries all through. According to 2014 World Travel and Tourism Chamber (WTTC) gauges, India's travel and tourism industry produced 6.2% of Gross domestic product and 4.9% of jobs in 2013. This industry increases worldwide Gross domestic product and employment. It contributed 9.5% of Gross domestic product and 8.9% of employment in 2013.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

1.1. Travel Trade

The Ministry of Tourism, Legislature of India, groups travel exchange as travel organizations, inbound and homegrown visit administrators, experience visit administrators, and vacationer travel administrators. Visit administrators, who are wholesalers, offer their bundles to travel organizations, who are retailers. Travel organizations are private retailers or administration offices that sell tourism-related administrations in the interest of airlines, vehicle rental organizations, lodgings, trains, journey lines, and bundle visits.

1.2. Human Resources in Travel Trade

Travel firm faculty are significant since they serve clients. Past expert abilities and experience, laborers' excitement and commitment to work and association are imperative to tourism. Just blissful, persuaded employees can give great work and client care. Tourism laborers might influence administration quality and corporate culture. In this way, travel firms should select devoted, excited staff at all levels. The HR chief should enlist and spur employees.

1.3. Research objectives

- Understand the notion of employee engagement.
- Assess employee engagement in travel organizations.
- Assess the impact of demographic parameters (e.g., gender, age, tenure) on employee engagement

2. LITERATURE REVIEW

Dhar, R. L. (2015)The review examined employee perspectives in Indian traveler lodgings, focusing on training potential open doors and their effect on visitor administration. An integrated model was created, revealing areas of strength for a between training openness, backing, benefits, and organizational commitment. The findings propose expected reasonable applications in the neighborliness industry.

Dajani, D. M. A. Z. (2015)Employee engagement has turned into a famous administrative develop as of late, however there is an absence of scholarly examinations on it, particularly in emerging economies like Egypt. This exploratory review plans to distinguish key drivers of employee engagement and its effect on job performance and organizational commitment using social trade hypothesis. The review, led on 245 bank employees in Cairo, observed that administration and organizational equity were the main drivers of engagement. Employee engagement altogether affected job performance however less on organizational commitment.

Garg, and Dhar(2014)The review examined factors affecting lodging employee commitment and its effect on help quality. Information from 36 little and medium lodgings in Delhi-NCR was broke down using SPSS large scale. Results showed organizational commitment intercedes job pressure, pioneer part trade, and saw organizational help, decidedly influencing administration quality.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Sharon and Vijayalakshmi (2021) The review examines the effect of balance between fun and serious activities ascribes on employee commitment in the training sector. It utilizes Exploratory Variable Examination to dissect information from 480 respondents. The findings propose that variables, for example, working climate, dynamic power, individual job, work backing, and struggle altogether influence employee commitment. HR supervisors ought to zero in on these elements.

3. RESEARCH METHODOLOGY

This study surveyed 100 employees in Delhi-based travel organizations, using both primary and secondary sources. Data was collected through a survey method and secondary sources. The questionnaire included demographic factors and employee engagement, measured on a five-point Likert scale. The cronbach alpha was found to be good, indicating good reliability in the study.

Table 1 Table 1 shows the overall cronbach alpha value of employee engagement, while Table 2 displays the alpha value of employee engagement sub-dimensionally.

Table 1:Employee Engagement Reliability Statistics.

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | No. of Items |
|------------------|--|--------------|
| 0.984 | 0.984 | 10 |

Table 2:Employee Engagement subdimension reliability statistics.

| Employee Engagement | No. of items | Cronbach's Alpha |
|-------------------------|--------------|------------------|
| Intellectual Engagement | 5 | 0.920 |
| Social Engagement | 3 | 0.850 |
| Affective Engagement | 2 | 0.920 |

4. DATA ANALYSIS

The demographics of 100 samples The mean scores for three employee engagement factors (IE, SE, AE) from a 100-person sample are shown in Table 3. No values are missing in the data. The typical scores for IE, SE, and AE are 3.70024, 3.4571, and 3.84571. Providing the standard error of the mean for these aspects shows the precision of the sample mean estimations. Each facet's standard deviation (S.D.) values show variability.

Table 4 shows the mean Employee Engagement score with 100 samples and no missing values. The mean score is 3.6487, with an SD of 0.99458 and a mean error of 0.84511.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

Table 3: Average score of 3 employee engagement factors

| | | IE | SE | AE |
|--------------------|---------------|----------|---------|---------|
| N | Valid Missing | 100 | 100 | 100 |
| | | 0 | 0 | 0 |
| Mean | | 3.70024 | 3.4571 | 3.84571 |
| Std. Error of mean | | 0.9745 | 0.07459 | 0.88457 |
| S.D. | | 1.197458 | 0.91425 | 1.08459 |

Table 4: Average employee engagement score

| | | |
|------------------------|---------------|---------|
| N | Valid missing | 100 |
| | | 0 |
| Mean | | 3.6487 |
| Standard error of mean | | 0.84511 |
| SD | | 0.99458 |

Table 5: Comparison of gender and three employee engagement subdimensions.

| | Gender | N | Mean | SD | Std. Error Mean |
|-----------|--------|----|--------|----------|-----------------|
| IE | Male | 50 | 3.7458 | 1.20365 | 0.13354 |
| | Female | 50 | 3.5154 | 1.14587 | 0.14360 |
| SE | Male | 40 | 3.5798 | 0.95478 | 0.10564 |
| | Female | 60 | 3.3015 | 0.86487 | 0.10564 |
| AE | Male | 70 | 3.2482 | 1.054781 | 0.11454 |
| | Female | 30 | 3.7458 | 1.12475 | 0.13547 |

Table 5 shows gender disparities in employee engagement subdimensions IE, SE, AE. Males have a mean IE score of 3.7458 with a standard deviation of 1.20365, while females have 3.5154 with 1.14587. In the SE dimension, males have a mean of 3.5798 and a standard deviation of 0.95478, while females have 3.3015 and 0.86487. Males have a mean AE score of 3.2482 and a standard deviation of 1.054781, while females have 3.7458 and 1.12475. The

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

standard error of the mean for each group shows the precision of the mean estimates among gender groups for each employee engagement sub-dimension.

5. CONCLUSION

This research helps explain the evolution of "employee engagement" and the many writers' perspectives on it. Reviewers also stressed the importance of managers engaging staff. Tourism is the only industry rising quickly and contributing significantly to the economy. Companies' success or failure rely heavily on its workers. All organizations depend on their employees, therefore they must be devoted, pleased, and engaged. According to the statistics, travel company employees are more engaged, but organizations must take steps to sustain this engagement level for effective growth. Organizations must consider demographic aspects like gender, age, and tenure since engagement levels are similar. Travel companies must take steps to attract and retain engaged employees as employee engagement becomes the buzzword across all sectors.

REFERENCES

1. Dhar, R. L. (2015). *Service quality and the training of employees: The mediating role of organizational commitment*. *Tourism management*, 46, 419-430.
2. Dajani, D. M. A. Z. (2015). *The impact of employee engagement on job performance and organisational commitment in the Egyptian banking sector*.
3. Garg, S., & Dhar, R. L. (2014). *Effects of stress, LMX and perceived organizational support on service quality: Mediating effects of organizational commitment*. *Journal of Hospitality and Tourism Management*, 21, 64-75.
4. Sharon, S. S., & Vijayalakshmi, B. (2021). *IMPACT OF WORK-LIFE BALANCE ON WOMEN EMPLOYEE COMMITMENT IN EDUCATION SECTOR*.
5. Kumar, S., & Kumar, M. (2016). *Job satisfaction and organisational commitment in hospitality industry-an empirical study*. *Amity Research Journal of Tourism, Aviation and Hospitality*, 1(2), 25-32.
6. Middleton, V. T., & Clarke, J. R. (2012). *Marketing in travel and tourism*. Routledge.
7. Wang, Q., & Huang, R. (2021). *The impact of COVID-19 pandemic on sustainable development goals—a survey*. *Environmental Research*, 202, 111637.
8. Chavez, A., Ramaswami, A., Nath, D., Guru, R., & Kumar, E. (2012). *Implementing trans-boundary infrastructure-based greenhouse gas accounting for Delhi, India: Data availability and methods*. *Journal of Industrial Ecology*, 16(6), 814-828.
9. Priyadarshi, P. (2011). *Employer brand image as predictor of employee satisfaction, affective commitment & turnover*. *Indian Journal of Industrial Relations*, 510-522.
10. Asif, M., Qing, M., Hwang, J., & Shi, H. (2019). *Ethical leadership, affective commitment, work engagement, and creativity: Testing a multiple mediation approach*. *Sustainability*, 11(16), 4489.

FUTURE CHALLENGES POSED BY AQUATIC INVASIVE SPECIES

JATINDRA KUMAR MISHRA

Research Scholar Zool-
ogy
Asian International University Imphal, Manipur

Abstract

Research on aquatic invasive species has been increasingly popular, as evidenced by the doubling of papers published in Hydrobiologia over the preceding ten years. We provide an overview of the contributions made to the present Special Issue, which includes fresh research on the introduction and establishment of AIS, characteristics that set them apart from other human stressors, the effects of those attributes, interactions between AIS and other stressors, and management advancements. This study inspects the qualities of species that ought to represent the greatest gamble for future intrusions, especially those that work with the inundation of different species (a peculiarity known as "invasional complete implosion"). Repositories and other help-less aquatic environments could go about as venturing stones for the attack of new regions. Certain microbes can travel significant stretches, taint new has, and prosper in the outside aquatic medium — a cycle that can be unsafe to human wellbeing. We also talk about how invasions of new species interact with other effects of human activity, such as changes in climate and terrain, and how invasions may be linked to changes in lake regime. Since many invaders end up becoming permanent parts of the ecosystem, we talk about how people coexist with invasive species before offering some research questions for the future.

Keywords: Future Challenges, Aquatic, Invasive Species, AIS,

1. INTRODUCTION

Invasive species, as enormous scope, by and large inadvertent trials, have progressed a few natural review points. Moreover, invasive species have demonstrated to be versatile to various refined biological speculations, featuring the constraints of the reductionistic way to deal with many-sided environmental frameworks and the restricted progress of summing up patterns across species and biological systems. How does the eradication of a few species, or the missing connections in biological organizations, connect with the sensational local area revamping and loss of environment benefits that can be brought about by a solitary remarkable species on a scene scale?

Various late surveys offer a valuable starting point for digging into various features of aquatic invasive species (AIS) research, for example, intrusion conditions, influences demonstrating, characteristics and effects, intrusion rates, consequences for compromised and jeopardized species, consequences for the food web, the job of parasites in marine attacks, influences on

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

environment works and administrations, the board and eradication, social discernment, and strategy issues.

We lament our doubtlessly changed lakes and waterways and the deficiency of key scene joins, however AIS have brought issues to light of social biological administrations. AIS are more notable than other aquatic environmental issues that might cause more overall eliminations, for example, natural surroundings change and misfortune. Exploration and the board subsidizing and activity speed frequently mirror this. Capacity to achieve quick and observable changes for an enormous scope, non-human wellspring of demolition, distinct, noteworthy danger that occasionally offers business arrangements, neighborhood issue, xenophobia, huge financial effects of high-influence intruders, and solid accentuation on adverse consequences because of restricted center around them and virtual entertainment consideration are only a couple. These angles are frequently associated and difficult to recognize, and their overall significance is obscure. AIS have surely raised public attention to freshwater and marine aquatic environments' delicacy. Researching the connection between open view of AIS and fruitful administration and control would be advantageous. In this presentation, we sum up the ebb and flow Extraordinary Issue's commitments and look at web search volume patterns to decide public interest in high-influence AIS, invasive species, and aquatic biological system ecological issues.

2. LITERATURE REVIEW

Kovalenko, K. E. (2021) looked into commitments to the ongoing Unique Issue, remembering new investigations for presentation and foundation, high-influence trespasser qualities and effects, AIS-human stressor connections, and the executives improvements. They likewise break down open interest in invasive species utilizing 17 years of Google outright hunt volumes from 2004-2020 extricated utilizing Catchphrases Wherever application. We center around invasive species look, a few high-influence AIS, and their prevalence contrasted with other environmental issues in aquatic biological systems. During the accessible hunt time frame, scan volume for invasive species overall expanded and contrasted well and other biological issues, while species-explicit quest volumes for high-influence AIS frequently surpassed the overall catchphrase. AIS exploration and the executives rely upon public commitment, and search volume examination can gauge, maintain, and enhance it.

Rahel and Past (2008) analyzed how environmental change and invasive species communicate in freshwater biological systems. Climbing water temperatures, more limited ice cover, adjusted streamflow designs, expanded salinization, and expanded interest for water capacity and movement structures are supposed because of environmental change. Growing fish-culture offices and water nurseries to new regions and working with species spread during floods will change the pathways for non-local species to enter aquatic frameworks. Because of diminished winter hypoxia and expanded supply development, environmental change will improve the probability of new species laying out. Environmental change will expand the harmfulness of certain infections and increment the serious and ruthless impacts of invasive species on local

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

species. Environmental change might require new anticipation and control techniques like hindrance development or expulsion to control invasive species with moderate impacts or occasional limits. Most scientists center around how temperature change might support intrusions, albeit some invasive coldwater species may not make due. Our discoveries show that environmental change and invasive species cooperate in complex ways that will influence how aquatic biological systems and biota adjust to new natural circumstances.

Grosholz (2008) gave instances of estuarine and beach front presented species' financial expenses and a synopsis of late natural costs data to help our case. We examine the administrative system for presented species the board and different elements that frustrate or help science-the executives associations. They utilize seaside destruction program case chronicles for *Caulerpa taxifolia* and *Spartina alterniflora* (and crossovers) in the western USA to show the plausibility of overseeing presented species and how the executives and science can further develop results. We finish up with an examination plan that stresses science that will assist with overseeing invasive species, in light of our own insight and that of directors straightforwardly involved.

Willby (2007) By agreement, organic attacks cause biodiversity misfortune, In new streams invasive aquatic plants (IAP) draw significant consideration. To some part this is justified since they spread quickly and are very obvious, frequently to the relaxed onlooker, in a way that the enormous number of invasive molluscs and amphipods, for instance, are not. Invasive aquatic plants trigger various responses. Numerous environmentalists (myself included) may, I assume, admit to a secret affection for plants which, in spite of the fact that many kilometers from home, can yet change a water body yellow or pink, apparently almost short-term. Different responses to IAP range between very much established uneasiness over the destiny of uncommon local species through to those all the more every now and again connected with traditional sensation-alist newspapers while examining human movement matters. The administration of IAP gives significant issues to hippies. This publication cover, according to a UK point of view, what are thought of as a portion of the significant issues in taking care of this errand, the headway that has been made and the possibilities for the future.

3. IMPACTS OF INVASIVE SPECIES

There are a few known and potential impacts of organic intrusions on local area design and biological system capability in freshwater conditions. It has been shown that AIS foundation rates are moreover high for different aquatic animals and conditions. The ongoing intrusion pace impressively outperforms that of the paleo-attacks and biotic exchanges that happened throughout geologic time spans, albeit the two cycles added to biodiversity as far as we might be concerned. Since freshwater populaces are exceptionally different and defenseless to biotic collaboration, the impacts of intruders ought to without a doubt raise a few worries. Indeed, even in situations where an intrusion is a postponed response to past climatic occasions or littly affects the general capability of the biological system, the actual change is much of the time saw as unfortunate.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Numerous AIS have adversely affected the biological system and human interests, even as some have had insignificant or no outcomes by any means. In scholastic texts, the general press, and essential writing, contextual analyses of their effects are much of the time distributed. Since unsettling influences to these levels have other unexpected outcomes, we focus here on the impacts of AIS on networks and environments. For example, invasive species can rapidly modify whole biological systems when they go about as environment engineers. The adjustment of the Hudson Waterway from a pelagic to a littoral food web after the zebra mussel intrusion fills in to act as an illustration of this situation. In regions like Lake Erie and the Hudson Stream, where zebra mussels are exceptionally thick, most of the green growth can be sifted through of the water section, leaving little nourishment for pelagic zooplankton and expanding light for vascular plants. These plants' expanded development thus fortifies the construction of their living spaces and has numerous different ramifications.

It is ordinarily realized that invasive species modify freshwater food networks. A ton of spotlight has been on exploring the impacts of fish on networks as game fish have been broadly presented by fisheries organizations and savage fish regularly control the local area construction of lakes and streams. There have been a few huge impacts. The first populace of haplochromine cichlid fishes in Lake Victoria, East Africa, was totally annihilated by the presentation of Nile Roost (*Latesniloticus*), which likewise caused the termination of a few species. The natural pecking order, which incorporates zooplankton and bugs, was fundamentally rearranged when peacock bass were acquainted with Lake Gatun, Panama. This presentation additionally expanded mosquito populaces and mosquito-borne diseases by diminishing mosquitofish (*Gambusia affinis*). Aquatic people group can be essentially influenced by omnivores also.

4. FEATURES OF A SPECIES THAT IMPROVE THEIR ABILITY TO INFILTRATE

Early exploration on attacking species for the most part comprised of lovely depictions of the fruitful intruders, similarly as with numerous environmental events. These examination carefully described the situation into the presentation of non-local species and the mischief they caused to the encompassing networks. In later times, biologists have analyzed shared qualities that recognize fruitful trespassers from fruitless ones. While each effective intrusion has specific particular attributes, speculations in regards to attack characteristics empower more exact recognizable proof of the most probable species to attack. The progress of an attack really relies on two classifications of characteristics. The primary comprises of attributes that empower non-local organic entities to colonize new regions (see the part above on dispersal). The limit of a colonizing species to thrive in its new watery home is covered constantly set of qualities.

Outcome of intrusions can be anticipated utilizing a scope of life history qualities. Agamic generation, which is common in numerous aquatic plants and creatures, is one of the most huge. A solitary fruitful macrophyte piece can lead to a whole province through vegetative proliferation. Like this, safe resting eggs of cladocerans and rotifers can begin new populaces

or clonal heredities by agamic propagation (apomictic parthenogenesis) following overland dispersal and incubating. Invasive earthly plant species normally show more noteworthy sizes, higher development rates, and more shoot assignment than painless species. We guess that aquatic plants with comparable qualities will be more invasive. As per a review directed on fish in the Colorado Stream bowl, invasive species are bound to develop early and lay more modest eggs. Nonetheless, huge bodied fish with tremendous eggs and additionally parental consideration are among the various fruitful intruders. Quick development was connected to non-local fish foundation outcome in the Laurentian Extraordinary Lakes, yet not to spread rate, demonstrating the meaning of particular elements at different attack stages.

5. INVASIBILITY AQUATIC COMMUNITIES' SUSCEPTIBILITY TO INVASION

The inability of non-native species to colonise a new ecosystem is frequently explained by biotic resistance in conjunction with abiotic environmental variables. The primary factor influencing the success of an invasion, according to Elton, is the species variety of the recipient community. This theory is known as the biotic resistance hypothesis. Essentially, competition, predation, and parasitism are the factors that give rise to a local community's resistance against the invasion of nonnative species. The more native species there are, the more intense these unfavourable interactions tend to be. Therefore, variety is frequently used as a stand-in for native resistance in studies examining the function of biotic resistance. A meta-analysis revealed that while this type of biotic resistance hinders the establishment and performance of invaders, it is not a perfect barrier against plant invasions.

In freshwater ecosystems, the function of biotic resistance to invasions has been extensively studied. Since native species become more diverse and densely populated, macrophytes' growth is inhibited, demonstrating the significance of competition in biotic resistance. Beavers' effects on one species of invasive macrophyte in wetlands provide evidence that herbivory also contributes to a decrease in the population of invasive macrophytes. Invasive species can also be impacted by native predators. Zebra mussel mortality in rivers is increased by crabs and other predators, whereas native fish in lakes reduce the number of non-native crayfishes. Apple snail invasions in rivers are resisted by fish, turtles, and crayfish, among other predators.

6. CONCLUSION

In addition to posing management difficulties, invasive species offer a chance to investigate fundamental ecological issues. How are communities formed, and how do existing groups react to the emergence of new species? What is the frequency of niche shifts? What mechanisms control dispersal, and how significant are these regional mechanisms in relation to local community interactions? What is the process of community succession after an upheaval? Furthermore, a number of significant biases in the quantity of research done in various ecosystems are highlighted by our present AIS study. First, compared to terrestrial ecosystems, freshwater habitats have gotten far less attention. For example, future studies of ongoing invasions offer a large number of examples from terrestrial ecosystems, but there are very few in freshwater environments. Second, compared to the tropics, temperature zones have seen a

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

significantly greater amount of research. A portion of this prejudice stems from our inadequate comprehension of the ranges of species found in the tropics. Nonetheless, freshwater communities have a greater risk of losing more species due to invasions than temperate systems do because of the greater diversity found in the tropics, especially with regard to plants and fish. Thus, there are many prospects for significant contributions from research conducted in the tropics for invasion biologists.

REFERENCES

1. Cuthbert, R. N., Pattison, Z., Taylor, N. G., Verbrugge, L., Diagne, C., Ahmed, D. A., ... & Courchamp, F. (2021). *Global economic costs of aquatic invasive alien species. Science of the total environment*, 775, 145238.
2. Gallardo, B., & Aldridge, D. C. (2018). *Inter-basin water transfers and the expansion of aquatic invasive species. Water Research*, 143, 282-291.
3. Hill, M. P., & Coetzee, J. (2017). *The biological control of aquatic weeds in South Africa: Current status and future challenges. Bothalia-African Biodiversity & Conservation*, 47(2), 1-12.
4. Kernan, M. (2015). *Climate change and the impact of invasive species on aquatic ecosystems. Aquatic Ecosystem Health & Management*, 18(3), 321-333.
5. Kovalenko, K. E., Pelicice, F. M., Kats, L. B., Kotta, J., & Thomaz, S. M. (2021). *Aquatic invasive species: introduction to the Special Issue and dynamics of public interest. Hydrobiologia*, 848, 1939-1953.
6. Rahel, F. J., & Olden, J. D. (2008). *Assessing the effects of climate change on aquatic invasive species. Conservation biology*, 22(3), 521-533.
7. Strayer, D. L. (2010). *Alien species in fresh waters: ecological effects, interactions with other stressors, and prospects for the future. Freshwater biology*, 55, 152-174.
8. Vander Zanden, M. J., & Olden, J. D. (2008). *A management framework for preventing the secondary spread of aquatic invasive species. Canadian Journal of Fisheries and Aquatic Sciences*, 65(7), 1512-1522.
9. Willby, N. J. (2007). *Managing invasive aquatic plants: problems and prospects. Aquatic Conservation: Marine and Freshwater Ecosystems*, 17(7), 659- 665.
10. Williams, S. L., & Grosholz, E. D. (2008). *The invasive species challenge in estuarine and coastal environments: marrying management and science. Estuaries and Coasts*, 31, 3-20.

EXPLORING STUDENT PERSPECTIVES ON RURAL AGRICULTURAL ENGAGEMENT WITHIN THE COLLEGE OF AGRICULTURE

Dhirendra Kumar Sing

Research Scholar

Agriculture

Asian International University Imphal, Manipur

Abstract

This paper explores the perspectives of College of Agriculture students about their involvement in work experience in rural areas. By use of an extensive combination of qualitative and quantitative analyses, questionnaires, and interviews, the study reveals the attitudes, obstacles, and advantages that students have in relation to their involvement in agricultural activities in rural communities. The results highlight how crucial practical experience, learning, and personal development are in the field of agriculture. The study also emphasises how important it is to combine theoretical understanding with real-world application, encourage community involvement, and support cross-cultural interactions among students. Teachers and legislators can create efficient plans to maximize work-study programmes in rural agriculture by addressing and comprehending students' perceptions. This will ultimately help to develop the next generation of agricultural leaders and advance sustainable agricultural practices.

Keywords: *Perception, Students, Rural, Agriculture, Work Experience, College Agriculture Experiential, Perception, Rawe, Practice and Learning.*

1. INTRODUCTION

The primary goal of agricultural education is to produce skilled laborers who can engage in farming, research, teaching, and extension activities for the advancement of agriculture in India. Increased agricultural production, sustainability, ecological and environmental security, profitability, employment stability, and equity can all be achieved with its help. Several ICAR committees proposed that the programme should have a significant connection between agricultural education and real-world farming situations. Given the impact that agricultural knowledge has on farmers' socioeconomic behaviour, agricultural graduates are required by

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

university regulations to work and study in rural areas during their internship. This course is typically offered by SAUs during the final semester (VII or VIII) of an undergraduate degree programme.

For more than 60% of Indians, agriculture is the main driver of the country's economy. Since most of these farmers live in rural areas, improving the socioeconomic conditions in which they operate is essential to the prosperity of our nation. This kind of hands-on training and experience working with people in villages becomes inevitable because the rural work experience is essential to building a graduate's competence in functioning as an effective teacher, researcher, and extension professional in the transfer of technology to rural families. One of the finest ways to generate highly skilled agricultural graduates with a wide range of knowledge and skills to tackle new challenges is through RAWE.

This kind of hands-on training and experience working with people in villages becomes inevitable because the rural work experience is essential to building a graduate's competence in functioning as an effective teacher, researcher, and extension professional in the transfer of technology to rural families. One of the finest ways to generate highly skilled agricultural graduates with a wide range of knowledge and skills to tackle new challenges is through RAWE. In this context, a brand-new graduate course called the Rural Agricultural Work Experience (RAWE) Programme was introduced during the eighth semester at Indian agricultural universities. It was thought to be the best chance to help students become fully immersed in the rural environment, as well as to help them develop the necessary potential. As early as 1980–81, the Andhra Pradesh Agricultural University in Hyderabad was the first to include the RAWE programme in its curriculum. This came soon after the suggestions made by the Randhawa Committee.

2. LITERATURE RRVIEW

Jjuuko et.al (2019) study looks into Ugandan agricultural vocational education, emphasising student experiences. The study looks at different pedagogical strategies for agricultural education and illuminates the opportunities and difficulties faced by students in Uganda's agriculture industry. Their results provide insightful information that may be used to improve student learning and the efficacy of agriculture education initiatives.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Monavvarifard et.al (2019) Examine how students might help Iranian universities of agriculture and natural resources achieve higher standards of sustainability. The focus of their research is on how students may promote sustainable development practices by participating in the value co-creation process. The study promotes a cooperative approach to resource management and environmental conservation within academic institutions by integrating students in sustainability activities.

In Li's (2022) focus switches to the COVID-19 pandemic's effects on agricultural education, particularly the move to online learning. From the viewpoint of the students, the study explores the advantages, difficulties, and necessary advancements of online learning. The study offers insightful information about how agricultural education can be adapted to digital platforms by examining students' experiences during the epidemic. It also emphasises the significance of resolving issues and improving online learning opportunities for students pursuing careers in agriculture.

3. MATERIALS AND METHODS

The current work was deliberately carried out at the College of Agriculture in Delhi, which is a branch of the National Institute of Plant Genome Research (NIPGR) in New Delhi. The study's respondents were students who had finished the RAWE programme in the 2022–2023 academic year. Out of the sixty pupils, forty-six were male and fourteen were female. Perception among RAWE programme participants at NIPGR Delhi is the dependent variable under investigation. Since RAWE had already been put into practice and student experience data had already been gathered, an ex-post facto study design is being used. The data covering the study's objectives was gathered using a pre-structured interview schedule. Frequency, percentage, mean score, and rank were used to analyse the collected data.

4. RESULTS AND DISCUSSION

The distribution of RAWE students is shown by the results in Table 1. According to the study, 3.60 percent of people had poor perception. Regarding the Rural Agriculture Work Experience course, 38.50 percent of students had a medium opinion, while the majority of students (57.90%) had a positive perception. Nonetheless, it was determined that the majority of students in the high group felt favourably about the programmes for rural agriculture work experience. The emphasis placed on each aspect of farming that was incorporated into the

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

RAWE curriculum is helping the kids learn, according to the results. The results showed that over 57.90% of RAWE participants had a high opinion of the programme, 38.50% had a medium opinion, and over 3.60% had a bad opinion. It is demonstrated that the attention paid to each module and the orientation programme of the Rural Agriculture Work Experience curriculum is helping the students learn. The results have supported the observations made by earlier researchers.

Table 1:Students' distribution according to how they felt about RAWE (N = 60)

| Categories | No. of students | Percentage |
|------------|-----------------|------------|
| Low | 03 | 3.60 |
| Medium | 22 | 38.50 |
| High | 35 | 57.90 |
| Total | 60 | 100.00 |

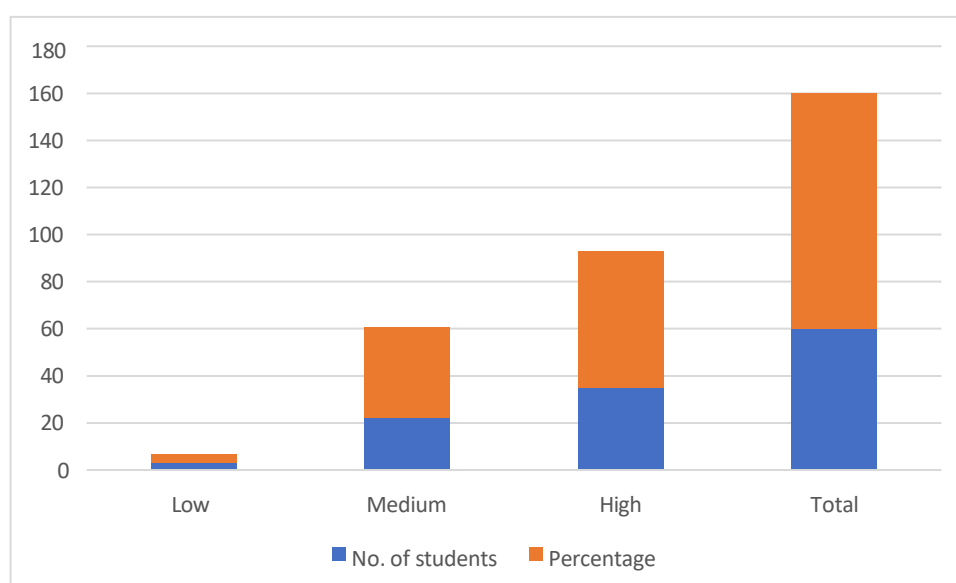


Table 2:Participants' perceptions of RAWE (N = 60)

| Statements | Mean Score | Rank |
|---|------------|------|
| Village Attachment has helped student to get familiar with rural people | 3.80 | VI |
| RAWE helped to understand local situations | 3.30 | II |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | |
|---|------|-----|
| To understand the working of rural | 3.20 | V |
| To understand socio-economic conditions of the farmers and their status | 3.95 | I |
| To realize adoption patterns and adoption gaps of the farmers | 2.99 | III |
| RAWE helped me to understand farming systems and home management. | 3.0 | IV |

Information shown in (Table 2) The statements that are supplied, together with the related mean scores and ranks, provide insightful information about how students see the College of Agriculture's rural agriculture work experience (RAWE). It is noteworthy that students place a high value on village attachment, as seen by the relatively high mean score and the recognition of its function in promoting familiarity with rural areas. Furthermore, the focus on comprehending farmers' socioeconomic circumstances highlights students' awareness of the larger agricultural context. There is potential for improvement in RAWE's comprehension of adoption patterns and gaps among farmers, even though it helps to some amount with understanding local circumstances and farming systems. Although there is room for improvement, overall the data indicates that RAWE programmes successfully support students' immersion into rural life and culture while also improving their comprehension of agricultural dynamics and socioeconomic realities.

5. CONCLUSION

Students at the College of Agriculture have a favourable perspective on job experience in rural agriculture, which is based on hands-on learning and community immersion. Students receive unique insights into the nuances of rural living, farming techniques, and socio-economic dynamics through programmes like village attachment and hands-on experiences. The results highlight areas for improvement, such as better understanding farming systems and adoption patterns, but they also highlight how important experiential learning is for developing a deeper understanding of agriculture and building meaningful relationships with rural communities. This favourable opinion lays the framework for students to later act as proactive participants in the development of sustainable agriculture.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

REFERENCES

1. Alston, A. J., Roberts, R., & English, C. W. (2020). *Toward a holistic agricultural student recruitment model: A national analysis of the factors affecting students' decision to pursue an agricultural related degree. Journal of Research in Technical Careers*, 4(1), 1.
2. Cuellar, M. G., Bencomo Garcia, A., & Saichaie, K. (2022). *Reaffirming the public purposes of higher education: First-generation and continuing generation students' perspectives. The Journal of Higher Education*, 93(2), 273-296.
3. Elias, M., Mudege, N. N., Lopez, D. E., Najjar, D., Kandiwa, V., Luis, J. S., ... & Bentaibi, A. (2018). *Gendered aspirations and occupations among rural youth, in agriculture and beyond: A cross-regional perspective. Journal of Gender, Agriculture and Food Security*.
4. Hendrix, R., & Morrison, C. C. (2018). *Student Perceptions of Workforce Readiness in Agriculture. Journal of Agricultural Education*, 59(3), 213-228.
5. Ingram, M. L., Sorensen, T. J., Warnick, B. K., & Lawver, R. G. (2018). *The Influence of School-Based Agricultural Education on Preservice Agriculture Teachers' Choice to Teach. Journal of Agricultural Education*, 59(2), 64-78.
6. Jjuuko, R., Tukundane, C., & Zeelen, J. (2019). *Exploring agricultural vocational pedagogy in Uganda: students' experiences. International journal of training research*, 17(3), 238-251.
7. Li, D. (2022). *The Shift to Online Classes during the COVID-19 Pandemic: Benefits, Challenges, and Required Improvements from the Students' Perspective. Electronic Journal of E-Learning*, 20(1), 1-18.
8. Monavvarifard, F., Baradaran, M., & Khosravipour, B. (2019). *Increasing the sustainability level in agriculture and Natural Resources Universities of Iran through students' engagement in the value Co-creation process. Journal of Cleaner Production*, 234, 353-365.
9. Simões, F., & do Rio, N. B. (2020). *How to increase rural NEETs professional involvement in agriculture? The roles of youth representations and vocational training packages improvement. Journal of Rural Studies*, 75, 9-19.
10. Triste, L., Vandenabeele, J., Van Winsen, F., Debruyne, L., Lauwers, L., & Marchand, F. (2018). *Exploring participation in a sustainable farming initiative with self-determination theory. International Journal of Agricultural Sustainability*, 16(1), 106-123

ENHANCING COMPUTER SCIENCE RESEARCH WITHIN EDUCATION: A FRAMEWORK FOR ADVANCEMENT

AMIT KUMAR MISHRA

Research Scholar COM-
PUTER SCIENCE & ENGINEERING
Asian International University Imphal, Manipur

Abstract

A framework for improving computer science research in polytechnic educational institutions is presented in this paper. Robust research programmes are becoming more and more necessary in polytechnic settings as the need for computer science personnel grows. This study presents a systematic framework for promoting a research, innovation, and cooperation culture among students, teachers, and industry partners. Establishing specialised research centres, encouraging interdisciplinary collaboration, including projects relevant to the industry into the curriculum, and offering assistance to faculty and student research efforts are important elements. Polytechnic institutions may foster a dynamic research ecosystem that advances computer science knowledge and its practical applications while also improving educational experiences by putting this framework into practice.

Keywords: *Computer Science, Research, Education*

1. INTRODUCTION

Computer science is an essential subject in today's higher education environment since it is incorporated into so many facets of contemporary life. Polytechnic schools are essential for training students for computer science professions because there is a growing need for qualified workers in this industry. However, it is crucial to promote a culture of research and innovation within polytechnic environments in order to guarantee that graduates remain competitive in a technological world that is changing quickly.

This paper presents a framework intended to improve institutional computer science research. Polytechnics can foster a dynamic research environment that enhances educational experiences and advances computer science knowledge and its practical applications by instituting structured approaches to research and cooperation. This study aims to examine the essential

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

elements of this framework and deliberate on methods for enhancing the calibre and influence of computer science research in polytechnic education.

2. LITERATURE REVIEW

Ahir et.al (2020) examine the diverse applications of virtual reality (VR) in enhancing education, military training, and sports. Their study likely highlights the immersive and interactive nature of VR technology, which offers unique opportunities to enhance learning experiences and training simulations.

Hwang et.al (2020) provide a comprehensive overview of the vision, challenges, roles, and research issues surrounding the integration of artificial intelligence (AI) in education. The study likely explores the potential of AI technologies, such as machine learning, natural language processing, and adaptive learning systems, to personalize and optimize learning experiences.

Chassignol et.al (2018) offer a narrative overview of the trends and developments in artificial intelligence (AI) within educational contexts. The study likely discusses the growing use of AI-driven tools and platforms for adaptive learning, automated grading, and personalized recommendations.

3. ENHANCING CS RESEARCH IN EDUCATION

Improving computer science (CS) research in the classroom is essential to getting students ready for the ever-changing needs of a technologically advanced society. The need for qualified CS experts is growing as technology continues to enter many sectors of the economy and areas of daily life. Because of its emphasis on experiential, hands-on learning, polytechnic schools are particularly well-positioned to encourage a culture of research and innovation among their professors and students. Closing the gap between theoretical knowledge and practical applications is one of the main objectives of improving CS research in education. Polytechnic institutions can give students invaluable opportunities to apply theoretical principles to real-world problems by including them in research initiatives. Their grasp of CS fundamentals is strengthened by this practical experience, which also gives them the tools they'll need to take on challenging tasks in the workplace.

Encouraging a strong research culture in polytechnic schools develops students' curiosity and spirit of inquiry. Through research projects, students can experiment with cutting-edge ideas,

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

learn from their peers, and work with faculty members. Critical thinking, creativity, and problem-solving abilities are all fostered in this collaborative atmosphere and are necessary for success in the computer science industry. Improving computer science research in the classroom also improves the relationship between business and academics. Polytechnic schools can make sure that their curricula are current and relevant to the newest demands and developments in the industry by working on research projects with industry partners. Through industry partnerships, students get insightful knowledge about real-world possibilities and difficulties. They also develop transferable skills and industry connections that improve their employability after graduation.

Furthermore, placing a high priority on computer science research in the classroom can help to develop knowledge and spur innovation in the subject. Research initiatives carried out by academic staff and students have the potential to produce ground-breaking findings, innovative technology, and fresh approaches to challenging issues. Polytechnic institutions may make a big difference in expanding the field of computer science knowledge and advancing technical developments that benefit society at large by promoting and funding research projects. Improving computer science research in the classroom is crucial to educating students for prosperous professions in the technologically advanced world. Polytechnic institutions can enable students to become skilled professionals and innovators who shape the future of technology by giving them opportunities for hands-on research, promoting a culture of inquiry and collaboration, fortifying relationships with industry partners, and furthering the advancement of CS knowledge.

4. RESEARCH DISCUSSION

The paper's earlier portion covered a variety of techniques, protocols, and approaches that can be applied to improve A-Poly's CS research. Fig. 1 also provides an illustration of these aspects. The first factor, the integrity of the CS research environment, is crucial because, in the absence of positive integrity, the CS research environment at A-Poly would not be appropriate for students or academic staff, which would undermine the training and education provided by the CS programme and other courses offered at A-Poly. Additionally, as Fig. 1 illustrates, access to premier CS electronic and digital databases and libraries, as well as e-library assistance for CS research, are critical additional considerations. The financial issue is one of these components' primary challenges, as was previously discussed. However, financing is a problem

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

that needs to be partially resolved if A-Poly is to continue supporting CS research and instruction. Furthermore, the fourth and fifth factors—which are closely related—explain CS research in terms of scientific collaboration, expert advice, and conference organisation, as shown in Fig. 4. As previously said, these elements will facilitate improved social awareness as well as possible interactions and teamwork that will ultimately increase CS research in A- Poly.

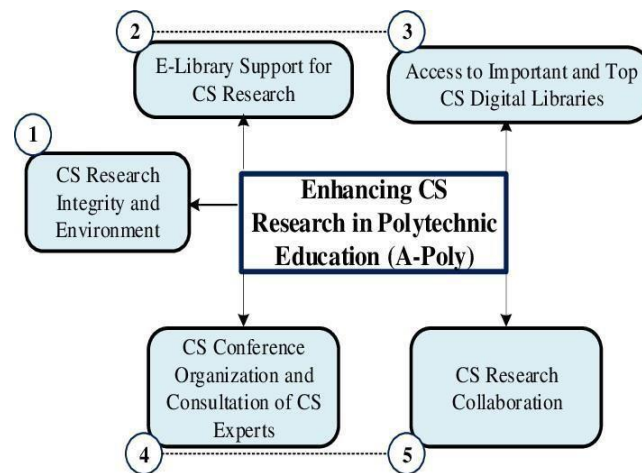


Figure 1:A-Poly: Elements to Take into Account for Improving CS Research in Polytechnic Education

5. CONCLUSION

In conclusion, it is critical to improve computer science research in the classroom through an organised framework in order to equip students to handle the challenges of the quickly changing technological environment. Future computer scientists can be encouraged to be innovative and inquisitive by educational institutions through the provision of chances for hands-on research, faculty-student collaboration, and fortifying industrial linkages. This enhances the learning process and advances information as well as helps create workable answers to issues that arise in the actual world. Institutions may enable students to become competent professionals and industry leaders by maintaining their commitment to improving computer science research inside the curriculum. This will foster innovation and help to shape the direction of technology.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

REFERENCES

1. Ahir, K., Govani, K., Gajera, R., & Shah, M. (2020). *Application on virtual reality for enhanced education learning, military training and sports. Augmented Human Research*, 5, 1-9.
2. Alam, A. (2021, December). *Should robots replace teachers? Mobilisation of AI and learning analytics in education. In 2021 International Conference on Advances in Computing, Communication, and Control (ICAC3) (pp. 1-12). IEEE.*
3. Chassignol, M., Khoroshavin, A., Klimova, A., & Bilyatdinova, A. (2018). *Artificial Intelligence trends in education: a narrative overview. Procedia Computer Science*, 136, 16-24.
4. Graesser, A. C., Fiore, S. M., Greiff, S., Andrews-Todd, J., Foltz, P. W., & Hesse, F. W. (2018). *Advancing the science of collaborative problem solving. Psychological science in the public interest*, 19(2), 59-92.
5. Hsu, T. C., Chang, S. C., & Hung, Y. T. (2018). *How to learn and how to teach computational thinking: Suggestions based on a review of the literature. Computers & Education*, 126, 296-310.
6. Hwang, G. J., Xie, H., Wah, B. W., & Gašević, D. (2020). *Vision, challenges, roles and research issues of Artificial Intelligence in Education. Computers and Education: Artificial Intelligence*, 1, 100001.
7. Luan, H., Geczy, P., Lai, H., & Li, P. (2020). *Challenges and future directions of big data and artificial intelligence in education. Frontiers in psychology*, 11, 580820.
8. Qureshi, M. I., Khan, N., Raza, H., Imran, A., & Ismail, F. (2021). *Digital technologies in education 4.0. Does it enhance the effectiveness of learning?.*
9. Vakil, S. (2018). *Ethics, identity, and political vision: Toward a justice-centered approach to equity in computer science education. Harvard educational review*, 88(1), 26-52.
10. Wedel, M., Bigné, E., & Zhang, J. (2020). *Virtual and augmented reality: Advancing research in consumer marketing. International Journal of Research in Marketing*, 37(3), 443-465.

OPTIMIZING PHARMACY MANAGEMENT INFORMATION SYSTEMS THROUGH OPERATIONS RESEARCH DESIGN AND IMPLEMENTATION

Prashant Somwanshi

Research Scholar Phar-
macy
Asian International University Imphal, Manipur

Abstract

This study explores how Pharmacy Management Information Systems (PMIS) might be optimised by using the design and implementation of operations research (OR). It looks at how OR approaches can improve PMIS's overall performance, efficacy, and efficiency in pharmacy settings. Pharmacy systems can improve patient care outcomes, expedite inventory management, and improve medicine dispensing operations by utilising OR approaches including mathematical modelling, simulation, and optimisation algorithms. The abstract emphasises how crucial it is to incorporate OR principles into PMIS design and deployment in order to handle difficult operational problems and promote ongoing pharmacy service improvement. By using this strategy, pharmacists may improve patient pleasure, accuracy, and cost-effectiveness—all of which will raise the standard of healthcare delivery.

Keywords: *Optimizing, Pharmacy Management Information Systems Operations Research Design Implementation, accounting, Inventory Management, Operations Research.*

1. INTRODUCTION

Global industry and government have witnessed a radical transformation in the collection, preservation, and utilization of information in recent times. The paper-based, error-prone, and delayed workplace of the past has given way to an information technology (IT)-based one. Even though IT has the potential to significantly increase accuracy and timeliness, it cannot resolve the serious issues with administrative inertia or staff capability on its own. In this fast-paced era, information technology is ingrained in all fields. IT is the process of converting, storing, protecting, processing, transmitting, and obtaining information safely utilizing electronic computers and computer software.

The real world is taken into consideration when developing the clinical pharmaceutical management system. The prescription for the patient review in the general operations

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

department is used as an illustration by the chemists. Before and after utilizing the clinical pharmacy management system, the productivity of clinical pharmacists was evaluated, as well as the quality and qualifying rates of prescription medications.

The Australian Department of Veterans Affairs (DVA) now uses the pharmacy management information systems (PMIS) software. It focuses on the information management design and the goals of the drug management programme.

When the pharmacy owner implemented the PMIS in their business, the researcher collected all the requirements that were needed for its creation. Additionally, the operations research of both large and small pharmacies may demonstrate a successful implementation and track all drug inventories coming into and going out of the pharmacy, as well as the cash flows of the entire international pharmacy business. The operations research conceptual framework for the pharmaceutical industry is depicted in Figure 1 below.

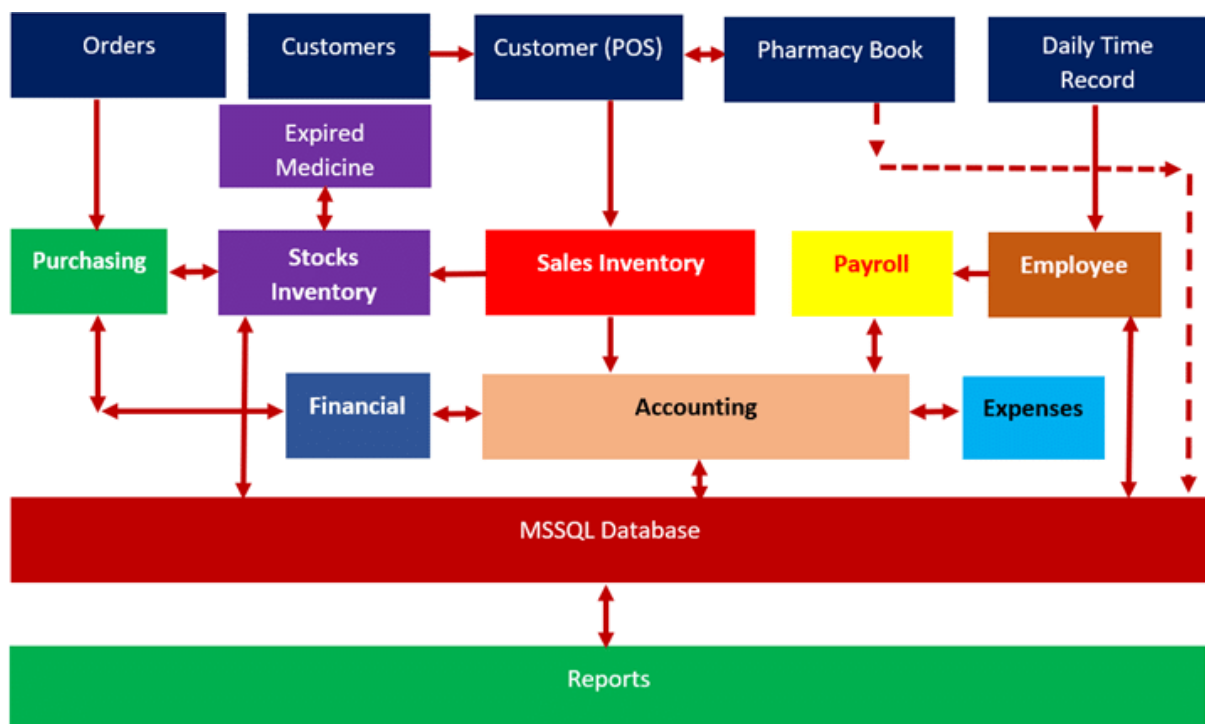


Figure 1:Operations Research Framework

1.1. Objective Of the Study

The main goal of this study is to provide guidance to aspiring pharmacy owners so they can use the PMIS of the industry rather than managing it manually. Its specific goal is to develop and carry out operations research on computerized pharmaceutical management information

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

systems with a front-end based on Visual Basic.net and a back-end based on an MSSQL database server.

1. Create procedures for tracking orders, clients, sales, inventories, payroll, employee time sheets, drug expiration, bookkeeping, outlays, accounting, and finance.
2. Create a Windows-based application that covers every facet of pharmacy business procedures using Visual Basic.net and MSSQL.
3. Put the system into practice in a pharmacy to evaluate the PMIS's integrity and efficacy in practical operations.

2. LITERATURE REVIEW

Guha and Kumar (2018) examine the development of big data research in the fields of information systems, operations management, and healthcare, offering an overview of previous contributions and a research plan for the future.

Malik, Abdallah, and Ala'raj (2018) do a thorough analysis of the literature on the applications of data mining and predictive analytics in the provision of healthcare services, providing insightful information on the use of advanced analytics to enhance patient outcomes.

Sazvar, Zokaee, Tavakkoli-Moghaddam, Salari, and Nayeri (2021) concentrate on creating a long-lasting closed-loop pharmaceutical supply chain in markets with intense competition, taking into account elements like waste management, manufacturer's brand, and unpredictable demand.

3. METHODOLOGY

Due to its experimental design, which relies on Random Application Development, the study's methodology is deductive. By focusing on client satisfaction through the timely and seamless delivery of necessary, functioning software, rapid application development reduces problems compared to traditional software development approaches. The study's model is shown in Figure 2.

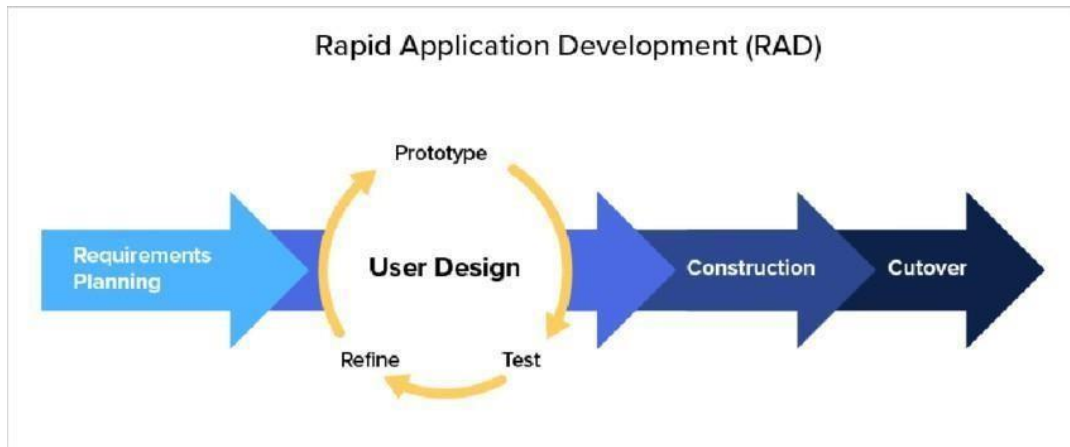


Figure 2:Model of Random Application Development

A. Project Requirements

- Some pharmacies use PMIS, however it only has features for stock inventory and sales. Others are more intricate, encompassing aspects that bear little connection to the basic functions associated with pharmacies.
- Front-End. Productive, multifunctional, type-safe, object-oriented, and open-source is Visual Basic.net.
- Back-end. An MSSQL database server powers the system's back end, acting as the system's central repository for all transaction data.
- Operating Systems. For the implementation, Windows 10 is advised because it is simple to set up in a network or multi-user environment.
- Hardware. As for the system's hardware specifications, the MSSQL database server's central storage should have at least an Intel i3 or higher processor, 8GB of RAM, 512GB of solid-state drive space for primary storage, and 1TB or more of secondary storage.
- Network. Every computer connected to the system requires an Ethernet card. Additionally, wireless connectivity can be connected.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

B. User Design

The researcher thought that the graphical user interface (GUI) should be as straightforward and user-friendly as possible. Figures 3 and 4 below, for instance, depict the system's primary command button operating following the completion of the user login page.



Figure 3: Functional Button



Figure 4: Sub Functional Button

The buttons in Figures 3 and 4 operate in accordance with the intended output when the systems are implemented.

4. RESULTS AND DISCUSSION

After conducting operations research on the business process of the pharmacy company operation, the researcher ultimately produced the intended outcome. Because they will automate the entire process, the complexity of the business process will be reduced. If the PMIS is installed properly, managing the business activity won't be a problem for the pharmacy owner, allowing them to focus more on growing their branches. The pharmacy clerk serving clients looking to search for medication in the database was diverted in Figure 5 below. Here, the cost of the medication, together with its inventory and storage location, may be seen on the screen when you search for it. For transactional clients, a number of function keys are operational, such as the customer discounts for PWDs, Senior Citizens, and variable discount entries for promotional products. Additionally, a medical lexicon plays a crucial role in enabling the attendant to reply to specifics regarding the medicine in question. Because this is not an internet platform, the medical dictionary's records are pre-loaded.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

SALES INVENTORY SYSTEM

Figure 5: Point of Sale customer transaction

In order to enable the pharmacist and pharmacy manager to purchase additional medication based on the reported top 20 saleable pharmaceuticals, data analytics is also incorporated in the implementation. It will show the top 20 most marketable medications.

5. CONCLUSION

The study came to the conclusion that it is not wise or beneficial to install PMIS software in the pharmacy business operation that handles all transactions since it provides an opportunity for staff fraud. For most businesses, automation is the key to becoming profitable and operating continuously. Additionally, it demonstrates how simple reporting is, particularly for the owner's financial records, as they can view the business's entire expenses, profit, payables, and receivables instantaneously. Furthermore, the system may instantly evaluate the analytics of marketable drugs to inform the purchase of new ones. Finally, it is evident from operations research that a scientific methodology forms the cornerstone of sophisticated decision-making and corporate performance.

REFERENCES

1. Ahmadi, A., Mousazadeh, M., Torabi, S. A., & Pishvae, M. S. (2018). *Or applications in pharmaceutical supply chain management. Operations research applications in health care management*, 461-491.
2. Dixit, A., Routroy, S., & Dubey, S. K. (2019). *A systematic literature review of healthcare supply chain and implications of future research. International Journal of Pharmaceutical and Healthcare Marketing*, 13(4), 405-435.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

3. Guha, S., & Kumar, S. (2018). *Emergence of big data research in operations management, information systems, and healthcare: Past contributions and future roadmap. Production and Operations Management, 27(9), 1724-1735.*
4. Gupta, S., Modgil, S., Bhattacharyya, S., & Bose, I. (2022). *Artificial intelligence for decision support systems in the field of operations research: review and future scope of research. Annals of Operations Research, 1-60.*
5. Kraus, M., Feuerriegel, S., & Oztekin, A. (2020). *Deep learning in business analytics and operations research: Models, applications and managerial implications. European Journal of Operational Research, 281(3), 628-641.*
6. Malik, M. M., Abdallah, S., & Ala'raj, M. (2018). *Data mining and predictive analytics applications for the delivery of healthcare services: a systematic literature review. Annals of Operations Research, 270, 287-312.*
7. Saha, E., & Ray, P. K. (2019). *Modelling and analysis of inventory management systems in healthcare: A review and reflections. Computers & Industrial Engineering, 137, 106051.*
8. Sazvar, Z., Zokaee, M., Tavakkoli-Moghaddam, R., Salari, S. A. S., & Nayeri, S. (2021). *Designing a sustainable closed-loop pharmaceutical supply chain in a competitive market considering demand uncertainty, manufacturer's brand and waste management. Annals of Operations Research, 1-32.*
9. Taleizadeh, A. A., Haji-Sami, E., & Noori-daryan, M. (2020). *A robust optimization model for coordinating pharmaceutical reverse supply chains under return strategies. Annals of Operations Research, 291, 875-896.*
10. Wager, K. A., Lee, F. W., & Glaser, J. P. (2021). *Health care information systems: a practical approach for health care management. John Wiley & Sons.*

RELATIONSHIP BETWEEN ACADEMIC PROCRASTINATION AND ACADEMIC ANXIETY AMONG STUDENTS WITH VISUAL DISABILITY

Awanish Kumar

Research Scholar
EDUCATION

Asian International University Imphal, Manipur

Abstract

This study investigates the connection between academic anxiety and procrastination in students with visual impairments. Academic anxiety can be made worse by academic procrastination, which is the propensity to put off academic work despite the consequences. This can result in increased stress and poor performance. Comprehending this correlation is vital in order to formulate focused remediations and assistance systems for pupils with visual impairments. Educators and legislators can adopt measures to encourage proactive academic behaviours and lower anxiety levels by recognising the elements that contribute to procrastination and anxiety in this population. This will ultimately establish a supportive learning environment for students with visual difficulties.

Keywords: Academic Procrastination, Academic Anxiety, Students, Visual Disability

1. INTRODUCTION

Academic procrastination and anxiety can have a substantial negative influence on students with visual difficulties' academic performance and general well-being, making academic contexts particularly difficult for them to navigate. Academic procrastination, which is characterised as the inclination to put off assignments in spite of negative outcomes, is a problem that affects a wide range of student demographics. For kids with visual impairments, who already face difficulties getting access to educational resources, navigating their physical surroundings, and getting accommodations, it can be very harmful.

For a number of reasons, it is crucial to comprehend the complex relationship that exists between academic procrastination and academic anxiety among individuals with visual impairments. First of all, it illuminates the psychological and emotional struggles faced by students who encounter particular obstacles in learning environments. Second, it emphasises

how crucial it is to create specialised treatments and support systems in order to cater to the unique requirements of this demographic.

Students with visual impairments are resilient and inventive despite these obstacles, frequently coming up with coping mechanisms to handle academic pressures. In order to enhance academic performance and well-being in this demographic, educators, researchers, and policymakers might learn useful support strategies and interventions by looking at the association between academic procrastination and academic anxiety among students with visual difficulties.

2. LITERATURE REVIEW

Mohammadian et al. (2023) investigates the efficacy of group counselling grounded in reality therapy on academic resilience and academic procrastination among visually impaired students. The study addresses a critical gap in the literature by focusing on the unique challenges faced by visually impaired students in academic settings.

Tras and Gökçen (2020) explore the interplay between academic procrastination, social anxiety, and internet addiction among adolescents. The study recognizes procrastination as a pervasive phenomenon impacting academic performance and psychological well-being.

Pathrose and Ramaa (2020) examine the association between academic stress and academic achievement among visually impaired students. Academic stress represents a significant concern among students with visual impairments, stemming from environmental barriers, academic demands, and societal perceptions.

3. ACADEMIC PROCRASTINATION

Academic procrastination is a common problem among students, wherein they put off academic assignments even when they are aware of the implications. Students frequently put off assignments out of a lack of enthusiasm or unclear goals, or out of negative emotions like worry and fear of failing. Social networking and entertainment platforms are examples of contemporary digital distractions that exacerbate procrastination issues. Academic achievement may suffer from this behaviour, which can result in hurried work, poorer grades, and increased stress. A comprehensive strategy that includes time management techniques, psychological therapies, and self-awareness is needed to address academic procrastination.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Procrastination tendencies can be lessened by teaching students to divide work into manageable chunks, set reasonable objectives, and create disciplined routines. Furthermore, emotional impediments to academic development must be addressed by fostering a supportive learning atmosphere where students feel comfortable asking for assistance.

4. STUDENTS WITH LEARNING DISABILITIES IN HIGHER EDUCATION

Academic environments in higher education present particular difficulties for students with learning problems because of the high standards and sometimes demanding coursework. Their overall success and academic performance may be impacted by these limitations, which may impair their capacity to process information, organise their thoughts, or effectively articulate ideas. Many individuals with learning difficulties have skills and abilities that can help them in their academic endeavours, despite these obstacles. To accommodate their learning needs, they could, nevertheless, need accommodations like more time for tests, help taking notes, or different formats for resources. Additionally, maintaining the academic success and wellbeing of students with learning disabilities in higher education requires creating a friendly and inclusive learning environment that encourages awareness, understanding, and acceptance of varied learning styles.

5. DEFINITION AND MEASUREMENT OF ACADEMIC ANXIETY

Students with visual impairments face additional difficulties in meeting academic requirements, traversing physical locations, and gaining access to educational materials, which exacerbates their anxiety related to assignments, assessments, and performance expectations. Students with visual impairments have higher levels of anxiety as a result of these challenges, which also include social stigmatisation, dependence on assistive technologies, and challenges in accessing written materials. Academic anxiety can have a significant negative effect on this group, making it difficult for them to focus, process information, and participate in educational activities. Additionally, avoidance behaviours such as procrastination or disengagement from academic work might result from academic anxiety, worsening academic challenges and lowering performance overall. Additionally detrimental to mental health, persistent anxiety can lead to low self-esteem, feelings of inadequacy, and a decreased desire to pursue academic goals.

6. FACTORS CONTRIBUTING TO ACADEMIC PROCRASTINATION AMONG STUDENTS WITH VISUAL DISABILITIES

Academic procrastination among students with visual impairments is caused by a variety of factors, including special difficulties, environmental obstacles, social dynamics, and psychological elements. First of all, because of their visual impairments, pupils have difficulty achieving academic standards, traversing physical situations, and accessing instructional resources. This involves having trouble getting to printed materials, getting around campus, and doing assignments quickly. Environmental considerations compound these difficulties, as many educational environments do not provide the accommodations and assistive technologies that are vital for the success of students with visual impairments. In addition, procrastination tendencies are influenced by social factors that affect students' motivation and confidence, such as social isolation, lack of support, and stigma. Ultimately, psychological elements such as worry, low self-worth, and fear of failing exacerbate the situation and frequently cause students to put off assignments as a coping strategy. In conclusion, developing successful support solutions to enable visually impaired children to overcome procrastination and succeed academically requires a comprehensive understanding of these complex aspects.

7. FACTORS CONTRIBUTING TO ACADEMIC ANXIETY AMONG STUDENTS WITH VISUAL DISABILITIES

Students with visual impairments experience academic anxiety due to a variety of intricate and multidimensional factors. First of all, these children face particular challenges in achieving academic standards, navigating physical situations, and gaining access to educational materials, which can cause dissatisfaction and failure-related worry. By encouraging social exclusion and internalised ableism, societal views on disabilities, including stigma and misconceptions, can make people feel more anxious. Furthermore, the efficacy and accessibility of academic accommodations have a substantial influence on anxiety levels; insufficient assistance results in increased stress. Effective accommodations, on the other hand, can reduce anxiety and encourage academic success. Furthermore, students' views of themselves and their talents are very important, and low self-esteem and negative self-talk can lead to increased worry. Reducing academic anxiety and promoting the wellbeing of students with visual impairments requires addressing these particular stressors, questioning society views, enhancing accommodations, and cultivating a positive self-perception.

8. CONCLUSION

In conclusion, the intricate connection between students with visual impairments' academic procrastination and anxiety highlights the range of difficulties they face throughout their academic careers. The challenges these students encounter are caused by a variety of obstacles, including getting access to educational resources, navigating physical spaces, fulfilling academic requirements, and cultural attitudes. Procrastination and anxiety only make matters worse. Furthermore, inadequate accommodations and support networks exacerbate anxiety and prolong delaying. It need comprehensive methods that put accessibility, inclusion, and individualised support first in order to address this interwoven dynamic. Through the establishment of a nurturing educational atmosphere, establishments can lessen the negative effects of worry and procrastination, enabling visually impaired students to reach their full potential and succeed academically.

REFERENCES

1. Desai, M., Pandit, U., Nerurkar, A., Verma, C., & Gandhi, S. (2021). *Test anxiety and procrastination in physiotherapy students. Journal of education and health promotion*, 10.
2. Hazan-Liran, B. (2023). *Does Procrastination Have a Cultural or a Neurological Source? Evidence of its Mediating Role in the Relationship Between Psychological Capital and Academic Adjustment. American Journal of Health Behavior*, 47(2), 306-320.
3. Itani, S. W. (2019). *Academic procrastination and its correlates among candidates of the Lebanese baccalaureate program: academic self-efficacy and academic achievement*.
4. Khomeini Shahr, I. (2020). *The effectiveness of the intervention based on attributional retraining on academic burnout and academic procrastination of students with reading learning disorder*.
5. Mohammadian, M., Haj Hosseini, M., & Keshavarz Afshar, H. (2023). *The effectiveness of group counseling based on reality therapy on academic resilience and academic procrastination in visually impaired students. Rooyesh-e-Ravanshenasi Journal (RRJ)*, 12(10), 1-10.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

6. Pathrose, A. P., & Ramaa, P. S. (2020). *Relation of academic stress on academic achievement of visually impaired students. International Journal of Indian Psychology*, 8(2).
7. Salata, K., Dobrodum, O., & Ishchuk, O. (2022). *Academic Procrastination as a challenge for Students' Mental Health in the context of distance learning and the virtual world during the COVID-19 pandemic. International Journal of Computer Science and Network Security*, (22 (3)), 276-284.
8. Shahr, I. (2020). *The effectiveness of the intervention based on attributional retraining on academic burnout and academic procrastination of students with reading learning disorder.*
9. Sutcliffe, K. R., Sedley, B., Hunt, M. J., & Macaskill, A. C. (2019). *Relationships among academic procrastination, psychological flexibility, and delay discounting. Behavior Analysis: Research and Practice*, 19(4), 315.
10. Tras, Z., & Gökçen, G. (2020). *Academic Procrastination and Social Anxiety as Predictive Variables Internet Addiction of Adolescents. International Education Studies*, 13(9), 23-35.

FINANCIAL ASSISTANT FOR WOMEN ENTREPRENEUR

Laxmipriya Mohapatra
Research Scholar Com-
merce

Asian International University Imphal, Manipur

Abstract

This paper emphasises how crucial financial support is to empowering female business owners and promoting economic expansion. Tailored financial support presents substantial opportunity for women-led firms, even in the face of particular constraints like low credit availability and gender bias. These issues are addressed by a number of programmes, including mentorship programmes, venture capital funding, and microloans, which empower women to create innovative and long-lasting businesses. Studies verify that financial support for female entrepreneurs results in observable advantages such as the generation of jobs and the mitigation of poverty. Supporting female entrepreneurs also complies with international objectives for economic development and gender equality.

Keywords: Commercial Banks, Financial Institutions, MSME Sector, Women Entrepreneurs, Financial Assistants

1. INTRODUCTION

To meet the financial and non-financial requirements of entrepreneurs, the government is establishing financial institutions at both the federal and state levels. Due to their fragile financial structures, women-owned businesses need financial assistance in order to endure over the long term and remain competitive with larger sectors of the economy.

Around 3.01 million women-possessed organizations represent 10% of all MSME in the country, contribute 3.09 percent to modern result, and give work to 8 million individuals. The vast majority of women-claimed organizations are in the casual sector, around 78% of women-possessed organizations are in the assistance sector, and 98% of women-claimed organizations are miniature endeavors. Despite having funding needs that are comparable to those of male-owned businesses, female-owned businesses experience greater levels of financial exclusion for a variety of reasons. Women's social standing and societal standards influence how financial institutions are seen and how easy it is for female entrepreneurs to obtain financing.

2. LITERATURE REVIEW

Baporikar and Akino (2020). The vital role that financial literacy plays in the success of women entrepreneurs is examined by the survey, financial literacy is crucial for women business owners to successfully manage their funds, make wise decisions, and deal with the challenges of the competitive business world.

Chowdhury et al. (2018). The attitudes of female entrepreneurs regarding their ability to obtain bank financing are examined by the report emphasises how crucial it is for women-owned businesses to have access to financial resources, especially bank loans, in order for them to expand and survive. Yet, due to things like bureaucratic processes, gender prejudices in financial institutions, and collateral requirements, women business owners sometimes encounter difficulties obtaining bank financing.

Ghosh et al. (2018) aims to determine the barriers that prevent female entrepreneurs from obtaining institutional financing. The report lists a number of obstacles, such as a deficiency of collateral, a restricted network of business contacts, and prejudice on the part of financial institutions against female entrepreneurs.

3. FINANCIAL ACCESS FOR WOMEN OWNED BUSINESS

There are 2.79 million unregistered and 325000 enrolled women-claimed MSME in India, as per the sixth MSME overview Registration of Enlisted and Unregistered MSME Report 2022-2023. Their requirements for working money, speculations, and advances or credit for long haul resources make up their financial interest. In terms of funding demand, SMEs lead the way. It is predicted that women-owned businesses will need 8.10 trillion Indian Rupees in total debt, and 2.59 trillion Indian Rupees in equity.

Regardless, as per the MSME Report 2022-23, the all-out conventional financing conceded to women-possessed organizations in 2023 was around 2.69 trillion Indian Rupees. This amount is made up of money from a variety of financial organisations, including self-help bank linkage initiatives, public sector banks, and non-banking financial businesses. Below is a list of the funding that various financial institutions have released to women-owned MSME: -

Table2: Various institutions provide financing to women-owned MSMEs

| Source | Financing Supply Share |
|---|------------------------|
| Public sector banks through microcredit | 35 |
| Public sector banks to small scale industries | 40 |
| Prime Minister's Rozgar Yojana | 1 |
| Swarna Jayanti Shahari Rozgar Yojana | 2 |
| Swarna Jayanti Gram Swarozgar Yojana | 5 |
| Private sector banks | 18 |
| Foreign Banks | 6 |

4. INSTITUTIONAL CREDIT FOR WOMEN ENTREPRENEURS

It's basic to perceive that the absence of financial projects and plans pointed toward supporting women entrepreneurs isn't the main variable adding to India's financial gap. These female entrepreneurs get both immediate and backhanded help from financial institutions and other financial foundations to assist them with expanding their pay and business levels. For example, the focal government presented the Rastriya Mahila Kosh program in 1993 to address the credit needs of low-pay women utilized in the customary or sloppy sectors who can't get credit from financial institutions. To help women entrepreneurs in sending off their own organizations, the public authority additionally sent off the Seed Capital Plan, which is upheld by associations like the Directorate of Businesses, Khadi and Town Ventures Board, and Little Enterprises Institutions.

5. FINANCIAL SCHEMES FOR WOMEN ENTREPRENEURS

In order to close the financial gap in this industry, the Indian government aims to promote women-owned businesses' participation in financial support programmes. Here, a few of the schemes are examined.

- **Credit Guarantee Fund Scheme** In May 2000, the government launched the Credit Guarantee Fund Scheme for small and medium-sized enterprises (SME) sectors. The plan intended to give credit to little and medium-sized endeavors (SSI) and permitted them to get up to Rs 25 lakhs without requiring insurance security or outsider assurances. The

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Public authority of India and IDBI together settled the Credit Assurance Asset trust for Little Ventures (CTGSI), which is responsible for administering the drive.

- **Bharatiya Mahila Bank Scheme** is the one launching this programme, which gives women businesses access to term loans and working capital up to Rs 20 crores. There is a specific credit programme available for daycare facilities and home cooking establishments. The credit guarantee fund trust for MSME insures loans up to Rs 1 crore since the bank does not require collateral.
- **Akshaya Mahila Arthik Sahay Yojana** Bank of Baroda is launching this initiative to provide working capital restrictions on both moveable and immovable assets as well as term loans.
- **Scheme for Professional and Self-Employed Women** Oriental Bank of Trade, which offers term credits with a limit of Rs. 500000 and working capital limits of Rs. 100,000 for a five-to seven-year residency, is supporting the arrangement.
- **Dena Shakti Scheme** Dena Bank offers working capital and term loans under this programme, with a maximum amount of two million Indian rupees.
- **Marketing Fund for Women** This programme, which is supported by SIDBI, is to help organisations and women entrepreneurs who are promoting their products to expand their reach in both home and foreign markets.
- **Mudra Yojna** The Micro Units Development Refinance Agency (MUDRA) Bank was established on April 8, 2015, with the goal of fostering the growth of micro units and provide financial support to the small, non-corporate business sector in India. When it comes to lending to microunits with loan requirements ranging from Rs. 50,000 to Rs. 10 lakhs, MUDRA Bank offers refinancing to banks, MFIs, NBFCs, and other entities. Three products—Shishu, Kishor, and Tarun—have been introduced by the Mudra Bank as part of the Mudra Yojana to denote the financial requirements and growth stage of entrepreneurs.

6. CONCLUSION

In India, the extent of female entrepreneurs is rising rapidly. the error among accessibility and interest for financing women-possessed organizations. Consequently, to advance women- possessed organizations, the bureaucratic and state legislatures have laid out various financial institutions and given a scope of projects pointed toward reducing the financial weight on these entrepreneurs. An itemized conversation of establishment wise loaning to women-claimed

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

organizations is given to give a total image of the financial assist that women with canning access.

REFERENCE

1. Andriamahery, A., & Qamruzzaman, M. (2022). *Do access to finance, technical know-how, and financial literacy offer women empowerment through women's entrepreneurial development?*. *Frontiers in Psychology*, 12, 776844.
2. Baporikar, N., & Akino, S. (2020). *Financial literacy imperative for success of women entrepreneurship*. *International Journal of Innovation in the Digital Economy (IJIDE)*, 11(3), 1-21.
3. Chowdhury, T. Y., Yeasmin, A., & Ahmed, Z. (2018). *Perception of women entrepreneurs to accessing bank credit*. *Journal of Global Entrepreneurship Research*, 8, 1-16.
4. Fauzi, F., Antoni, D., & Suwarni, E. (2021). *Mapping potential sectors based on financial and digital literacy of women entrepreneurs: A study of the developing economy*. *Journal of Governance and Regulation/Volume*, 10(2).
5. Ghosh, P. K., Ghosh, S. K., & Chowdhury, S. (2018). *Factors hindering women entrepreneurs' access to institutional finance-an empirical study*. *Journal of Small Business & Entrepreneurship*, 30(4), 279-291.
6. Goel, N., & Madan, P. (2019). *Benchmarking financial inclusion for women entrepreneurship—a study of Uttarakhand state of India*. *Benchmarking: An International Journal*, 26(1), 160-175.
7. Kamberidou, I. (2020). *"Distinguished" women entrepreneurs in the digital economy and the multitasking whirlpool*. *Journal of Innovation and Entrepreneurship*, 9(1), 3.
8. Khaleque, A. (2018). *Performance of women entrepreneurs: Does access to finance really matter?*. *Eurasian Journal of Business and Economics*, 11(21), 23-48.
9. Nguyen, H. A., Phuong, T. T., Le, T. T. B., & Vo, L. P. (2020). *Vietnamese women entrepreneurs' motivations, challenges, and success factors*. *Advances in Developing Human Resources*, 22(2), 215-226.
10. Shaikh, E., Tunio, M. N., & Qureshi, F. (2021). *Finance and women's entrepreneurship in DETEs: A literature review*. *Entrepreneurial Finance, Innovation and Development*, 191-209.

NON-BANKING FINANCIAL HOW TO PROMOTING THE SMALL AND MEDIUM INDUSTRIES

PRASANTA KUMAR DHAL

Research Scholar

Management

Asian International University Imphal, Manipur

Abstract

Small and medium-sized businesses (SMEs) are essential to innovation, economic growth, and job creation, but because of strict rules and collateral requirements, they frequently encounter obstacles when trying to obtain traditional banking services. Through the provision of specialised financial products including microfinance, factoring, leasing, and venture capital, Non-Banking Financial Institutions (NBFIs) have emerged as key players in the support of SMEs. This abstract examines the ways in which NBFIs might collaborate strategically with trade groups and governmental entities to support SMEs in an efficient manner. It also highlights the significance of supportive legislative frameworks and talks about how technology may improve NBFIs services for SMEs. In the end, NBFIs are critical to the growth and resilience of SMEs, supporting inclusive and dynamic economies.

Keywords: NBFIS Sector, NBFCS, DFIS, Mutual Funds, Venture Capital, Investment Bank, Non-Banking, Financial Promoting, Small Medium Industries

1. INTRODUCTION

Small and Medium Enterprises (SMEs) are the main drivers of innovation, growth, and job creation in modern economies. But in spite of their major contributions, SMEs usually have trouble obtaining traditional banking services. Tight rules, collateral specifications, and drawn-out approval procedures can make it difficult for them to obtain finance through conventional channels. As a result, Non-Banking Financial Institutions (NBFIs) have become essential players in closing this funding gap and supporting the expansion of SMEs. This introduction provides context for examining the various ways that non-bank financial institutions (NBFIs) support small and medium-sized enterprises (SMEs), including the partnerships, methods, and strategies that support SMEs' growth.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

This study aims to shed light on the transformative potential of non-banking financial mechanisms in empowering small and medium-sized enterprises and promoting equitable economic growth by analysing the various financial products, technical advancements, and regulatory frameworks that govern NBFIs operations. This study seeks to add to the continuing conversation on building robust and dynamic SME ecosystems by offering insights into the dynamic landscape of NBFIs-SME interactions through a thorough investigation.

2. LITERATURE REVIEW

Bhadauria et.al (2023). study delves into the crucial role Non-Banking Financial Institutions (NBFIs) play in fostering the sustainable development of Small and Medium Enterprises (SMEs). The author highlights the importance of NBFIs in providing financial services tailored to the unique needs of SMEs, which often face challenges in accessing traditional banking channels.

Khowaja et.al (2021). Khowaja et al. examine the role of Non-Banking Financial Institutions (NBFIs) in the context of Pakistan's economic growth. Through an empirical investigation, the authors assess the impact of NBFIs on various economic indicators, including GDP growth, investment, and employment.

Nazneen et.al (2018). Nazneen and Dhawan's review focuses on the role and challenges faced by Non-Banking Financial Companies (NBFCs) in the economic development of India. The authors analyze the regulatory framework, market dynamics, and operational challenges confronting NBFCs in India's evolving financial landscape.

3. ROLE OF MICRO, SMALL AND MEDIUM ENTERPRISES

Globally, the micro, small, and medium-sized firm (MSME) sector has been acknowledged as a growth driver. Low investment requirements, operational flexibility, location-based mobility, and import substitution are the sector's defining characteristics. In India, the first all-inclusive piece of legislation that addresses all three groups is the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006. As to the Act, these businesses are divided into two categories: (i) Manufacturing companies that produce or manufacture goods for any industry included in the Industries (Development and Regulation) Act of 1951's first schedule. These are described as investments in plant and machinery; (ii) service businesses that offer or render services are described as investments in equipment.

4. IMPORTANCE OF THE MSME SECTOR

The micro, small, and medium-sized enterprise (MSME) sector makes a substantial contribution to the nation's manufacturing output, employment, and exports. Based on approximations, the industry contributes around 45% of India's manufacturing output and 40% of its total export earnings in terms of value. Approximately 42 million people are employed by the MSME industry across more than 13 million units nationwide. Indian MSMEs are producing over 6000 products, spanning from conventional to advanced technological items.

5. TYPE OF ENTERPRISE

Business entities are often divided into two groups: (1) Manufacturing; and (2) Service Providers. Based on their investments in equipment (in the case of businesses providing or offering services) or plant and machinery for manufacturing, both types of firms have been further divided into Micro, Small, Medium, and large enterprises.

6. CONCLUSION

In conclusion, by assisting Small and Medium-Sized Businesses (SMEs), Non-Banking Financial Institutions (NBFIs) significantly contribute to inclusive economic growth. By providing specialised financial products like microfinance, factoring, leasing, and venture capital, NBFIs help SMEs close the funding gap. NBFIs, governmental organisations, and trade groups can form strategic alliances that improve SMEs' access to capital and business prospects. By incorporating innovation and technology into NBFI operations, efficiency and transparency are increased, enabling SMEs to successfully overcome obstacles. Encouraging regulatory regimes provide stability and openness, which gives investors and business owners confidence. NBFIs act as stimulants for economic growth, employment generation, and entrepreneurship, supporting the expansion and resilience of SMEs. In the future, NBFIs will benefit SMEs most when innovation and cooperation are embraced, as this will help create more inclusive and resilient economies.

REFERENCES

1. Acharya, D., & Sadharma, E. K. S. *Non-Banking Financial Company-Microfinance Institutions Sector in India: Current Policy Issues and Challenges. Need and Rationale for Gender Budgeting in Higher Education in*, 3.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

2. AG, H. K., & Katookkaran, T. P. (2018). *Performance evaluation of Non Banking Finance Companies (NBFCs) in Kerala (Doctoral dissertation)*.
3. Bhadauria, M. G. S. (2023). *Role Of Non-Banking Financial Institutions Towards Sustainable Development of Small and Medium Enterprises. Rivista Italiana di Filosofia Analitica Junior*, 14(2), 57-71.
4. Bukhtiarova, A., Semenog, A., Mordan, Y., Kremen, V., & Balatskyi, Y. (2022). *Modeling the dynamic patterns of banking and non-banking financial intermediaries' performance. Banks and Bank Systems*, 17(1), 49.
5. DWIARTI, R., HAZMI, S., SANTOSA, A., & RAHMAN, Z. (2021). *Does bankruptcy matter in non-banking financial sector companies?: evidence from Indonesia. The Journal of Asian Finance, Economics and Business*, 8(3), 441-449.
6. Khowaja, I. A., Talpur, U., Soomro, S. H., & Khan, M. S. (2021). *The non-banking financial institutions in perspective of economic growth of Pakistan. Applied Economics Letters*, 28(8), 701-706.
7. Nazneen, A., & Dhawan, S. (2018). *A review of role and challenges of non-banking financial companies in economic development of India. International Journal of Economics and Financial Issues*, 8(6), 90.
8. Shor, I., Shelestova, D., & Galamyan, L. (2021). *Financial support for the sustainable development of small and medium-sized businesses in the Regions. In Proceedings of the International Scientific and Practical Conference on Sustainable Development of Regional Infrastructure*.
9. Sriyono, Biduri, S., & Proyogi, B. (2021). *Acceleration of performance recovery and competitiveness through non-banking financing in SMEs based on green economy: impact of Covid-19 pandemic. Journal of Innovation and Entrepreneurship*, 10, 1-10.
10. Virginie, T. F. *Effects of Bank and Non-Bank Institution Credit on Small and Medium Size Enterprise in Cameroon. International Journal on Economics, Finance and Sustainable Development*, 3(1), 1-13.

AN EMPIRICAL STUDY OF THE INDIAN PHARMACEUTICAL SECTOR

Rudra Pratap Singh

Research Scholar Pharmacy
Asian International University Imphal, Manipur

Abstract

The empirical research presented here examines the main dynamics, obstacles, and possibilities facing the Indian pharmaceutical industry. The report clarifies the complexities of this important business by means of a thorough examination of empirical data, market trends, and regulatory frameworks. The study intends to offer useful insights for scholars, industry stakeholders, and policymakers by revealing empirical facts. It provides a thorough grasp of the industry's present situation as well as possible future development routes. The study's conclusions support strategic planning and well-informed decision-making, which in turn promotes innovation and sustainability in the Indian pharmaceutical industry.

Keywords: *Pharmaceutical Industry, Bulk Drugs, Contract Research, Patent.*

1. INTRODUCTION

Following India's 1947 declaration of independence, its authorities made the creation of a national patent system that catered to its particular requirements a top priority. The relevant patent law issues were handled by committees chaired by Justices Bakshi Tek Chand and Rajagopal Iyengar, which resulted in the National Patents Act being enacted in 1970. This law sought to balance the public interest and expedite industrialization. In 1970, a new Patents Act was passed with the intention of supporting India's independence in drug manufacture by excluding agrochemicals and pharmaceuticals from patent eligibility. Following the balance of payments crisis of 1991, economic liberalisation became necessary and led to a change in policy towards neoliberal policies that emphasised support for the private sector and an export-oriented approach. By bringing India into line with international norms, the Patents Act amendments of 2005 put an end to the process patent era and made patents for novel medications possible. The Indian pharmaceutical sector was greatly affected by this shift, which led to a reevaluation of its dynamics in areas including contract research, bulk drug

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

export, and formulation export. This essay aims to offer a thorough examination of the Indian pharmaceutical industry following amendments, highlighting developments and difficulties.

1.1. Formulation Export

To make a finished therapeutic product, a pharmaceutical formulation combines several substances, including active medicines. The pharmaceutical industry in India is positioned to lead the country's manufacturing sector, being the second largest in the world by volume. Nine billion dollars' worth of formulations and bulk pharmaceuticals were sold in India in 2023 by more than 20,000 licenced pharmaceutical businesses. Although over 60% of these bulk medications were shipped, with the US and Russia being the main destinations, only 85% of these formulations were used locally. This highlights India's important place in the world's supply networks for pharmaceuticals.

1.2. Bulk Drug Export

These constituents comprise pharmaceutical raw materials, intermediates, medication additives, and gelatin capsules (also known as active pharmaceutical ingredients, or APIs). The industry faced more competition as it expanded beyond bulk pharmaceuticals after regulatory reforms. Among the pioneers, Dr. Reddy's was aware of the ramifications from the start and gradually shifted its emphasis to formulations. In the wake of the WTO, lesser-known companies such as Divi's Laboratories, Matrix, Suven Pharma, and Neuland Laboratories developed survival strategies, despite the focus being on Dr. Reddy's and Aurobindo. Data analysis, however, shows that diversification hasn't impeded the bulk medicine industry's expansion. This development highlights the Indian pharmaceutical industry's flexibility and resilience in the face of shifting market conditions.

2. LITERATURE REVIEW

Sharma and Modgil (2020) investigated the relationship between Total Quality Management (TQM), Supply Chain Management (SCM), and operational performance within the Indian pharmaceutical industry. Their study, published in the Business Process Management Journal, delves into the intricate dynamics of quality management and supply chain operations, shedding light on how these factors influence overall performance. By conducting empirical analysis, Sharma and Modgil provide valuable insights into the strategies and practices that enhance operational efficiency and effectiveness in the pharmaceutical sector.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Ganguly and Chatterjee (2020) explored the role of social capital, knowledge quality, knowledge sharing, and innovation capability in the context of the Indian pharmaceutical sector. Their study, published in *Knowledge and Process Management*, examines the interplay between social relationships, knowledge management processes, and innovation outcomes. Through empirical investigation, the authors elucidate the mechanisms through which social capital and knowledge sharing contribute to innovation capability within pharmaceutical firms. This research offers important implications for fostering a culture of innovation and collaboration in the industry.

Farhan et.al (2020) focused on board composition and its impact on firms' profitability in the Indian pharmaceutical industry. Published work from Farhan and colleagues provides empirical evidence on the relationship between board structure and financial performance, particularly within the Indian pharmaceutical context. By analyzing board composition and its implications for profitability, the study sheds light on corporate governance practices and their influence on firm-level outcomes. The findings contribute to the ongoing discourse on governance mechanisms and their role in enhancing financial performance in the pharmaceutical sector.

3. RESEARCH METHODOLOGY

These constituents comprise pharmaceutical raw materials, intermediates, medication additives, and gelatin capsules (also known as active pharmaceutical ingredients, or APIs). The industry faced more competition as it expanded beyond bulk pharmaceuticals after regulatory reforms. Among the pioneers, Dr. Reddy's was aware of the ramifications from the start and gradually shifted its emphasis to formulations. In the wake of the WTO, lesser-known companies such as Divi's Laboratories, Matrix, Suven Pharma, and Neuland Laboratories developed survival strategies, despite the focus being on Dr. Reddy's and Aurobindo. Data analysis, however, shows that diversification hasn't impeded the bulk medicine industry's expansion. This development highlights the Indian pharmaceutical industry's flexibility and resilience in the face of shifting market conditions.

4. DATA ANALYSIS

We have employed the least squares method, a mathematical tool, to determine the growth of different segments of the Indian pharmaceutical industry following changes to the country's patent laws. The graphs below display the study's findings.

4.1. Formulation Export

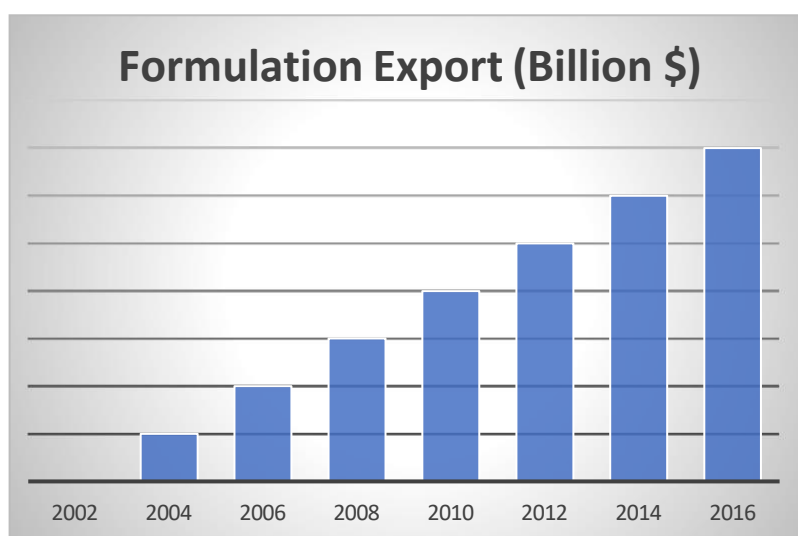


Figure 1: Growth of Indian Formulation Export in Billion \$ Vs Trend

The findings show that Indian formulations are increasing steadily and are unaffected by changes in patent regulations. By 2023, they are expected to reach \$7 billion.

4.2. Bulk Drug Export

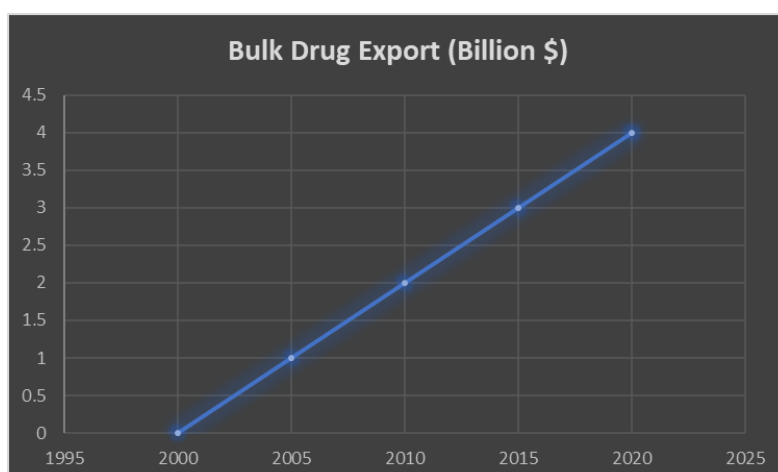


Figure 2: Growth of Indian Pharmaceutical Contract Research Actual Vs Trend

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

According to the study's findings, the bulk medicine market in India would be valued at 6.5 billion dollars in 2023.

5. CONCLUSION

India began its unique intellectual property journey more than 40 years ago, motivated by the need to support the development of the country's pharmaceutical industry and provide for its impoverished people. Nonetheless, recent modifications to India's intellectual property laws demonstrate the country's compliance with global IP norms. This change has had a significant impact on a number of aspects of the Indian pharmaceutical industry. The expiration of patents for well-known pharmaceuticals and the convergence of international patent laws have created a significant opportunity for Indian manufacturers to excel in creating generic copies at competitive pricing. Certain firms have prospered in the generic medication industry by utilising their proficiency in process advancements. However, difficulties still exist, especially in the home market where access to healthcare is restricted and per capita income is low. Several companies have delved into new chemical creation and established strategic alliances with both local and foreign rivals, going beyond standard technology transfer agreements, in an effort to explore multiple growth possibilities. Indian pharmaceutical companies have also proven their strength in exporting formulations and bulk drugs. The industry's adaptability and endurance in the face of shifting patent regulations highlight its forward-thinking outlook and tenacity. Prospects for the industry look good going forward, particularly in the area of contract research, suggesting more growth and success in the years to come.

REFERENCES

1. Farhan, N. H., Tabash, M. I., Almaqtari, F. A., & Yahya, A. T. (2020). *Board composition and firms' profitability: Empirical evidence from pharmaceutical industry in India.*
2. Ganguly, A., Talukdar, A., & Chatterjee, D. (2020). *Social capital, knowledge quality, knowledge sharing, and innovation capability: An empirical study of the Indian pharmaceutical sector. Knowledge and process management, 27(1), 25-42.*
3. Gupta, K., Goel, S., & Bhatia, P. (2020). *Intellectual capital and profitability: Evidence from Indian pharmaceutical sector. Vision, 24(2), 204-216.*

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

4. Nandy, M. (2020). *Is there any impact of R&D on financial performance? Evidence from Indian pharmaceutical companies. FIIB Business Review*, 9(4), 319-334.
5. Panwar, A., Jain, R., Rathore, A. P. S., Nepal, B., & Lyons, A. C. (2018). *The impact of lean practices on operational performance—an empirical investigation of Indian process industries. Production Planning & Control*, 29(2), 158-169.
6. Saha, E., Rathore, P., Parida, R., & Rana, N. P. (2022). *The interplay of emerging technologies in pharmaceutical supply chain performance: An empirical investigation for the rise of Pharma 4.0. Technological Forecasting and Social Change*, 181, 121768.
7. Sarwenda, B. (2020). *Intellectual capital, business performance, and competitive advantage: An empirical study for the pharmaceutical companies. QUALITY Access to Success*, 103-106.
8. Sharma, S., & Modgil, S. (2020). *TQM, SCM and operational performance: an empirical study of Indian pharmaceutical industry. Business Process Management Journal*, 26(1), 331-370.
9. Tyagi, S., Nauriyal, D. K., & Gulati, R. (2018). *Firm level R&D intensity: evidence from Indian drugs and pharmaceutical industry. Review of Managerial Science*, 12, 167-202.
10. Yameen, M., Farhan, N. H., & Tabash, M. I. (2019). *The impact of liquidity on firms' performance: Empirical investigation from Indian pharmaceutical companies. Academic journal of interdisciplinary studies*, 8(3), 212-220.

AN OVERVIEW OF THE GROWTH OF THE INDIAN PHARMACEUTICAL INDUSTRY

Shiv Murti Singh

Research Scholar Pharmacy
Asian International University Imphal, Manipur

Abstract

In recent decades, the pharmaceutical business in India has experienced extraordinary expansion and transformation, emerging as a global leader in healthcare. Post-independence policies emphasising public health and self-sufficiency initially shaped the industry, but it has since transformed into a vibrant ecosystem distinguished by innovation and strategic collaborations. India is the world's third-largest manufacturer of pharmaceuticals by volume, thanks to its sizable domestic market, highly skilled labour force, and advantageous regulatory framework. With its focus on R&D and proficiency in the production of generic drugs, it has been known as the "pharmacy of the world." Its incorporation into international supply chains has been made easier by increased investments in infrastructure, technology, and human resources. Innovation and a dedication to global healthcare are what drive the industry's persistence in the face of obstacles including intellectual property rights and regulatory compliance. This summary clarifies the state of the Indian pharmaceutical industry, highlighting its importance as a major driver of both economic growth and world health.

Keywords: Indian pharmaceutical industry, global pharmaceutical industry, value, volume, Annual Growth Rate.

1. INTRODUCTION

According to Equity Master, the pharmaceutical market in India is the thirteenth largest in terms of value and the third largest in terms of volume worldwide. Significantly, India is the world's top supplier of generic medications; by volume, its generics make up a healthy 20% of all exports. The Indian pharmaceutical sector has always been extremely fragmented, but in recent years, consolidation has become a noticeable trend.

India is strategically set up to lead the pharmaceutical industry globally in light of the fact that to a major pool of profoundly gifted researchers and designers. The way that Indian

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

pharmaceutical organizations supply over 80% of the antiretroviral prescriptions used to treat HIV globally is a striking landmark to India's responsibility. India's position has been additionally set by the UN-upheld Prescriptions Patent Pool, which has inked six sub-licenses with notable Indian pharmaceutical firms, including Aurobindo, Cipla, Desano, Emcure, Hetero Labs, and Laurus Labs. These sublicences empower these organizations to deliver Tenofovir Alafenamide (TAF), a conventional enemy of HIV drug, for 112 immature countries. This demonstrates India's basic situation in global medical services and its commitment to giving individuals in need admittance to sensibly estimated prescription.

2. LITERATURE REVIEW

Lakdawalla et.al (2018). work delves into the intricate economics of the pharmaceutical sector, a crucial aspect in understanding the industry's dynamics. By examining various economic principles, Lakdawalla sheds light on how market forces, regulatory frameworks, and innovation incentives shape the pharmaceutical landscape.

González et.al (2021). This study, conducted by González Peña et al., explores the relationship between pharmaceutical research on water and wastewater and market dynamics, consumption trends, and disease incidence. The paper likely investigates whether the focus of pharmaceutical research in this domain aligns with market demands and health priorities.

Nirmala et.al (2018). work explores the utilization of bamboo as a source of natural antioxidants and its applications in the food and pharmaceutical sectors. The paper likely discusses the chemical composition of bamboo, its antioxidant properties, and potential applications in food preservation and pharmaceutical formulations.

3. INDIAN PHARMACEUTICAL INDUSTRY

With analysts predicting an accelerated growth of 15 to 20% CAGR over the next ten years, the Indian pharmaceutical business is expected to develop significantly and reach between US\$49 billion and US\$74 billion by 2023. Dynamic changes are occurring in this industry, such as the creation of special economic zones (SEZs), greater investments from domestic and foreign players, wider penetration of the rural market, and significant acquisitions by multinational corporations.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

With more inventive R&D, Indian pharmaceutical businesses are becoming important outsourcing partners for their international counterparts. These companies are firmly establishing themselves as competitors in manufacturing and research and development, as well as possible partners in other domains, inside the global pharmaceutical value chain. The pharmaceutical sector worldwide is confronted with dynamic social, demographic, and economic environments, which include demands for lower drug costs and outcome-based pricing. The Indian pharmaceutical business is growing at a solid rate despite obstacles including reduced R&D productivity and more stringent regulations. By 2020, the local market is expected to grow at a compound annual growth rate (CAGR) of 15% to 20% and reach a valuation of between US\$50 billion and US\$74 billion.

4. GOVERNMENT INITIATIVES

- To work on the framework and medication guideline framework, the Indian government intends to work around eight little medication testing labs at significant ports and air terminals. By observing the norms of pharmaceuticals that are imported and sent out, this activity looks to eliminate how much time that is spent on quality assessment.
- On account of the public authority's choice to allow half open subsidizing in the pharmaceutical area through the Public Confidential Organization (PPP) model, India is supposed to be among the main five global focal points for pharmaceutical development by 2020.
- To assess and analyse the type of Indian pharmaceutical organizations to those of their global partners, the Indian Pharmaceutical Affiliation (IPA) plans to foster information honesty standards.
- The public authority means to give motivating forces to state-run and business mass drug creators to work with the 'Make in India' drive and diminish reliance on imports of Dynamic Pharmaceutical Fixings (Programming interface), of which around 85% come from China.
- An interministerial coordination panel was shaped by the Division of Pharmaceuticals to survey, direction, and manage issues that Indian pharmaceutical organizations experience consistently.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- Moreover, the Branch of Pharmaceuticals intends to lay out an investment store with a capital of Rs. 1,000 crore (US\$149.11 million) to help business visionaries chipping away at Research and development in the biotech and pharmaceutical areas.

5. GROWTH OF INDIA PHARMACEUTICAL INDUSTRY

With 10% of the industry's volume and 2.4% of its value, the Indian pharmaceutical industry is one of the biggest on the planet. Figures demonstrate that the area would develop at a Build Annual Growth Rate (CAGR) of 15.92%, from US\$20 billion of every 2015 to US\$55 billion by 2020. Conventional drugs make up the biggest gathering, with a 71% piece of the pie. India is supposed to ascend to the third position on the planet's conventional Dynamic Pharmaceutical Fixing (Programming interface) trader market by 2016. Besides, India beat the US in the quantity of utilizations for Medication Expert Records (DMFs) and is second in Condensed New Medication Applications (ANDAs). Indian pharmaceuticals are offered to in excess of 200 nations, with the US being a significant objective. By volume, nonexclusive medications make up 20% of all commodities from India. Pharmaceutical commodities are supposed to outperform US\$25 billion out of 2015, as indicated by the Pharmaceuticals Products Advancement Committee (Pharmexcil). Among the proportions of the Indian government is an investment asset of US\$640 million, which is planned to help drug research and reinforce the pharmaceutical foundation. Under the 'Pharma Vision 2020' program, India desires to set up a good foundation for itself as a main place for start to finish drug disclosure, mirroring its goals for the pharmaceutical industry around the world.

❖ Increasing investments in the sector

- The Indian pharmaceutical market extended fundamentally, ascending from US\$6 billion of every 2005 to a Build Annual Growth Rate (CAGR) of 17.46% in 2015.
- Extra growth is anticipated, with a build annual growth rate of 15.92%, arriving at US\$55 billion by 2020.
- India is anticipated to rank 6th in outright terms and be among the main three pharmaceutical business sectors on the planet by 2020 regarding steady growth.
- India enjoys a cutthroat upper hand over other pharmaceutical business sectors because of its a lot of lower creation costs contrasted with the US and almost 50% of Europe.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

❖ Generic drugs form the largest segment

- At 70% of the Indian pharmaceutical market as far as deals, nonexclusive meds address the biggest piece of the industry.
- India has turned into the world's biggest provider of nonexclusive meds, representing 20% of the market's volume trades, and is supposed to keep filling from here on out.
- Of the US\$20 billion in by and large market incomes, protected drugs and over-the-counter (OTC) meds represent 21% and 9%, separately.

6. CONCLUSION

Important data from the study about the pharmaceutical sector showed that, with a 41.17% coefficient of variance, the mean value of exports was 6619.33. In a similar vein, the average import value was 1090.29, with a 43.26% coefficient of variance. The industry's exports' Annual Growth Rate (AGR) was examined in the study, and its growth trajectory was given weight. Nonetheless, over the study period, the total export and import statistics of the Indian pharmaceutical industry did not show any appreciable fluctuations, indicating a steady trend in the trade dynamics within the business.

REFERENCES

1. Belkhir, L., & Elmeligi, A. (2019). *Carbon footprint of the global pharmaceutical industry and relative impact of its major players. Journal of Cleaner Production, 214*, 185-194.
2. Chowdhury, L. A. M., Rana, T., & Azim, M. I. (2019). *Intellectual capital efficiency and organisational performance: In the context of the pharmaceutical industry in Bangladesh. Journal of Intellectual Capital, 20(6)*, 784-806.
3. González Peña, O. I., López Zavala, M. Á., & Cabral Ruelas, H. (2021). *Pharmaceuticals market, consumption trends and disease incidence are not driving the pharmaceutical research on water and wastewater. International journal of environmental research and public health, 18(5)*, 2532.
4. Hilfiker, R., & Von Raumer, M. (Eds.). (2019). *Polymorphism in the Pharmaceutical Industry: Solid Form and Drug Development. John Wiley & Sons.*

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

5. Lakdawalla, D. N. (2018). *Economics of the pharmaceutical industry*. *Journal of Economic Literature*, 56(2), 397-449.
6. Nirmala, C., Bisht, M. S., Bajwa, H. K., & Santosh, O. (2018). *Bamboo: A rich source of natural antioxidants and its applications in the food and pharmaceutical industry*. *Trends in Food Science & Technology*, 77, 91-99.
7. Osorio, L. L. D. R., Flórez-López, E., & Grande-Tovar, C. D. (2021). *The potential of selected agri-food loss and waste to contribute to a circular economy: Applications in the food, cosmetic and pharmaceutical industries*. *Molecules*, 26(2), 515.
8. Paul, D., Sanap, G., Shenoy, S., Kalyane, D., Kalia, K., & Tekade, R. K. (2021). *Artificial intelligence in drug discovery and development*. *Drug discovery today*, 26(1), 80.
9. Prasad, M., Lambe, U. P., Brar, B., Shah, I., Manimegalai, J., Ranjan, K., ... & Prasad, G. (2018). *Nanotherapeutics: An insight into healthcare and multi-dimensional applications in medical sector of the modern world*. *Biomedicine & Pharmacotherapy*, 97, 1521-1537.
10. Taneja, N., & Sharma, M. (2019). *Antimicrobial resistance in the environment: The Indian scenario*. *Indian Journal of Medical Research*, 149(2), 119-128.

PHILOSOPHY OF INDIAN AESTHETICS

RUMPA ROY
Research Scholar
PHILOSOPHY

Asian International University Imphal, Manipur

Abstract

This research paper explores the Philosophy of Indian Aesthetics in depth, going into its complex tenets, historical foundation, and current applicability. Indian aesthetics, with its roots in antiquated Indian philosophical traditions, represents a thorough comprehension of art, beauty, and the human condition. This paper employs an interdisciplinary approach to investigate the basic ideas of rasa, bhava, and rasavada, clarifying their philosophical foundations and their significant influence on diverse artistic mediums. In the context of current discussions about art, culture, and human perception, this paper seeks to shed light on the timeless value of Indian aesthetics by referencing classic works like the Abhinavabhāratī and Natya Shastra and interacting with contemporary perspectives. This study aims to explore the everlasting wisdom woven within the conceptual framework of Indian aesthetics by sifting through the rich tapestry of Indian philosophical thinking.

Keywords: Indian Aesthetics, Philosophy, Rasa, Bhava, Natya Shastra, Abhinavabhāratī, Art, Culture, Human Perception.

1. INTRODUCTION

A source of great wisdom, The Philosophy of Indian Aesthetics provides insights into the nature of beauty, artistic expression, and the human condition. Indian aesthetics, which has its roots in the country's long-standing intellectual traditions, takes a comprehensive approach to comprehending life's aesthetic aspects. The idea of rasa, an elusive but essential element that captures the essence of the aesthetic experience, is at its centre. A deeper understanding of rasa, bhava, and the complex relationship between the artist, the artwork, and the audience is revealed by Indian Aesthetics through an examination of classical writings like the Abhinavabhāratī by Abhinavagupta and the Natya Shastra credited to Bharata Muni.

2. LITERATURE REVIEW

Bhatnagar et.al (2019). work delves into the intricate aesthetics of Indian music, offering profound insights into the cultural, philosophical, and artistic dimensions of this ancient tradition. By delving into the theoretical frameworks, historical contexts, and practical applications of Indian musical aesthetics, Bhatnagar sheds light on the profound relationship between music and human experience. Through meticulous analysis and scholarly exploration, this volume serves as a comprehensive resource for scholars, musicians, and enthusiasts seeking to deepen their understanding of Indian musical aesthetics.

Deet.al. (2021). exploration of Sanskrit poetics as a study of aesthetics offers a compelling insight into the rich literary heritage of India. By examining classical Sanskrit texts such as the Natya Shastra and the Kavya Shastra, De unravels the intricate principles of poetic composition, language, and expression. Through a nuanced analysis of rhetorical devices, literary conventions, and aesthetic sensibilities, De highlights the enduring relevance of Sanskrit poetics in contemporary literary discourse. This scholarly work serves as a testament to the profound aesthetic sophistication of ancient Indian literature and its enduring influence on global literary traditions.

Von et.al (2021). exploration of aesthetic principles, the arts, and the interpretation of culture offers a multidisciplinary perspective on the role of aesthetics in shaping human experience and cultural identity. Through a synthesis of philosophical inquiry, cultural analysis, and artistic interpretation, von Brück elucidates the dynamic interplay between aesthetics, creativity, and cultural expression. By examining diverse artistic traditions and cultural practices, this scholarly article provides valuable insights into the ways in which aesthetic principles inform our understanding of the world and contribute to the richness of human civilization. As a seminal contribution to the field of cultural studies, von Brück's work invites readers to reconsider the significance of aesthetics in shaping our perceptions, values, and collective consciousness.

3. HISTORICAL FOUNDATIONS: THE EVOLUTION OF INDIAN AESTHETICS

The rich tapestry of ancient Vedic literature, which examined fundamental ideas of beauty, art, and the human experience, is where Indian aesthetics originated. This philosophical

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

investigation eventually found expression in classical texts, which represented important turning points in the evolution of Indian philosophical ideas. Three timeless masterpieces— Bharata Muni's foundational work, the *Natya Shastra*, and Abhinavagupta's *Abhinavabhāratī*— offer deep insights into the nature of aesthetics and artistic expression. These books not only explain important ideas like *rasa* and *bhava*, but they also act as the cornerstones of later philosophical discussions.

Indian aesthetics has developed through a synthesis of several philosophical schools, such as Nyaya, Mimamsa, and Vedanta. The theoretical framework of Indian aesthetics was enhanced by the integration of diverse views and approaches made possible by this interdisciplinary approach. The comprehensive grasp of aesthetics within the Indian philosophical tradition was influenced by the discovery of metaphysical truths by Vedanta, the rigorous logic of Nyaya, and the emphasis on interpretation and analysis by Mimamsa. These disparate philosophical currents coming together allowed for a thorough investigation of beauty, emotion, and the aesthetic experience, which profoundly influenced the philosophical discourse of Indian aesthetics.

4. BHAVA: THE EMBODIMENT OF AESTHETIC SENTIMENTS

Bhava is the emotional element that gives creative performances depth and resonance in Indian aesthetics; it transcends technical proficiency. It includes the nuanced expressions of feeling and emotion that artists share with their audience, creating a strong bond between the viewer and the artwork. It is essential to comprehend the categorization of *bhavas*, which are divided into eight main emotional states in books such as the *Natya Shastra*, in order to appreciate emotional expression in a variety of artistic mediums. A wide range of emotional subtleties are encompassed by each *bhava*, enabling artists to depict a complex mosaic of the human experience. Artists evoke genuine emotional reactions from audiences by deftly manipulating *bhavas*; this transcends linguistic and cultural boundaries and connects with people on a universal level. *Bhava* offers viewers a cathartic and transcendental experience with its capacity to arouse strong emotional responses and visual enjoyment. It encourages people to interact with art on a profoundly intimate and transforming level, acting as a catalyst for reflection and emotional development.

5. RASAVADA: THE AESTHETICS OF TASTE

In the *Abhinavabhāratī*, Rasavada explores the aesthetics of taste and the deep relationship between the senses and the appreciation of art. It investigates the idea of aesthetic pleasure, in which people immerse themselves in the exquisite beauty of art to transcend ordinary experiences. Rasavada has important philosophical ramifications since it develops an artistic consciousness and refined sensibility in both practitioners and admirers. Through practicing rasavada, people become more conscious of the subtleties of artistic expression and grow to appreciate the complexity of creativity and beauty on a deeper level. This idea emphasises how art has the ability to elevate human consciousness and improve the human experience.

6. CONCLUSION

To sum up, the Philosophy of Indian Aesthetics represents a thorough investigation of the underlying principles of emotion, beauty, and human awareness. Its complex theories of rasa, bhava, and rasavada offer a thorough framework for understanding the fundamentals of aesthetic perception and artistic expression. Indian Aesthetics contains a comprehensive understanding of the human interaction with art through the investigation of rasa's emotional resonance, bhava's embodiment of sentiment, and rasavada's aesthetics of taste. Indian aesthetics, with its ageless wisdom, continues to be a source of inspiration, enrichment, and enlightenment as modern society navigates the complexity of art and culture. It provides significant insights into the human condition and invites people to interact with art in a way that transforms and strengthens relationships with both the outside world and oneself. Essentially, Indian aesthetics continues to be a timeless source of knowledge that leads us to a greater understanding of the complexity and beauty of the human experience.

REFERENCES

1. Adamson, P., & Ganeri, J. (2020). *Classical Indian Philosophy: A history of philosophy without any gaps, Volume 5*. Oxford University Press.
2. Bartley, C. (2020). *Indian philosophy AZ*. Edinburgh University Press.
3. Bhatnagar, M. L. (2019). *Aesthetics of Indian music (Vol. 5)*. Jai Bharat.
4. De, S. K. (2021). *Sanskrit poetics as a study of aesthetic*. University of California Press.
5. Fischer-Lichte, E., & Wihstutz, B. (Eds.). (2018). *Transformative aesthetics*. Routledge.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

6. Kaushik, S. (2023). *Exploring the Influence of Indian Philosophy on Modern Art Movements*. *International Journal of Fine, Performing and Visual Arts*, 3(1), 21-25.
7. Nanay, B. (2019). *Aesthetics*. Oxford University Press, USA.
8. Shrawan, A. (2019). *The language of literature and its meaning: A comparative study of Indian and Western Aesthetics*. Cambridge Scholars Publishing.
9. Sunderason, S. (2020). *Partisan aesthetics: Modern art and India's long decolonization*. Stanford University Press.
10. von Brück, M. (2021). *Aesthetic principles, the arts, and the interpretation of culture*. *PsyCh Journal*, 10(2), 200-209.

EXPLORING THE ESSENCE: AN INSIGHT INTO INDIAN AESTHETICS

Sushma Chhetri
Research Scholar
PHILOSOPHY

Asian International University Imphal, Manipur

Abstract

Indian aesthetics incorporates the development of Indian art and places a strong focus on symbolically representing spiritual or philosophical moods in the viewer. Important words like Rasa, which refers to the emotional core, and Bhava, which represents mental states, have special meaning in Indian theatre and literature. These ideas, which are expounded in Bharatha Muni's Natyashastra, serve as the cornerstone of Indian dramatic philosophy and have an impact on a wide range of artistic mediums, including dance, music, theatre, film, and literature. Rasa reflects the diversity within Indian aesthetics, exhibiting great variation among styles, emotions, and places. It is acknowledged that various preferences and feelings are not contained in a single object or location, but rather are distributed throughout space and contribute to the distinctive characteristics of manufactured objects.

Keywords: Aesthetics, Rasa, emotions and senses, Indian Aesthetics, Rasa, Bhava, Rasavada, Natya Shastra, Abhinavabhāratī, Art, Culture, Human Consciousness.

1. INTRODUCTION

Indian aesthetics is a shining light of deep wisdom, providing understanding of the essence of human awareness, emotion, and beauty. It is a comprehensive view of art and culture that cuts over time and space and is woven throughout the rich tapestry of Indian philosophy. Indian aesthetics invites us to reflect on the essence of aesthetic experience by illuminating the complex relationship between the artist, the artwork, and the audience through an examination of fundamental ideas like rasa, bhava, and rasavada. In order to understand Indian aesthetics' ageless wisdom and ongoing relevance in today's conversation, we will dive into its core in this paper.

2. LITERATURE REVIEW

Cajete et.al (2020). offer a profound exploration of eco-aesthetics from an Indigenous perspective, emphasizing the significance of metaphor, story, and symbolism in understanding the interconnectedness of humanity and nature. Through a conversational format, they delve into the Indigenous worldview, highlighting the role of aesthetics in shaping relationships with the natural world. This work contributes to a deeper understanding of eco-aesthetics, emphasizing the importance of Indigenous knowledge and perspectives in contemporary discourse on environmental sustainability and cultural preservation.

Singh et.al (2022). research examines regional variations in Indian folk-dance forms, offering case studies from different states to elucidate the diverse cultural expressions found within the country. Through meticulous analysis and documentation, Singh sheds light on the unique aesthetics, movements, and narratives embedded within each folk-dance tradition. This study enriches our understanding of Indian cultural diversity and the dynamic interplay between tradition and innovation in the realm of performing arts.

Raina et.al (2019). exploration delves into the intricate aesthetics of Kathakali performance, focusing on the concept of rasa and its manifestation in the actor's experience of aesthetic pleasure. Through a nuanced analysis of performance techniques, emotional expression, and theatrical traditions, Raina unveils the profound depths of Kathakali aesthetics. This research not only contributes to our understanding of classical Indian performance art but also offers insights into the transformative power of aesthetic experience in the context of Kathakali theater.

3. HISTORICAL FOUNDATIONS: TRACING THE ORIGINS OF INDIAN AESTHETICS

The philosophical investigation of beauty and creative expression found in the rich tapestry of ancient Vedic literature is where the historical roots of Indian aesthetics can be located. Throughout the ages, this investigation developed thanks to the contributions of great figures like Bharata Muni and Abhinavagupta, whose foundational texts, the *Abhinavabhāratī* and the *Natya Shastra*, enhanced the discussion of Indian aesthetics. These books offered both academics and artists useful recommendations in addition to theoretical frameworks. Furthermore, the integration of many philosophical traditions, such as Nyaya, Vedanta, and

Mimamsa, which each offered distinctive insights into the nature of emotion, beauty, and artistic creativity, was beneficial to Indian aesthetics. This synthesis led to the development of Indian aesthetics as a comprehensive field that went beyond simple academic study and influenced Indian art, culture, and spiritual expression in its whole.

4. KEY CONCEPTS IN INDIAN AESTHETICS: RASA, BHAVA, AND RASAVADA

The fundamental ideas of Indian aesthetics, such as rasa, bhava, and rasavada, form the basis for comprehending the nature of artistic expression and the aesthetic experience. The idea of rasa, as explained in the Natya Shastra, is the essence of the aesthetic experience; it is the audience's emotional response to a piece of art. Rasa engulfs the listener in a rich visual experience by encompassing a range of emotional flavours that go beyond simple comprehension. Bhava, on the other hand, stands for the emotional core of artistic expression and acts as a medium through which creators communicate complex feelings and emotions to their audience. Through bhava, the artist gives their work life and energy and elicits genuine emotional reactions from the audience. The study of rasavada, often known as the aesthetics of taste, transcends the ordinary to elicit high states of awareness by delving into the sensory and cognitive aspects of aesthetic experience. Through art and culture, people who practise rasavada raise their senses and feel a greater feeling of appreciation and spiritual fulfilment. Collectively, these fundamental ideas shed light on the complex interactions that occur between feeling, thought, and perception of the senses, deepening our comprehension of the great beauty that exists throughout artistic expression.

5. CONTEMPORARY PERSPECTIVES: INDIAN AESTHETICS IN THE MODERN WORLD

Indian aesthetics are dynamically reinterpreted in the modern world to reflect changes in global relationships, cultural practices, and artistic expression. In order to produce avant-garde works that speak to a variety of audiences, scholars and artists combine ancient forms with contemporary sensibilities as they investigate new facets of Indian aesthetics. Globalisation and technological progress have had a significant impact on the development of Indian aesthetics, promoting cross-cultural interactions and the international interchange of creative concepts. Some contend that artistic manifestations become more homogenised as a result of

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

globalisation, while others see it as a chance to appreciate cultural diversity and promote inter-cultural understanding. Indian aesthetics continues to be relevant today despite these shifts, acting as a link across various philosophies and cultures. Its emphasis on spiritual profundity, emotional resonance, and artistic sensibility cut across national barriers, allowing people to connect with its profound beauty and ageless wisdom from all over the world. Indian aesthetics continues to inspire, enhance, and promote a greater knowledge of the human experience across nations and continents in a world growing more interconnected by the day.

6. CONCLUSION

In conclusion, an examination of Indian aesthetics reveals a complex fabric woven with beauty, wisdom, and cultural diversity. Indian aesthetics is a rich source of inspiration and enlightenment, extending our knowledge of art, culture, and human awareness from its ancient origins to its modern expressions. The ageless ideas of Indian aesthetics provide priceless direction as we negotiate the intricacies of contemporary life, inspiring us to explore the limits of our aesthetic sensitivities and interact with the outside world in a deeper and more meaningful way. Indian aesthetics offers a transforming view of beauty and creativity that surpasses bounds and improves the human experience through its complex ideas and insightful observations. We are encouraged to embrace the beauty and wisdom that Indian aesthetics has to give in our quest for a deeper comprehension and appreciation of the world around us by its timeless relevance and global appeal, which serve as a powerful reminder of the intrinsic relationship between art, culture, and the human spirit.

REFERENCES

1. Cajete, G. A., & Williams, D. R. (2020). *Eco-aesthetics, metaphor, story, and symbolism: An Indigenous perspective: A conversation. Research handbook on childhood-nature: Assemblages of childhood and nature research, 1707-1733.*
2. Joshi, A., Roy, S., Manik, R. K., & Sahoo, S. K. (2023). *Scientific Philosophy: Exploring Existential, Metaphysical, and Ethical Research Philosophy Behind the Question "WHO AM I?". Journal of Pharmaceutical Negative Results, 1648-1671.*
3. Kaushik, N. (2021). *The Evolution of Indian Cinema: A Socio-cultural Perspective. International Journal of Fine, Performing and Visual Arts, 1(1), 18-23.*

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

4. Majeed, J. (2020). *Muhammad Iqbal: Islam, aesthetics and postcolonialism*. Routledge India.
5. Rahapsari, S. (2022). *The quest of finding the self in the Bedhaya: Unravelling the psychological significance of the Javanese sacred dance*. *Culture & Psychology*, 28(3), 413-432.
6. Raina, A. (2019). *Rasa revisited as the Kathakali actor's taste of aesthetic pleasure*. *Theatre, Dance and Performance Training*, 10(1), 113-126.
7. Shen, W., Yuan, Y., Zhao, Y., Zhang, X., Liu, C., Luo, J., ... & Fan, L. (2018). *Defining insight: a study examining implicit theories of insight experience*. *Psychology of Aesthetics, Creativity, and the Arts*, 12(3), 317.
8. Shrawan, A. (2019). *The language of literature and its meaning: A comparative study of Indian and Western Aesthetics*. Cambridge Scholars Publishing.
9. Singh, J. (2022). *Exploring Regional Variations in Indian Folk Dance Forms: Case Studies from Different States*. *International Journal of Fine, Performing and Visual Arts*, 2(2), 21-24.
10. Vatsyayan, K. (2022). *Classical Indian Dance: in Literature and the Arts*. DK Print-world (P) Ltd.

INFLUENCE OF CROSS CULTURAL DIFFERENCES IN CONSUMER DECISION MAKING STYLES IN INDIA& THE ARAB WORLD

RAJAGOPAL A G
Research Scholar
MANAGEMENT

ABSTRACT

Cross cultural differences and consumer decision making styles varies from country to country and from continent to continent. As a person living between India and the Arab countries for the last 25 years can definitely ascertain that cultural differences are the corner stone for decision making styles especially in consumer choices among India and the Arab world. There is a remarkable difference between these nationalities in terms of brand awareness, brand consciousness and future demands. Organisations and product strategists are keen to know what makes an Indian and an Arab in terms of product choices and its influencing factors.

INTRODUCTION

In the area of globalization, regional markets play a pivot role in consumer decision making process. When placing a product, organisations will investigate various aspects of purchase decision making styles which varies from region to region. For example, a purchase decision made by an Indian may be contradictory or obsolete to an Arab customer.

Consumer decision making style normally refers to the approach or mental processes to make or choose among many. This may be same or contrasting to a consumer living far from the region. An organisational success and marketing strategies revolves how effectively incorporating purchase decision or making styles adopt to their product or services.

Decision making styles differs from one culture to other, for example, compare a multicultural society like India with Arab region which is uniformly cultured. Both cultures vary differently in the decision-making process. Managers can adapt to a marketing strategy based on the differences and similarities in a multi-cultural environment and cultural personality of the consumers.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

India and Arab culture adopted many factors in the century long associations and through cultural exchange programs. Understanding the cultural adaptations make critical evaluations and can be useful to the managers to analyse different strategies in product lounges and evaluation of product life cycle.

Thus the aim of this project is to demonstrate that consumer orientations and decision making styles differs from region to region according to consumers cultural orientations. For this purpose, sample of consumers were taken from India and the gulf region to make test predictions and making hypothesis.

Moreover, India and Gulf region are good trade partners and understand that the thorough study between these two cultures will definitely boost the economic framework required to strengthen the consumer product industry as a whole.

LITERATURE REVIEW

There are three ways to characterize consumer decision making styles. They are consumer typology approach, consumer lifestyle approach and consumer characteristics approach (Spokes & Kendall 1986). The consumer typology approach categorizing consumers in to groups that are related to retail orientations. It may be specific product groups or general marketplace. Lifestyle approach identifies the consumer behaviour based on personal traits or their lifestyles (Lastovika 1982, Wells 1974). Also, it related to consumers general activities.

Lastly, the consumer characteristics approach emphasize the cognitive and affective character orientations toward a purchase decision and decision making styles (West Brook & Black 1985). This approach assumes that consumer decision making styles affects cognitive and affective cultural orientations (Fan & Xiao 1998), Spokes & Kendall 1986).

Based on these approaches (typology & lifestyle), focus on the mental characteristics of the consumers but consumer characteristic approach seems to be more precise and explanatory. Therefore, consumer characteristic approach will be taken for data collection and analysis.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

DATA COLLECTION

Tools:

- Observations
- Surveys
- Focus tools
- Interviews
- Questionnaires

Sample Design:

- The study of 200 consumers (100 each from India & UAE)

Sample Size:

- 200 consumers of Luxury cars of India & UAE (100 each)

Tools for data analysis:

- Correlation: Will find out whether a relationship exists between variables and the determining the magnitude and action.
- Objective of the study: The study of culture and decision making focuses on variations in how and why people from different cultures tend to decide differently. India & Arab countries boasts of century long associations in trade and culture. It is important for the managers to assess and analyse the impacts of purchase decision making in relation with their culture. In consumer goods industry, culture plays a vital role in purchase decision making. An Indian will buy a product more or less different from an Arab in terms of pricing and all the other factors associated with a purchase decision.

Tools to find different cultures:

Developed by Charles Hamden-Turner and the model was published by the book “Riding the Waves of Culture”.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

- Universalism versus Particularism
- Individualism versus Groups
- Specific versus Diffuse
- Neutral versus Emotional
- Achievement versus Ascriptions
- Sequential time versus Synchronus
- Internal direction versus external direction

Factors influencing a luxury car purchase decision in India & UAE:

| Age | Style | Power | Reference | Ownership Pride | Value for Money |
|---------------------------|-------|-------|-----------|-----------------|-----------------|
| INDIA (Out of 100) | | | | | |
| 18-25 | 7 | 5 | 11 | 7 | 3 |
| 25-45 | 5 | 5 | 15 | 4 | 4 |
| 45 Above | 3 | 4 | 18 | 3 | 5 |
| UAE (Out of 100) | | | | | |
| 18-25 | 8 | 8 | 10 | 4 | 3 |
| 25-45 | 7 | 8 | 11 | 4 | 3 |
| 45 Above | 4 | 7 | 14 | 3 | 5 |

From the above table, we can see that Reference groups are the most powerful influencing factors for a purchase decision making which can be associated with cultural orientations. A purchase decision by the same ethnic group will be more or less the same.

A Webometric Analysis of Libraries of Central Universities of Sanskrit in India

Naveen Dobriyal

Research Scholar

Email: dobriyalnav@gmail.com

and

Dr. Deepmala

Assistant Professor

Email: deepmala.mlis@gmail.com

Department of Library and Information Science, Mangalayatan University, Aligarh

ABSTRACT

The rise in global internet users has led to a web-centric approach to information, with the World Wide Web (WWW) serving as a primary source of information for academic and research activities. Webometrics, a scientific discipline, studies the quantitative analysis of web content and resource utilization using specific approaches. It aims to measure the World Wide Web using content analysis to understand the influence of web pages, links, and parameters. Key components of webometrics analysis include web page content analysis, web link structure analysis, web usage analysis, and web technology analysis, including search engine performance.

Present study examining the webometrics of central universities of Sanskrit in India and their libraries, focusing on three universities established under the Central Sanskrit Universities Act, 2020, was conducted. The study found that two universities use .ac.in URLs, while only Central Sanskrit University uses .nic.in. Search engine performance evaluation revealed that search expressions with gaps had more hits than without gaps. Central Sanskrit University had the highest domain authority and page authority, while SLBSNSU and NSUT had similar scores. Universities with more link pages have a greater impact factor. Future challenges in webometrics research include quantitative methods like sampling web pages and links, domain authority measuring tools, and qualitative methods like web link interpretation and classification.

Keywords: *Central University, Sanskrit, Link, Websites, Domain, Web Impact Factor*

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

1. INTRODUCTION

To maintain their place among the world's leading institutions, Indian higher education institutions must improve the creative coordination of international universities through a regular interchange of experiences and information. The websites of these institutes can give a platform for easy and effective communication among them. Figure 1 clearly indicates that there has been a consistent and large increase in Internet users worldwide over the previous decade, indicating that people are getting more and more web centric in order to find information on the internet. Improving a web policy broadens the dialogue between institutions and universities, which in turn contributes significantly to the production of fresh ways and means of communication in the scientific community by facilitating a greater realisation of the potential of innovation and new discoveries. As a result, this article sheds some insight on the use of a critical communication medium and may pave the way for more successful academic use of the internet. "The World Wide Web (WWW) has now become one of the main sources of information on academic and research activities, and therefore, it is an excellent platform to test new methods of evaluating webometric activities"(Babu, Jeyshankar, and Rao, 2010).

Web resources are now recognised as the most important components of all aspects of life since they give much needed value-added services most precisely and thoroughly in the shortest amount of time by being the prospective demand of the hour. In terms of the World Wide Web, web pages are the essential entities of information, holding very prospective and instructive linkages from general aspects pointing to specific aspects, much like citations. The quantitative analysis of websites is carried out in the same way that it is done in traditional databases. Because of the spectacular expansion of web literature and web pages, the methodology for assessing impacts is developing at a quicker rate, with new theories and new metrics of complex network analysis emerging. Webometric analysis scientifically demonstrates the impact and influence of web sites and web contents. The term 'webometric' is defined as, "the webometric study is based on quantitative measurement – indirectly includes the qualitative aspect also of structure, use of information resources and technologies on WWW drawing on bibliometric and informetric approach" (Goswami, 2007).

Webometrics, according to Bjornborn and Ingwersen (2004), is "the quantitative study of the construction and use of information resources, structures, and technologies on the Web using

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

bibliometric and informetric approaches." Almind and Ingwersen (1997) coined the term Tern webometrics. A second definition of webometrics has also been proposed: "the study of web traffic."

Webometrics is the study of all networking activity using quantitative methodologies and measures. The method of word counts, page counts, page linkages, domain analysis, and other critical criteria are apparently taken into account when evaluating the depth of the World Wide Web of a specific patch or a specified field of knowledge, subject, or even institutions. WebPages are information entities that contain hyperlinks that act as citations. When applying informatics approaches to the internet, the search engine plays a crucial role. For example, if the search engine is weak and influenced by commercial interests, then searching for the perfect algorithm; matching the perfect user's perfectly well stated information demand (Fugl, 2001)

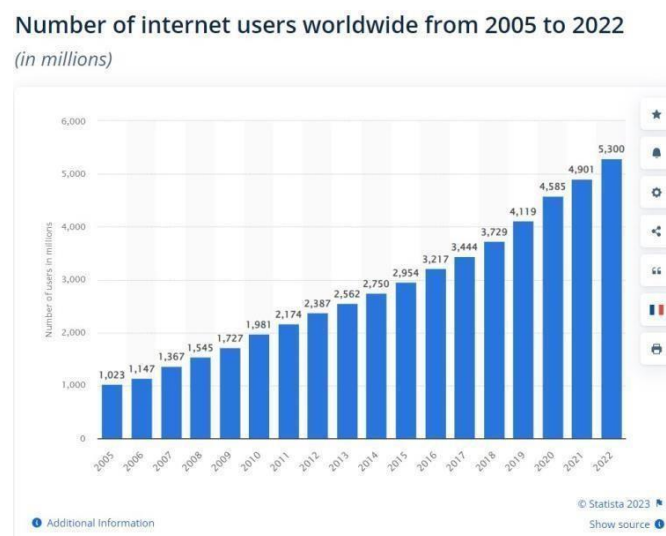


Fig. 1: Internet Users in the World from 2005 to 2022

(Source <https://www.statista.com/statistics/273018/number-of-internet-users-worldwide/>)

WEBOMETRIC-THE CONCEPT

Webometrics is a distinct scientific discipline that studies the quantitative analysis of web content and the rate of utilisation of web resources using particular approaches. In other

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

words, webometrics seeks to measure the World Wide Web in a very thorough manner using content analysis, so that the influence of desired web pages, links, and associated parameters is very well known. Almind and Ingwersen first invented the term "webometrics" in 1997. Webometrics is an amalgamation of two English words, "web" and "metric." "Webometrics (also known as cybermetrics) attempts to measure the World Wide Web in order to gain knowledge about the number and types of hyperlinks, structure of the World Wide Web, and based content using primarily quantitative methods for social science research goals using techniques that are not specific to one field of study" (Thelwall, 2008). Webometric studies are frequently cited by Social Science scholars. Because of the prolific growth of web literature over the previous decade, there has been a huge increase in webometric studies. The key components of Webometrics analysis are:

- Web page content analysis. (A type of subject analysis based on the content of the website is web page content analysis.)
- Web link structure analysis (e.g. hyperlink, self-link and external link).
- Web usage analysis (e.g., exploiting log files for users searching and browsing behavior).
- Web technology analysis (including search engine performance).

2. SCOPE AND LIMITATION OF THE STUDY

Presently there are 18 Sanskrit universities in India. Current study's scope is limited to webometric examination of websites of central universities of Sanskrit in India and their libraries. Out of 18 Sanskrit universities, currently three (3) are central universities of Sanskrit in the country, as published on the UGC website (<https://www.ugc.gov.in/centraluniversity.aspx?type=1>), located in various parts of the country and established under Central Sanskrit Universities Act, 2020 by parliament. Table 1 contains a list of Central Universities of Sanskrit with URL of their websites.

Table 1: List of Central Universities of Sanskrit with location and Websites Address as on 18/10/2023

| S.N. | Name of University | Location | Websites |
|------|-----------------------------|-----------|---|
| 1. | Central Sanskrit University | New Delhi | https://www.sanskrit.nic.in/ |

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

| | | | |
|----|---|-----------|---|
| 2. | Shri Lal Bahadur Shastri National Sanskrit University | New Delhi | https://www.slbsrsv.ac.in/ |
| 3. | National Sanskrit University | Tirupati | https://nsktu.ac.in/ |

3. REVIEW OF LITERATURE

Ingwersen's (1998) examines the case study and found reliability and feasibility of calculating online Impact Factors (Web-IF) for various online sites. Results show high confidence in estimating national and industry Web-IFs, but caution is advised for institutional Web-IFs. Lawrence and Giles (1998) discovered that the coverage and freshness of major search engines are limited, with no one indexing more than one-third of the "indexable Web." The examination of engine overlap implies that the indexable Web has a bottom bound of 320 million pages. Björneborn and Ingwersen (2001) describes Webometrics, a research field since the mid-1990s, investigates the Web's properties using modern informetric methodologies. This article explores recent search engine coverage, performance, challenges in measuring Web Impact Factors, and new directions for knowledge discovery and issue monitoring, based on bibliometric methodologies. Jeyshankar and Babu (2009) examine and explore through a webometric study the websites of 45 universities in Tamil Nadu comprising 27 state and 18 private universities. Karadia and Sahoo (2021) analysed Odisha universities' websites or web portals by applying the webometric indicators to check their existence and performance in the virtual globe and rank them according to data available on the basis of WIF and R-WIF. Patel et al (2021) in their study aims to examine the website analysis of the top 15 Indian universities ranked in the NIRF (National Institutes Ranking Framework). Varadharajulu and Dhanavandan (2017) explore the Web Impact Factors (WIFs) for the websites of Kerala State Universities. Walia and Gupta (2012) examined the linking on websites of national libraries and found their web impact factor and amount of information present on these websites in the form of rich files.

Kapde and Barphe (2022) analysed 16 homepages of Sanskrit University in India, indicating the enormous impact of the Internet on human activities and education. Kaur and Verma (2021) analyze citation activity in Sanskrit and allied subjects at Uttarakhand Sanskrit University, Haridwar, using bibliometrics and in-house data collected using MS-Excel, SPSS, and Power BI. The study aims to provide qualitative interpretation of published materials. Ramkumar (2020) studied research productivity of guides in two Sanskrit Universities, analyzing 1016

doctoral theses from 2002-2016. Popular topics included Sahitya, Shikshashastra, and Vyakarana. Single-campus universities had higher productivity, while multi-topic guides were more productive.

Many studies of website evaluation have focused on Educational Institutions, but no comprehensive study has been found on webometric analysis of Libraries of Sanskrit universities in India and this study is limited to Central Universities of Sanskrit in India.

4. OBJECTIVES OF THE STUDY

The present study is undertaken to have an in-depth study of webometric study of websites of Central Universities of Sanskrit in India with following objectives to:

- To analyze URL of websites/ webpages under study.
- To analyze the different types links of websites of Sanskrit Universities and webpages of their libraries.
- Evaluate the search engine performance for Webometric studies.
- Find out the Domain Authority, Page Authority of websites under study.
- To calculate the web impact factor (WIF) of website under study and rank them as per WIF.

5. METHODOLOGY USED

The current study focuses on webometric analysis of websites of central universities of Sanskrit in India by computing web impact factor of various websites and evaluating search engine performance through webometric study. The primary data is obtained from the websites of selected institutes using survey and observation methods (as shown in table-3). Google, Yahoo Search, All the Web are the search engines and different online free SEO optimisation tool were used to analyse links, search engine performance, and domain authority of Sanskrit Universities website.

Calculation of Web Impact Factor (WIF):

The web impact factor (WIF) can be calculated by using the Showing formula given by Ingwersen (1998) where:

A = total links to a website (all *in links* and *self-links* pages)

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

B = *in links* to the website (subset of A)

C = *self-links* within the same website

D = *external links* within the same website

E = total number of web pages present in the website at a time

Calculation for Simple Web Impact Factor(SWIF)

A = total links to a website (all in links and self-links pages)

E = total number of web pages present in the website at a time

$$\text{SWIF} = A/E$$

Calculation for In-link Web Impact Factor(ILWIF)

B = In-links or Back-link to the website

E = total number of web pages present in the website at a time

$$\text{ILWIF} = B/E$$

Calculation for Self-link Impact Factor(SLWIF)

C = Self-links within the same website

E = total number of web pages present in the website at a time

$$\text{Self-link WIF} = C/E$$

Calculation for External-link Impact Factor(ELWIF)

D = external-links within the same website

E = total number of web pages present in the website at a time

$$\text{Self-link WIF} = D/E$$

6. DATA ANALYSIS AND DISCUSSION

6.1 Analysis of Websites URL

A universal resource locator (URL), often known as a web address, is a specified character string that serves as a resource reference. The transfer protocol is specified in the first portion of the URL, followed by the directory and file names in the second section. The domain name was taken into account when examining the URL of the website. Table 2A shows the URL analysis of websites, and after analysis it was determined that two university websites use .ac.in as domain name in their URLs, whilst one (CSU) website uses .nic as domain name in their URLs. Further all the Sanskrit university websites are using .in (stand for country India) as country code in their URLs. Table 2B shows that there is no separate website of library in any of the Sanskrit University. Library data of all the three universities reflects on the subdomain and webpages. Links of the library webpages of all three universities is mentioned in table 2B.

Table 2A: Analysis of URLs of Websites

| Name of University | Uniform Resource Locator (URL) | URLs | Country Code in URLs |
|--------------------|---|------|----------------------|
| CSU | https://www.sanskrit.nic.in/ | .nic | .in |
| SLBSNSU | https://www.slbsrsv.ac.in/ | .ac | .in |
| NSUT | https://nsktu.ac.in/ | .ac | .in |

Table 2B: Analysis of URLs of Libraries Website/Subdomain/Webpages

| Name of University | Uniform Resource Locator (URL) | Website/Subdomain/Webpage |
|--------------------|---|---------------------------|
| CSU | https://www.sanskrit.nic.in/section_library.php | Subdomain/Webpage |
| SLBSNSU | https://www.slbsrsv.ac.in/library/about-library-0 | Subdomain/Webpage |

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

| | | |
|------|---|-------------------|
| NSUT | https://nsktu.ac.in/index.php/about-library/ | Subdomain/Webpage |
|------|---|-------------------|

6.2 Search Engine Performance of Sanskrit Universities Websites

The search engine performance is one of the important criteria in webometric research for evaluating the reliability of the search engines. Table 4A & B shows the differences in performance of search result by using same search expression withafter command and without command. The Search expressions used for this Study are given below:

1) Search expression with command

Site:www.sanskrit.nic.in/

2) Search expression without command

www.sanskrit.nic.in/

Table 4A & B depicts that search expression without command are having a greater number of results in comparison to search expression with command. Through logically, search expressions with command are corrects. The command site: URL means the number of all the pages inside the URL. There is huge variation in data given by the same search engine for the same search expression.

Table 4A: Search Engine Performance of Sanskrit Universities Websites

(With link command, Site:URLand without linkcommand)

| Search Expression (With command) | Google | Yahoo | Bing | Search Expression (Without command) | Google | Yahoo | Bing |
|-------------------------------------|--------|-------|-------|-------------------------------------|--------------|-----------|-----------|
| CSU | 3,060 | 1,310 | 1,310 | CSU | 31,70,00,000 | 1,48,000 | 1,48,000 |
| SLBSNSU | 3,360 | 2,200 | 2,180 | SLBSNSU | 17,500 | 17,00,000 | 15,20,000 |

(Data collection Date & Time: 18.10.2023 between 03:05pm to 4.00 pm)

Table 4B: Search Engine Performance of subdomain of Library of Sanskrit Universities

(With link command,site:URL)

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| Search Expression (With command) | No of results (Google) | No of results (Yahoo) | No of results (Bing) |
|-------------------------------------|---------------------------|--------------------------|-------------------------|
| CSU | 10 | 0 | 0 |
| SLBSNSU | 974 | 0 | 0 |
| NSUT | 1130 | 1 | 1 |

(Data collection Date &Time: 18.10.2023 between 8:00pm to 8.20 pm)

6.3 Domain Authority and Page Authority of Websites of Sanskrit Universities

The effectiveness and efficiency of a certain website/ domain is measured through domain authority using a 0 to 100 logarithmic scale and the pattern follows for the measurement of page authority. In simple terms, the highest score obtained for page authority and domain authority respectively determines higher ranks.

Here we have used an “*SEO review tool*” free online SEO tools for collecting the data of Domain Authority and Page Authority of Websites of Sanskrit Universities that are depicted in table 5.

Table 5 A: Domain Authority and Page Authority of Websites of Sanskrit Universities

| Sl. No. | Name of University | Domain Authority | Page Authority |
|---------|--------------------|------------------|----------------|
| 1 | CSU | 44 | 65 |
| 2 | SLBSNSU | 37 | 80 |
| 3 | NSUT | 36 | 60 |

Table 5 B: Domain Authority and Page Authority of Websites of Library of Sanskrit Universities

| Sl. No. | Name of University | Domain Authority | Page Authority of Library |
|---------|--------------------|------------------|---------------------------|
|---------|--------------------|------------------|---------------------------|

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | | |
|---|---------|----|----|
| 1 | CSU | 44 | 0 |
| 2 | SLBSNSU | 37 | 12 |
| 3 | NSUT | 36 | 12 |

Table-5A shows the Domain Authority and Page Authority of Sanskrit Universities websites, in which Domain Authority of CSU is in the highest position with 44 among the all websites, followed by SLBSNSU with 37 and NSUT has the lowest Domain Authority i.e., 36

In Page Authority, SLBSNSU with 80 is the highest, followed by CSU with 65. Among the all websites, NSUT has the Lowest Page Authority i.e., 60.

Table-5B shows the Domain Authority and Page Authority of Libraries of webpages of Sanskrit Universities websites, in which Domain Authority results are similar as mentioned in table 5A whereas, in Page Authority of library webpages, SLBSNSU and NSUT has same score i.e. 12 and CSU has scored zero.

6.4 Link analysis of Websites

Table 6 A: Total Links (TL): Internal link (IL), External link (EL) and Back link (BL) of websites of Sanskrit Universities

| University | TL | IL | EL | BL |
|------------|-----|-----|----|--------|
| CSU | 486 | 411 | 53 | 220330 |
| SLBSNSU | 34 | 32 | 2 | 175807 |
| NSUT | 840 | 787 | 53 | 165543 |

Table 6 B: Total Links (TL): Internal link (IL), External link (EL) and Back link (BL) of library subdomain of Sanskrit Universities

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

| University | TL | IL | EL | BL |
|------------|-----|-----|----|----|
| CSU | 128 | 5 | 17 | 1 |
| SLBSNSU | 105 | 92 | 10 | 1 |
| NSUT | 186 | 171 | 14 | 5 |

6.5 WebImpact Factor of Websites of Central Universities of Sanskrit

It is observed from table 7A, NSUT has maximum number of webpages followed by SLBSU. It could be noted that NSUT has majority of linked pages followed by CSU. Ingwersen proposed an innovative measurement for calculating the online areas of the web, including websites. Web impact factors determines the average online impact of a website by dividing the number of link pages by total number of webpages. CSU has secured first position (0.15) followed by NSUT (0.12) in Simple WIF. In case of In-linked WIF again CSU secured first position with 0.13 score and NSUT remains in second position with 0.11 score. In Self-Link WIF CSU remains in top with 72 points and SLBSNSU stands at second position with score of 53.32, NSUT stand at least position with score of 24.70 points. In case of External-link WIF again CSU scored 0.01 and stood at first place.

Table 7A: WIF's of Sanskrit Universities Websites

| University | SWIF | ILWIF | SLWIF | ELWIF |
|------------|------|-------|-------|-------|
| CSU | 0.15 | 0.13 | 72.00 | 0.01 |
| SLBSNSU | 0.01 | 0.00 | 53.32 | 0.00 |
| NSUT | 0.12 | 0.11 | 24.70 | 0.00 |

From the table 7B it is observed that the university subdomain of library CSU library stood at rank 1 in all the WIF's followed by NSUT library and library subdomain of SLBSNSU remained last in all the cases of WIF's

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Table 7B: WIF's of Library sub-domain of Sanskrit Universities Websites

| University | SWIF | ILWIF | SLWIF | ELWIF |
|------------|------|-------|-------|-------|
| CSU | 12.8 | 0.5 | 0.10 | 1.7 |
| SLBSNSU | 0.10 | 0.09 | 0.00 | 0.01 |
| NSUT | 0.16 | 0.15 | 0.00 | 0.01 |

Table 7C: Rank of Universities websites as per WIF's

| University | SWIF | ILWIF | SLWIF | ELWIF | Overall WIF Rank |
|------------|------|-------|-------|-------|------------------|
| CSU | 1 | 1 | 1 | 1 | 1 |
| SLBSNSU | 3 | 3 | 2 | 3 | 3 |
| NSUT | 2 | 2 | 3 | 2 | 2 |

Table 7D: Rank of Library sub-domain of Sanskrit Universities Websites as per WIF's

| University | SWIF | ILWIF | SLWIF | ELWIF | Overall WIF Rank |
|------------|------|-------|-------|-------|------------------|
| CSU | 1 | 1 | 1 | 1 | 1 |
| SLBSNSU | 3 | 3 | 3 | 3 | 3 |
| NSUT | 2 | 2 | 2 | 2 | 2 |

FINDINGS

The major findings of the study are:

- The two universities are using *.ac.in* URL and only one website (Central Sanskrit University) used *.nic.in* URL. The country code TLD (ccTLD) *.in* is used by all of the all the universities (i.e. 100%) websites.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- In search engine performance evaluation, it was found that search expression with gap having a greater number of hits in all universities websites comparison to search expression without gap in both site command and link command sites and huge variations in data was found. Although, conceptually search expression without gap is more logical. Different search engines show different search results, google search is shown higher in all the cases.
- The Central Sanskrit University have highest (44) domain authority among the websites while SLBSNSU have (80) page authority among the all. As far as concern with page authority of libraries SLBSNSU and NSUT have similar score (12).
- In overall ranking of websites, CSU has the highest WIF's and ranked 1st, while NSUT and SLBSNSU ranked second and third respectively.

7. CONCLUSION & RECOMMENDATIONS

Search engine search facilities are continually changing, which is a major impediment to webometrics research, for example, Yahoo, Altavista, and other web-link search engines no longer function as a search analysis tool. Indeed, the Webometrics study field suffers from a scarcity of relevant and robust measuring instruments. Future Webometrics problems include quantitative methods such as sampling web pages and web links, domain and page authority measuring tools, and qualitative methods such as web link interpretation and classification. In general, online link analysis of university websites is reliable, but in practise, web connections are unequal to citations in scholarly publications, because university website content mentions related other sites. This study reflects a direct relationship with the related links. The universities having a greater number of link pages obviously encompass more impact factor. The study observed that university owing to possess more web sites hence, comprises maximum web impact factor among central universities of Sanskrit.

Following suggestions are recommended to improve the university and library websites:

- a) Each university and their website(s) may have requirements that are vital and distinct.
- b) Each institution should have its own library website, and the library website or webpage should be clear and well-planned in relation to the target audience. Students (current, prospective, and graduates), researchers, professors, and all other staff members are among the target audience.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

c) It is critical to receive feedback from the user community. This takes advantage of users' impulsive tendencies. It is also critical to ensure that individuals are being heard.

d) It is also proposed that Sanskrit universities acquire expertise in order to navigate this technological deluge of titanic dimensions. As a result, change must be available and simple to implement.

REFERENCES

Björneborn, L. (n.d.). *Small-World Link Structures across an Academic Web Space: A Library and Information Science Approach*.

Björneborn, L., & Ingwersen, P. (2001). Perspectives of webometrics. *Scientometrics*, 50(1), 65–82. <https://doi.org/10.1023/A:1005642218907>

Deepak Barphe, K., & Uttamrao, V. (2022). “A Study of Web Credibility of Sanskrit University Websites in India.” *Peer Reviewed & UGC CARE Listed Journal, IX Issue-II*.

Goswami Umesh Sharma Anil Kumar Shukla, P. (n.d.). *The Webometrics*.

Ingwersen, P. (1998). RESEARCH BRIEF: THE CALCULATION OF WEB IMPACT FACTOR S. In *Journal of Documentation* (Vol. 54, Issue 2).

Jeyshankar, R., & Ramesh Babu, B. (2009). Websites of universities in Tamil Nadu: a webometric study. In *Annals of Library and Information Studies* (Vol. 56). www.tnuniv.ac.in

Hadagali, G. S., Bulla, S. D., Baliga, A., Shettar, I. M., Hadagali Shivanand D Bulla Iranna M Shettar, G. S., Link Analyzer, W., Link Watch, B., & Link, B. (n.d.). INDIAN INSTITUTES OF TECHNOLOGY'S WEBSITES IN INDIA: A WEBOMETRIC ANALYSIS. In *JOURNAL OF INDIAN LIBRARY ASSOCIATION* (Vol. 57, Issue 4).

Henzinger, M. (2000). *Link Analysis in Web Information Retrieval*. <http://www.google.com/>

Ingwersen, P. (1998). The calculation of web impact factors. *Journal of Documentation*, 54(2), 236–243. <https://doi.org/10.1108/EUM0000000007167>

Karadia, A., Karadia, A., & Sahoo, J. (n.d.). *Webometric Analysis of Odisha Universities' Websites through Google Search Engine Building institutional repositories to support changing scholarly and research processes View project Research Productivity in the Fields*

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

of Social Sciences in Odisha: A Bibliometric Appraisal View project Webometric Analysis of Odisha Universities' Websites through Google Search Engine. <http://publishingindia.com/ijisl/>

Kumar Jalal, S., Chandra Biswas, S., & Mukhopadhyay, P. (2010). Web impact factor and link analysis of selected Indian universities. In *UNIVERSITIES 109 Annals of Library and Information Studies* (Vol. 57).

Lahkar, R. (n.d.). *Web Impact Factor and link analysis of Central University Websites of North Eastern States of India.* <https://digitalcommons.unl.edu/libphilprac>

Lawrence, S., & Giles, C. L. (n.d.). *Searching the World Wide Web.* www.nw.com/zone/

Li, X. (2003). A review of the development and application of the Web impact factor. In *Online Information Review* (Vol. 27, Issue 6, pp. 407–417).
<https://doi.org/10.1108/14684520310510046>

Noruzi, A. (2015). *Web Impact Factors for Iranian Universities.* <https://www.researchgate.net/publication/26405854>

Oppenheim, C., Morris, A., McKnight, C., & Lowley, S. (2000). The evaluation of WWW search engines. *Journal of Documentation*, 56(2), 190–211.
<https://doi.org/10.1108/00220410010803810>

Prabakaran, R., & Lihitkar, S. (n.d.). *325-Web Link Analysis and Web Impact Factors of Space.* <http://www.iirs.gov.in/centrallibrary>

Ramalingam, J.-, & Jeyshankar, R. (2019). *Webometric Analysis of Deemed University Websites in India.* <https://digitalcommons.unl.edu/libphilprac/2266>

Ramkumar, S. (2020). Research productivity through the lens of doctoral guidance: A study of Sanskrit universities in India. *Journal of Scientometric Research*, 9(1), 19–28.
<https://doi.org/10.5530/JSCIRES.9.1.3>

Shukla, A. (n.d.). *Measuring Effectiveness of Institutional Websites: A Case Study of Central Universities of India Information Seeking Behaviour View project Information Resource Management View project.* <https://www.researchgate.net/publication/277958608>

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

- Smith, A., &Thelwall, M. (2002a). Web Impact Factors for Australasian universities. In *Budapest Scientometrics* (Vol. 54, Issue 3). Kluwer Academic Publishers. <http://www.avcc.edu.au/>
- Smith, A., &Thelwall, M. (2002b). Web impact factors for Australasian universities. *Scientometrics*, 54(3), 363–380. <https://doi.org/10.1023/A:1016030415822>
- Thamm, M., & Mayr, P. (n.d.). *Comparing webometric with web-independent rankings: a case study with German universities*. www.uni-konstanz.de
- Trivedi, S. S. P., D., Bhatt, A., & Chaudhari, S. P. (n.d.). *Web visibility and research productivity of NIRF ranked universities in India: A Webometric study*.
- Varadharajalu, J., Dhanavandan, S., & Librarian, A. (n.d.). Analysis of Web Impact Factor (WIF) for the Website of State Universities in Kerala. In *International Journal of Library and Information Studies* (Vol. 7, Issue 1). <http://www.ijlis.org>
- Walia, P. K., & Gupta, M. (2012). Web Impact Factor of Select National Libraries' Websites. In *DESIDOC Journal of Library & Information Technology* (Vol. 32, Issue 4).
- Web impact factor for malaysian public universities*. (n.d.).

Desirability Analysis to Optimize the Performance of Castor-Diesel Blends Using ANNOVA

Shweta, Kishan Pal Singh

Research Scholar in Mechanical Engineering, Mangalayatan University, Aligarh, India
Associate Professor in Mechanical Engineering, Mangalayatan University, Aligarh, India

shweta@mangalayatan.edu.in

Abstract

By using optimized engine parameters, this work seeks to maximize the performance of castor-diesel blends in a Variable Compression Ratio (VCR) diesel engine. Engine optimization takes operational factors such as engine load, fuel blends, and compression ratio into account. Performance metrics such as indicated thermal efficiency (ITHE), brake thermal efficiency (BTHE), and mechanical efficiency, on the other hand, are taken into consideration for responses. Research is carried out using the experimental design of the Box - Behnken Design (BBD). The Desirability approach is utilized in engine operating parameter optimization. According to the results, the VCR diesel engine performs better than the diesel engine at full load when it is run at a compression ratio of 18 and 40% fuel blend (Diesel 60% by volume and 40% by volume mixed with castor oil). Blending optimization yields 56.81% mechanical efficiency, 28.72% brake thermal efficiency, and 51.87% indicated thermal efficiency. Ultimately, the engine parameters with the best efficiency and lowest emissions for biodiesel blends are found in the mathematical models and experimental data.

Keywords: - Variable Compression Ratio, Diesel Blends, Engine Performance, and ANOVA

Introduction

Biomass refers to the organic matter that can be used as a substitute for energy. It encompasses various types of biofuels, including solid, gaseous, and liquid fuels. These can be obtained from biomass [1,2].

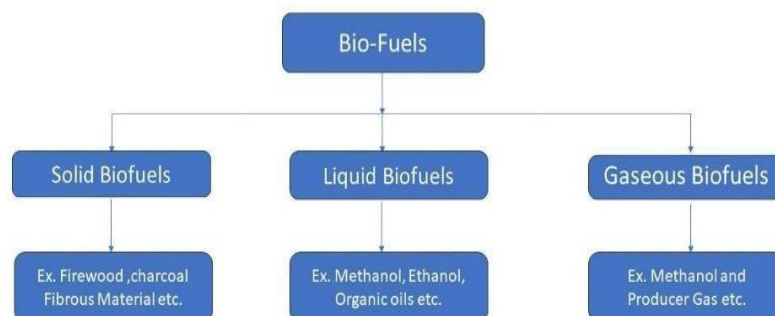


Fig.1: -Systematic Layout of Different Biofuels

In contemporary times, it is crucial to deliberate upon the optimal utilization of biofuels and fossil fuels in our daily lives, as both play a vital role in shaping our future generations [3]. The

cost of essential commodities, such as oil, is experiencing a significant increase. In this case, biofuel would be the most advantageous substitute to meet the need for fuel in human necessities. It replaces fossil energy sources and the depleting reserves of fossil fuels. The outcome serves as a means to mitigate the impacts of climate change and establish a sustainable and dependable energy source. Biofuels are considered perpetual and sustainable resources as they are continuously replenished. Fossil fuels are non-renewable resources that deplete over time as they require millions of years to form and are extracted from underground reserves [4].

The study's primary objective is to comprehend and analyse various characteristics of bio-diesel. Biodiesel is an environmentally friendly, widely available fuel and not dependent on geography. Like diesel, biodiesel comprises mono-alkyl esters of long-chain fatty acids derived from renewable natural sources like vegetable or animal fats. Significantly reducing the utilization of fossil fuels can greatly decrease the harmful emissions. It can be achieved by replacing fossil fuels with renewable fuels. The future global energy demand will be largely met by renewable energy sources [5]. Biodiesel is a clean and sustainable bioenergy that can be produced from various sources such as single edible oil (SEO), hybrid edible oils (HEO), single nonedible oil (SNEO), and hybrid nonedible oil (HNEO). It can be used as fuel for diesel engines without requiring engine modifications [6]. To enhance the production of biodiesel, numerous innovative technologies are being embraced in the field of bioenergy research [7]. Biodiesel is primarily derived from edible vegetable oil, nonedible vegetable oil, waste or recycled oil, and animal fats. It is relatively less flammable than regular diesel. Biodiesel can be readily blended with conventional diesel fuel. Bio-diesel is biodegradable, thereby rendering it less environmentally hazardous. It lacks sulfur, the primary cause of acid rain. Biodiesel is suitable for application in catalytic converters in numerous instances. The engines, which utilize bio-diesel as a fuel source, typically exhibit high durability. The refineries are relatively less complex and environmentally friendly. Biofuels show higher octane levels and lubricity scores than uncontaminated petroleum-based diesel fuel. It can enhance the engine's efficiency and prolong the machine's operational lifespan [8].

Recent studies have examined biodiesel engines' operational and exhaust properties under various engine speeds, loads, and ratios [9,10]. Benefits of using biodiesel as a substitute fuel for diesel engines include lower or nonexistent exhaust gas emissions of carbon monoxide, sulfur dioxide, and unburned hydrocarbons. The oxygen in biodiesel molecules generally leads to a more thorough burning process and decreased environmental pollution [11]. Optimizing the biodiesel engine's performance is the primary goal of the research. Design software can be used to calibrate the engine performance. Internal combustion engine (ICE) calibration is defined as finding the ideal combinations of several engine configurable parameters, like air- to-fuel ratio (AFR), spark advance, and variable valve timings (VVT), for all the points of the range of operations in order to attain the prescribed performance requirements in terms of maximum output power, minimum fuel consumption (FC), minimum pollutant emissions, and noise. In the real world, the engine calibration problem becomes a crucial optimization problem since an appropriately calibrated engine produces fewer greenhouse gas emissions and is therefore preferred over an engine that is not. Thus, engineers and researchers alike are interested in engine calibration. Unfortunately, dyno performance evaluation takes a lot of time, which makes engine calibration a costly optimization issue. The conventional manual method has reached its limit since engine calibration issues have typically been more complex than in the past few decades. On the one hand, as engine technology advances, more and more engine parameters can be adjusted [12].

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Experimental Set-Up

A problem-solving method called One factor at a Time (OFAT) separates the important causes of an effect from a group of possible causes. Many organizations use the OFAT approach to identify the primary factors when conducting experiments. Finding the performance characteristics with the OFAT approach requires selecting the appropriate range of input variables. A specific range of input variables is determined and fixed before the performance characteristics start, followed by an organized arrangement of the experimental performance. The variables chosen for the inputs are listed in Table 1 to achieve the best results. The appropriate ranges of the variables are also fixed. Pure castor oil was bought from the market for this investigation. Transesterification is the process that turns castor oil, which has less than 2% free fatty acids (FFA) and 27% alkaline, into biodiesel [13-15]. The mechanical efficiency of the biodiesel is optimized using the Design-expert 13 model. The output values are obtained using a diesel engine with a displacement of 87.50mm, stroke length of 110.00mm, connecting rod length of 234.00mm, and compression ratio 18. The engine has a power of 350KW @1500 rpm.

| Run Order | Torque | Brake Power | Indicated Power | Mechanical Efficiency | Brake Thermal Efficiency | Indicated Thermal Efficiency |
|-----------|--------|-------------|-----------------|-----------------------|--------------------------|------------------------------|
| 1 | 0.62 | 1.67 | 1.84 | 5.28 | 2.15 | 40.98 |
| 2 | 0.6 | 0.1 | 3.5 | 5.34 | 2.1 | 40.9 |
| 3 | 0.65 | 3.23 | 3.45 | 5.15 | 2.09 | 40.87 |
| 4 | 11.25 | 0.12 | 1.84 | 5.11 | 23.27 | 52.17 |
| 5 | 11.20 | 3.00 | 5.60 | 44.61 | 23.19 | 52 |
| 6 | 11.27 | 3.24 | 1.80 | 44.59 | 23.25 | 51.90 |
| 7 | 21.80 | 2.99 | 3.55 | 44.40 | 30.32 | 48.45 |
| 8 | 11.2 | 1.65 | 3.48 | 62.59 | 23.19 | 52 |
| 8 | 11.21 | .10 | 5.16 | 43.94 | 23 | 51.95 |
| 10 | 21.81 | .12 | 3.45 | 44.72 | 30.30 | 48.34 |
| Run Order | Torque | Brake Power | Indicated Power | Mechanical Efficiency | Brake Thermal Efficiency | Indicated Thermal Efficiency |
| 11 | 21.8 | 1.67 | 5.10 | 62.40 | 30.00 | 48 |
| 12 | 21.87 | 1.6 | 1.82 | 62.30 | 30.25 | 48.25 |
| 13 | 0.64 | 1.59 | 5.09 | 5.20 | 2.18 | 40.95 |

Table-1: Design Matrix

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Fig. 2 shows the systematic layout of the diesel engine used in the analysis of the result outcomes of the ANNOVA model.

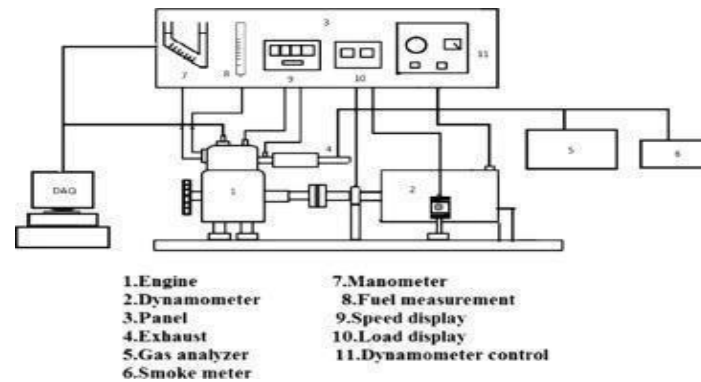


Fig.2 Systematic Engine Layout Diagram [16]

Experimental Methodology

Three levels of experiment design based on the BBD technique are generated to determine the optimal value of the output parameters selected for analysis. These levels include speed, load, indicated power, and brake power as input parameters, as shown in Fig.3.

Factors

| Factor | Name | Units | Type | SubType | Minimum | Maximum | Coded Low | Coded High | Mean | Std. Dev. |
|--------|-------|-------|---------|------------|---------|---------|--------------|--------------|---------|-----------|
| A | Speed | RPM | Numeric | Continuous | 1433.00 | 1493.00 | -1 → 1433.00 | +1 → 1493.00 | 1463.00 | 19.64 |
| B | I.P | KW | Numeric | Continuous | 2.28 | 3.93 | -1 → 2.28 | +1 → 3.93 | 3.10 | 0.5401 |
| C | B.P | KW | Numeric | Continuous | 0.1000 | 2.51 | -1 → 0.10 | +1 → 2.51 | 1.30 | 0.7889 |
| D | Load | Kq | Numeric | Continuous | 0.3600 | 9.20 | -1 → 0.36 | +1 → 9.20 | 4.78 | 2.89 |

Table-2: Details of factors chosen for Research Analysis

This study looked at torque, load, indicated power, and brake power as input factors that could impact the engine's indicated thermal efficiency, mechanical efficiency, and brake thermal efficiency. For the experimentation, full factorial designs of Design of Experiments (DOEs) are considered, where each factor varies at levels of 3x3x5, respectively. The complete factorial design from the software "Design Expert" trial version 13, which included 17 runs, served as the basis for creating the design matrix.

| Source | Sum of Squares | df | Mean Square | F-value | p-value |
|------------------|----------------|----|-------------|-----------|----------------------|
| Model | 6915.68 | 9 | 768.41 | 93423.62 | < 0.0001 significant |
| A-torque | 6557.99 | 1 | 6557.99 | 7.973E+05 | < 0.0001 |
| B-I.P | 0.0001 | 1 | 0.0001 | 0.0061 | 0.9428 |
| C-B,P | 0.0021 | 1 | 0.0021 | 0.2568 | 0.6472 |
| AB | 0.0000 | 1 | 0.0000 | 0.0000 | 1.0000 |
| AC | 0.0132 | 1 | 0.0132 | 1.61 | 0.2943 |
| BC | 0.0000 | 1 | 0.0000 | 0.0000 | 1.0000 |
| A ² | 265.56 | 1 | 265.56 | 32286.64 | < 0.0001 |
| B ² | 0.0002 | 1 | 0.0002 | 0.0213 | 0.8933 |
| C ² | 3.571E-06 | 1 | 3.571E-06 | 0.0004 | 0.9847 |
| Residual | 0.0247 | 3 | 0.0082 | | |
| Cor Total | 6915.71 | 12 | | | |

Table-3: -Quadratic Model of the ANNOVA

The quadratic model of the ANOVA technique is displayed in the table above.

Result & Discussion

The foundation of analysis is analysis of variance (ANOVA), which yields the p-value numerically. The alternative term for rejection points that indicates the lowest level of significance at which the null hypothesis would be rejected is the p-value. The maximum value of p is 0.05, and model terms with p-values greater than 0.05 are considered unimportant. Since the p-values for the different responses are less than 0.05, it is determined that the models are significant.

The actual Regression Analysis for different values is as follows:

Mech. Efficiency= $2.307 + 4.836 \times \text{Torque} - 0.0237 \times \text{I.P} - 0.0302 \times \text{B.P} - 0.000403 \times \text{Torque} \times \text{I.P} + 0.003458 \times \text{Torque} \times \text{B.P} + .0000269 \times \text{I.P} \times \text{B.P} - 0.0954 \times \text{Torque}^2 + 0.00317 \times \text{I.P}^2 + 0.000510 \times \text{B.P}^2$ (1)

BTHE = $0.6274 + 2.720 \times \text{Torque} - 0.0970 \times \text{I.P} - 0.01588 \times \text{B.P} - 0.000047 \times \text{Torque} \times \text{I.P} + 0.000451 \times \text{Torque} \times \text{B.P} - 0.003849 \times \text{I.P} \times \text{B.P} - 0.062018 \times \text{Torque}^2 + 0.013155 \times \text{I.P}^2 + 0.005614 \times \text{B.P}^2$ (2)

ITHE = $40.191 + 1.81469 \times \text{Torque} - 0.13534 \times \text{I.P} - 0.11562 \times \text{B.P} + 0.000951 \times \text{Torque} \times \text{I.P} + 0.003157 \times \text{Torque} \times \text{B.P} + 0.02021 \times \text{I.P} \times \text{B.P} - 0.06533 \times \text{Torque}^2 + 0.012701 \times \text{I.P}^2 - 0.001021 \times \text{B.P}^2$ (3)

Model Evaluation

ANOVA modeling is used to analyze the stability of the model, as shown in the table below.

| Model | Mean | SD | R-Square | Model Degree | Adj.R ² |
|-------------------------------------|-------|------|----------|--------------|--------------------|
| Mechanical Efficiency | 37.96 | .09 | 1.00 | Quadratic | .99 |
| Brake Thermal Efficiency | 18.91 | .036 | 1.00 | Quadratic | .98 |
| Indicated Thermal Efficiency | 47.48 | .09 | .99 | Quadratic | .99 |

Table-4: Model Evaluation

The model fits the data well because, according to regression statistics, the difference between goodness of fit and prediction is less than 0.2, and the value of p is less than 0.0500, indicating that the model terms are significant.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| Input Parameter | Goal | Lower Limit | Upper Limit | Importance |
|-----------------|----------|-------------|-------------|------------|
| Torque | In Range | 0.62 | 21.87 | 3 |
| Indicated Power | In Range | 1.84 | 5.16 | 3 |
| Brake Power | In Range | 0.1 | 3.23 | 3 |

Table 5: Analysis of Constraints

The **Model F-value** of 93423.62 implies the model is significant. There is only 0.01% chance that the F-value can increase due to noise. Model terms are adequate if the P-value are less than 0.05. In this case, A and A² are significant model terms. Values greater than 0.1000 indicate the model terms are not significant.

Actual Vs Predicted Values

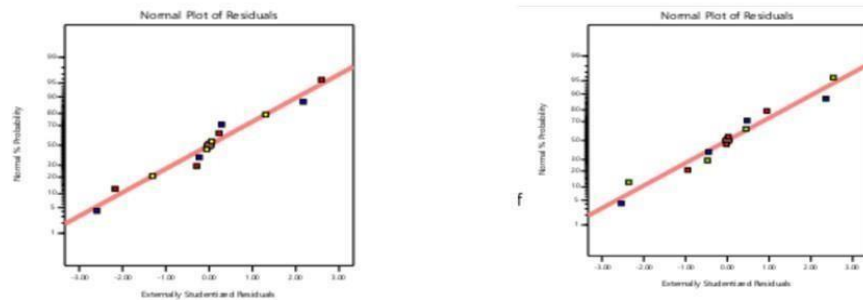


Fig.3 Actual Value Vs. Predicted Values for the ITHE and BTHE

The experimental analysis of the graph in Figure 4 provides easy validation of the values by comparing the spread between the predicted and actual values for the ITHE and BTHE for the 40% blended solution operated at predefined conditions with a compression ratio 18. The graph unequivocally demonstrates that the developed existing models of BTHE and ITHE are adjacent to and close to the theoretical values predicted during the experimental performance. This can be readily verified by observing the spread of the actual values to the predicted existing line.

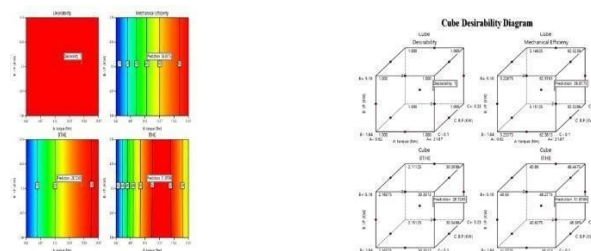


Fig. 4 Desirability Diagram at variable conditions

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Optimization

The table displays the optimization criteria that were used in this investigation. Three input variables and three output variables are chosen for the model to take into account each output and use optimization techniques to maximize the output variables. Each response in the desirability approach can be given a value between 1 and 5. Mechanical efficiency, BTHE, and ITHE are assigned the highest importance for this study. Maximum desirability is achieved with engine parameters such as a compressibility ratio 18, 40% of fuel blend, and a complete load condition.

| Number | torque | I.P | B.P | Mechanical Efficiency | BTHE | ITHE | Desirability | |
|--------|--------|-------|-------|-----------------------|--------|--------|--------------|----------|
| 1 | 16.931 | 3.611 | 1.417 | 56.818 | 28.727 | 51.879 | 1.000 | Selected |

Optimized Result

| Name | Goal | Lower Limit | Upper Limit | Lower Weight | Upper Weight | Importance |
|-----------------------|-------------|-------------|-------------|--------------|--------------|------------|
| A: Torque | is in range | 0.62 | 21.87 | 1 | 1 | 3 |
| B: I. P | is in range | 1.84 | 5.16 | 1 | 1 | 3 |
| C: B. P | is in range | 0.1 | 3.23 | 1 | 1 | 3 |
| Mechanical Efficiency | | 5.11 | 62.59 | 1 | 1 | 3 |
| BTE | | 2.09 | 30.32 | 1 | 1 | 3 |
| ITE | | 40.8 | 52.17 | 1 | 1 | 3 |

Table-6: Optimization Criteria

Conclusion

The following conclusion is noted after optimization is done to determine the ideal parameters for a biodiesel blend with castor oil:

- The software-designed experiments aided in the precise prediction of the responses.
- The highest desirability of 1 is attained using the RSM's desirability approach using Design Expert.
- As per the study, Indicated Thermal Energy should be higher than Brake Thermal Energy; it is observed from experimentation that the value of ITE is higher than BTE.
- During the analysis, maximum Mechanical Efficiency was observed as 56.818, Indicated Thermal Energy as 51.897, and Brake Thermal Energy as 28.727.
- The engine's efficiency increased during the process, and the optimal value for the blended mixture was achieved during the analysis.
- It is observed that the increased value is obtained for the 40 % blended mixture of castor oil in diesel in a VCR diesel engine at a compression ratio of 18 as compared to a pure diesel engine.

It is shown that the ANOVA analysis can be used to identify the variables needed for any IC engine to meet its goals. The current study determines the compression ratio, load, and blend

percentage to achieve the highest mechanical and thermal efficiency levels. This approach was discovered to be successful for multi-objective IC engine optimization.

References

1. B.M. Berla, R. Saha, C.M. Immethun, C.D. Maranas, T.S. Moon and H.B. Pakrasi, *Front. Microbiol.*, 4, 246 (2013); <https://doi.org/10.3389/fmicb.2013.00246>.
2. M. Bender, *Resour. Conserv. Recycling*, 30, 49 (2000); [https://doi.org/10.1016/S0921-3449\(00\)00045-8](https://doi.org/10.1016/S0921-3449(00)00045-8)
3. Armeanu, D.Ş., Vintilă, G. and Gherghina, Ş.C., 2017. Does renewable energy drive sustainable economic growth? Multivariate panel data evidence for EU-28 countries. *Energies*, 10(3), p.381.
4. Foster, E., Contestabile, M., Blazquez, J., Manzano, B., Workman, M. and Shah, N., 2017. The unstudied barriers to widespread renewable energy deployment: Fossil fuel price responses. *Energy Policy*, 103, pp.258-264.
5. Najafi, G., Ghobadian, B. and Yusaf, T.F., 2011. Algae as a sustainable energy source for biofuel production in Iran: A case study. *Renewable and Sustainable Energy Reviews*, 15(8), pp.3870-3876.
6. Moser, B.R., 2009. Biodiesel production, properties, and feedstocks. *In Vitro Cellular & Developmental Biology-Plant*, 45, pp.229-266.
7. Aransiola, E.F., Ojumu, T.V., Oyekola, O.O., Madzimbamuto, T.F. and Ikhu-Omoregbe, D.I.O., 2014. A review of current technology for biodiesel production: State of the art. *Biomass and bioenergy*, 61, pp.276-297.
8. Datta, A., Hossain, A. and Roy, S., 2019. An overview of biofuels and their advantages and disadvantages.
9. Di, Y., Cheung, C.S. and Huang, Z., 2009. Experimental investigation on regulated and unregulated emissions of a diesel engine fueled with ultra-low sulfur diesel fuel blended with biodiesel from waste cooking oil. *Science of the total environment*, 407(2), pp.835-846.
10. Chauhan, B.S., Kumar, N. and Cho, H.M., 2012. A study on the performance and emission of a diesel engine fueled with Jatropha biodiesel oil and its blends. *Energy*, 37(1), pp.616-622.
11. Karami, R., Rasul, M.G., Khan, M.M. and Anwar, M., 2019. Performance analysis of direct injection diesel engine fueled with diesel-tomato seed oil biodiesel blending by ANOVA and ANN. *Energies*, 12(23), p.4421.
12. Yu, X., Zhu, L., Wang, Y., Filev, D. and Yao, X., 2022. Internal combustion engine calibration using optimization algorithms. *Applied Energy*, 305, p.117894. Sharma, S., Saxena, V., Baranwal, A., Chandra, P. and Pandey, L.M., 2018.
13. Engineered nanoporous materials mediated heterogeneous catalysts and their implications in biodiesel production. *Materials Science for Energy Technologies*, 1(1), pp.11-21.
14. Sarin, R., Sharma, M., Sinharay, S. and Malhotra, R.K., 2007. Jatropha–palm biodiesel blends: an optimum mix for Asia. *Fuel*, 86(10-11), pp.1365-1371.
15. Bueno, A.V., Pereira, M.P.B., de Oliveira Pontes, J.V., de Luna, F.M.T. and Cavalcante Jr, C.L., 2017. Performance and emissions characteristics of castor oil biodiesel fuel blends. *Applied Thermal Engineering*, 125, pp.559-566.
16. Bharadwaz, Y.D., Rao, B.G., Rao, V.D. and Anusha, C., 2016. "Improvement of biodiesel methanol blend performance in a variable compression ratio engine using response surface methodology." *Alexandria Engineering Journal*, 55(2), pp.1201-1209.

Investigating the Influence of Drawbead Geometries on Springback in Mild Steel Sheet Metal Forming Using Abaqus Software

Tarun Nharwal¹, Dr. Kishan Pal Singh²

Research Scholar, Mechanical Engineering Department Mangalayatan University
Aligarh Associate Professor, Mechanical Engineering Department Mangalayatan
University Aligarh

Corresponding Author: - tarunnharwal@gmail.com

Abstract

This research study aims to investigate the influence of drawbeads on minimizing springback in the forming of mild steel sheet metal using the Abaqus software. Springback, which refers to the elastic recovery and inaccurate geometry of deformed parts after the forming process, can be reduced by introducing drawbeads. Four different drawbead geometries, namely without drawbeads, circular drawbeads, rectangular drawbeads, and triangular drawbeads, are examined through computational analysis using the finite element method. The results indicate that the triangular drawbeads are the most effective in reducing springback compared to the other geometries.

Keywords: Springback, Draw-bead, Metal Forming, Abaqus/Explicit Software.

Introduction

Sheet metal forming involves various processes used to shape sheet metal into desired forms, such as stamping, bending, and drawing (Trzepieciniski, & Lemu, 2017). Springback, an elastic deformation that occurs after the forming process, can pose challenges in subsequent assembly processes, and cause geometric distortions. Drawbeads are introduced to control material flow and improve product quality by applying restraining forces (Soualem, & Hakimi, 2018). However, the influence of drawbead geometries on springback behavior is not well understood. This research aims to investigate the effect of drawbead geometries on minimizing springback.

Numerical simulations play a crucial role in product design, providing valuable insights into various aspects of the manufacturing process. However, there are still challenges in achieving accurate and reliable results using numerical tools. To address these issues and enhance the prediction of springback in Finite Element (FE) analysis, researchers have proposed guidelines for mesh discretization and introduced a new through-thickness integration scheme for shell elements (Maia et al., 2017). Among the FE analysis software available, ABAQUS is a versatile option that enables the modeling of structures, both homogeneous and heterogeneous, at macro and micro scales (Neto et al., 2017). When it comes to springback simulation in sheet metal forming, several factors significantly influence the accuracy of the results.

To optimize springback simulation, it is important to carefully select appropriate values for

these factors. The damping value at the nodes should be neither too large nor too small, and often a preliminary simulation is necessary to determine the suitable damping value (Wang et al., 2017).

- The size of the blank sheet elements is another crucial consideration.
- To ensure reliable results, the punch velocity should not exceed 1m/s^2 . Adhering to this limit helps maintain the accuracy and stability of the simulation.

When dealing with drawbeads, which are typically much smaller in size compared to the rest of the die surface, a different approach is required. Modeling the sheet metal's bending deformation around the drawbeads using very small elements is necessary to capture this effect. However, employing such small elements results in an increased number of elements and contact segments, leading to a decrease in the minimum time step and significantly longer computation times (Sumathi, & Mohan, 2019). To overcome this issue and save computational resources, an equivalent drawbead model has been developed. This model replaces the full-scale physical modeling of the drawbead in the finite element simulation, enabling efficient and time-saving computations (Mohd and Ishak, 2015).

Furthermore, the use of equivalent drawbead models offers a practical solution to reduce computation time without compromising the representation of the bending deformation around the drawbeads. These advancements contribute to the overall efficiency and effectiveness of numerical simulations in product design and manufacturing processes.

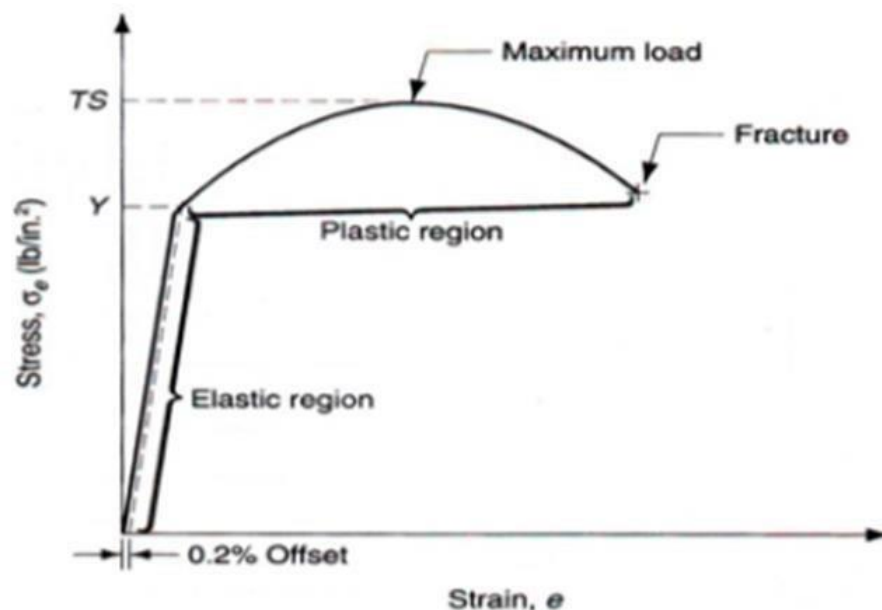


Figure-1.1. Engineering stress strain curve (Koniki, and Ravi Prasad, 2019)

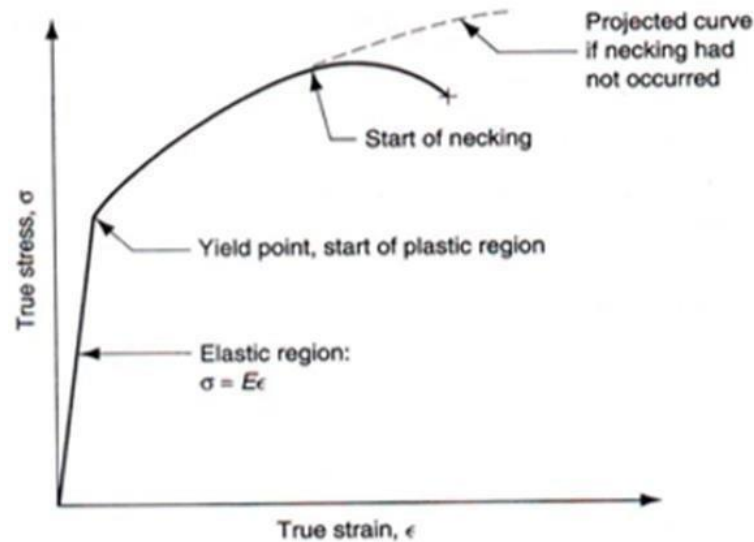


Figure-1.2 True stress strain curve (Moradi, Bagherie, & Esfahani, 2016).

Problem statement

Springback in sheet metal forming leads to inaccurate part geometry and difficulties during assembly. Introducing drawbeads is a method to minimize springback, but the mechanism and influence of drawbead geometries need to be explored further.

Objectives of this study

- Investigate the impact of different drawbead shapes on springback.
- Determine most effective drawbead geometry for reducing springback.
- Gain insights into the springback process through visual simulation using Abaqus software

Study's Scope

This research emphasizes on simulating springback in different drawbead shapes for 1mm mild steel sheet metal. The simulation results will provide a benchmark for two-dimensional analysis and help select the most effective drawbead geometry for reducing springback.

Methodology

The project involves four major steps: preprocessing, forming simulation, springback simulation, and springback measurement. Preprocessing includes creating the physical model of the die set using MSC.Patran software. The forming and springback simulations are conducted using Abaqus/Explicit, which employs an explicit dynamic finite element formulation (**Ghaei, 2012**). Finally, springback measurements are performed by analyzing the angle changes in the blank before and after Springback using Abaqus/Explicit.

Forming Simulation Process

The research study utilizes ABAQUS/Explicit, a specialized software for highly nonlinear problems in forming simulations. The process involves importing the results from MSC/Patran and conducting a two-step analysis. In the first step, symmetry boundary conditions are applied to the blank, and the blank holder force is gradually increased using a smooth step definition to minimize inertia effects. In the second step, the punch is moved downward by 30 mm with a prescribed velocity using a triangular smooth step amplitude function. The analysis run time varies depending on the complexity of the problem and the computational power available. At the end of the analysis, the deformed geometry and residual stress state are obtained.

Results and Discussion: -

The simulation results for mild steel as given in the table 1 shows that the triangular drawbead geometry provides the closest approximation to the blank sheet before springback.

Table -1. Simulation results for mild steel

| Blankholder | Before Springback (θ) | | After Springback (θ) | |
|------------------|--------------------------------|------------|-------------------------------|-------------|
| | θ_1 | θ_2 | $\theta' 1$ | $\theta' 2$ |
| Without drawbead | 91.00 | 81.20 | 92.70 | 87.00 |
| Circular | 89.37 | 85.06 | 91.00 | 90.90 |
| Rectangular | 89.37 | 86.39 | 90.30 | 89.40 |
| Triangular | 91.37 | 87.10 | 90.50 | 89.94 |

It produces a more sufficient restraining force, resulting in effective springback reduction compared to other drawbead geometries shown in Figure 1.3. The drawbead plays a crucial role in sheet metal forming by allowing the material to flow more freely. In particular, the sharp shape of a triangle drawbead significantly affects the metal flow and reduces Springback. This is due to the draw bead's ability to effectively hold the blank sheet within the die cavity. The force exerted by the holder is concentrated in small areas and acts in one direction. On the other hand, when using a blank holder without a drawbead or with circular and rectangular draw beads, the metal flow occurs more freely. This is because these shapes

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

provide a larger area for the metal to flow. The force applied by the holder is distributed more uniformly across the entire area. By controlling the shape of the drawbead, manufacturers can influence the material flow during the forming process.

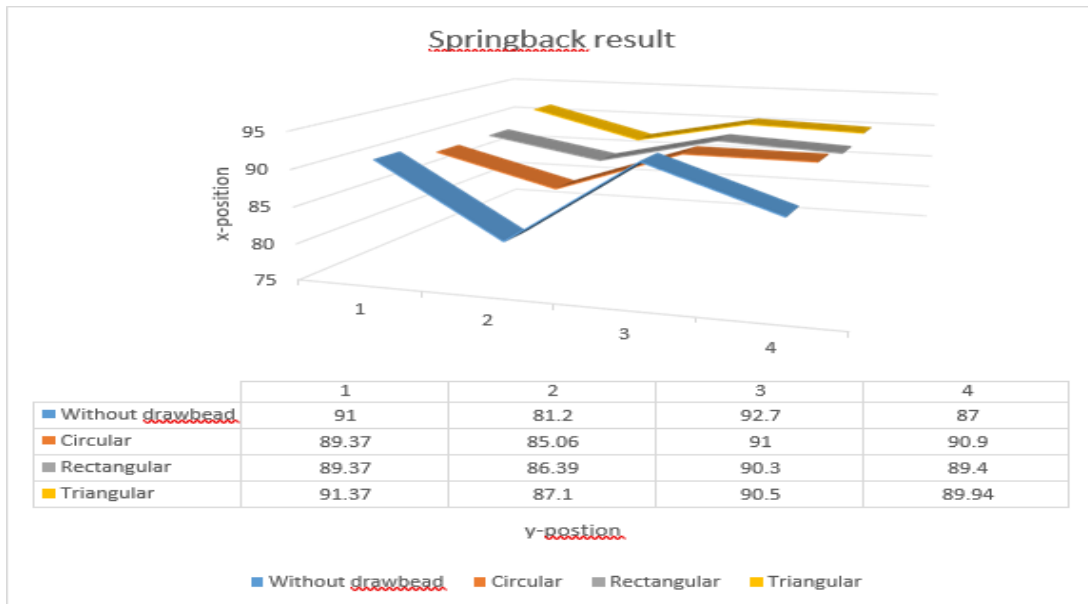


Figure-1.3 Four different drawbead configurations were evaluated to assess their impact on springback in mild steel

The sharp triangle drawbead shape restricts the flow and leads to reduced springback, while other shapes allow for freer flow and potentially different springback characteristics. Properly selecting the drawbead shape based on the desired outcome can help optimize the forming process and improve the overall quality of the final product.

Key findings from the research include:

- The sharp shape of the triangular drawbead geometry is more effective in reducing springback compared to other geometries.
- The material properties of the blank sheet, particularly its softness, influence the occurrence of springback. Material selection is a significant concern for forming simulations.
- Thicker blank thickness can contribute to more effective springback reduction compared to thinner blanks.
- The simulation results show a relatively small percentage error compared to experimental data, validating the use of simulations for springback prediction.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Conclusion:

In conclusion, this research study confirms that drawbeads are an effective solution for minimizing springback in sheet metal forming. Among the different drawbead geometries investigated, the triangular drawbead demonstrates the best results. Its sharp shape allows for better control of material flow, creating a sufficient restraining force on the blank sheet. This results in a reduced rate and volume of material entering the die cavity, effectively reducing springback. Conversely, larger drawbead geometries such as rectangular and circular allow for freer material flow and less effective springback reduction.

- Conduct three-dimensional simulations to better represent the actual parts produced in industries, as they are typically three-dimensional in nature.
- Expand the range of drawbead geometries investigated to explore more effective options for minimizing springback.

By implementing these recommendations, further advancements can be made in optimizing drawbead design and reducing springback in sheet metal forming processes.

Reference

- [1].Maia, A., Ferreira, E., Oliveira, M.C., Menezes, L.F. and Andrade-Campos, A., 2017. Numerical optimization strategies for springback compensation in sheet metal forming. In Computational methods and production engineering (pp. 51-82). Woodhead Publishing.
- [2]. Neto, D.M., Oliveira, M.C., Santos, A.D., Alves, J.L. and Menezes, L.F., 2017. Influence of boundary conditions on the prediction of springback and wrinkling in sheet metal forming. International Journal of Mechanical Sciences, 122, pp.244-254.
- [3]. Wang, Z., Zhang, Q., Liu, Y. and Zhang, Z., 2017. A robust and accurate geometric model for automated design of drawbeads in sheet metal forming. Computer-Aided Design, 92, pp.42-57.
- [4]. Mohd, N. and Ishak, A.S., 2015. Thermodynamic study of corrosion inhibition of mild steel in corrosive medium by Piper nigrum extract. Indian Journal of Science and Technology, 8(17), p.1.
- [5]. Koniki, S. and Ravi Prasad, D., 2019. Mechanical properties and constitutive stress–strain behaviour of steel fiber reinforced concrete under uni-axial stresses. Journal of Building Pathology and Rehabilitation, 4, pp.1-8.
- [6]. Sumathi, A., & Mohan, K. S. R. (2019). Effect of steel fiber on structural characteristics of high-strength concrete. Iranian Journal of Science and Technology, Transactions of Civil Engineering, 43, 117-130.
- [7]. Moradi, M., BAGHERIE, A., & Esfahani, M. R. (2016). Relationship of tensile strength of steel fiber reinforced concrete based on genetic programming.
- [8]. Ghaei, A. (2012). Numerical simulation of springback using an extended return mapping algorithm considering strain dependency of elastic modulus. International Journal of

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

Mechanical Sciences, 65(1), 38-47.

[9]. Trzepiecinski, T., & Lemu, H. G. (2017). Effect of computational parameters on springback prediction by numerical simulation. *Metals*, 7(9), 380.

[10]. Soualem, A., & Hakimi, S. (2018). Experimental Study and Prediction of the Springback under Heat Treatments for Anisotropic Sheet. *Experimental Techniques*, 42(3), 253-260.

A Critical Review for Job Opportunities and Challenges in Cloud Computing

Neetu Amlani
S.S. Maniar College
Nagpur

Dr. Swapnil Deshpande
S.S. Maniar College
Nagpur

Abstract

Cloud Computing is an enormously growing field which provides computing services over the internet like servers, storage, networking, analytics etc. With the trend of shifting from traditional methods to adoption of the latest technology, numerous career opportunities have arisen. There are several areas like Engineering, Security, Architecture, Management etc. which contribute to job prospects there by increasing the employability scale. Present paper is a review exploring the career development prospects provided by Cloud Computing across different domains.

Keywords: Cloud Computing, Services, Career Opportunities, Job roles.

Introduction

Cloud Computing offers flexible resources which include software, platform or infrastructure in the form of services on the basis of payment as per the usage. With increasing demand for this

field, cloud computing has revolutionized the ICT industry too [1]. In the field of Business, cloud computing helps in improving the efficacy of the business and also encouraging new transformations in the business. Because of its benefits like scalability, unlimited storage, anytime accessibility cloud computing is being rapidly adopted by business owners [2]. Real World Applications of cloud computing are E-commerce, Big Data Analytics, software development and IOTs. Cryptography technology also implements Cloud Computing. Prerequisites for logging in to a cloud computing services are obtainability, unification and confidentiality. Job prospects are titled as Cryptography Security and Research Consultant, Client software Engineer etc.[16].

One of the main aims of Cloud Computing is to utilise the distributed resources in a much better way and also to resolve extensive computational issues. Resources are shared among the swarm that can access the applications as well as data from everywhere [8]. Cloud

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

computing is a system with spectacular properties. In order to gain maximum potential from this field, these properties must be known to the masses. Lack of awareness about the benefits and skills required for usage of cloud computing created hurdles for widespread of this technology.[9]Not only existing entrepreneurs but also new upcoming entrepreneurs with small and medium startups also use cloud computing because of its advantages. Thus employing people as data analyzers, cloud security Engineers, Infrastructure Engineers etc.Cloud computing features efforts and cloud management which provides quick services [13]. Cloud computing offers an accessible platform for cyber threats and ML applications, thereby promoting the organizations to create and deploy the technologies easily and at low costs.[15] Organizations can train potential employees for the same and can set internships for spreading the awareness about job prospects in this field.

Literature Review:

Cloud computing is a new innovation in hosting and providing services on the Internet. Cloud computing is attractive to business owners because it eliminates the need for customers to plan and allows

organizations to start small and scale only when demand for the service increases. Cloud computing has more opportunities in IT industry and there are still many challenges to be solved.

This survey covers the cloud computing environment. In this survey paper we only considered literature from last six-year. Figure 1 shows the workflow for selection of papers. First shortlisted the papers which comes under the considered categories then after select papers that are most relevant to theme of this review.

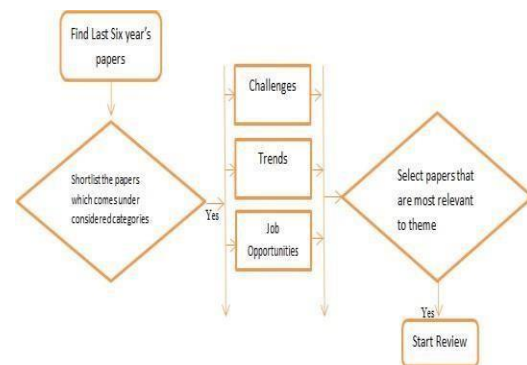


Fig 1: Paper selection workflow

Stephen et.al.[1] describes about cloud computing as well as its opportunities and challenges in various fields such as healthcare, education and business.

Amanpreet Kaur et.al.[2] focuses on various aspects of cloud computing and the overall management of the cloud in an efficient, reliable and sustainable way. They

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

recognize different opportunities, identify research challenges and present future research in cloud computing. They also investigate energy related issues, in cloud computing environments. Various algorithms used in energy saving technologies in cloud data centres are analysed.

Amir Taherkordi et.al.[] present about cloud computing its related subfields and introduce the problems and future research directions in each field. Provide broader understanding of cloud computing design issues, energy consumption. Also discusses about challenges and directions for future research.

Hazzaa N. Alshareef[] provides an overview of cloud computing, its advantages, current developments, challenges and future trends. Also discusses cloud computing architecture, service model, service selection, resource usage and cloud based resource planning. Also discusses the problems or challenges in cloud computing such as data security, security breaches, and load balancing. Many methods have been put forward, discussed and analysed to solve these problems.

Rafia Islam et.al.[] provide a better understanding basic concepts of cloud

computing and present relevant research in this growing field, architectural standard, applications and research problems. Also share benefits and future challenges of cloud computing.

SirajMunir et.al.[] examines five key aspects of cloud computing, including load balancing, resource scheduling, resource allocation, resource sharing and scheduling. A brief comparison of current challenges and methods for load balancing and future needs are also discussed. This paper also provides detailed information about planning issues, detailed analysis and comparison of resource planning methods and resource allocation strategies.

Methodology

This review aims to explore the new career opportunities offered by the field of cloud computing. For this Review, several research papers on cloud computing have been studied and analysed

1. Concept of Cloud Computing:
With the spread of digitalization, cloud computing has come up as a keystone of modern IT infrastructure. Cloud computing provides flexible and cost-effective solutions for storing, handling, processing and accessing data. There are five types of

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

clouds are Public, Private, Hybrid, community and Multi cloud.

2. Architecture of Cloud Computing: The architecture of cloud computing is categorised into the following two parts-

i. FrontEnd

ii. BackEnd

i. **FrontEnd:** It refers to the client-side or client-end of Cloud Computing system which includes all applications and user interfaces required to use the cloud computing resources or services.

ii. **BackEnd:** It means the cloud itself which contains the resources or services along with large storage, network traffic control mechanism, virtual machines and last but not the least deployment models.

➤ Services offered by the cloud can be categorised as follows-

a. IaaS (Infrastructure as a Service):

Also referred as Hardware as a service. It delivers massive computing resources like storage capacity, processing and network. Reliability, security and payment as per the usage are the crucial benefits of this service. E.g. Amazon EC2.

b. PaaS (Platform as a Service): This service provides API i.e. Application

Program Interface for the cloud. This service provides an environment which is as demanded by the user for developing, testing, delivering and managing the software applications. E.g. Google App Engine.

c. SaaS (Software as a Service): It offers the service which is directly used by the end-user. SaaS is software deployed over the Net. This service aims to replace applications running on a Personal Computer. Major advantage of this service is pay as you go. E.g. Salesforce.com

➤ **Runtime Cloud** - This cloud takes care of the execution and the Runtime environment for the Virtual machine.

➤ **Storage** - The backend also offers flexible and extensible storage along with management of the data stored.

➤ **Security**- Backend security implies application of several security mechanisms for achieving the security of cloud resources as well as system, data and infrastructure.

➤ **Database**- Backend offers a database for storing the structured data. For example Google Cloud SQL, Amazon RDS etc.

➤ **Network**- This provides the networking infrastructure which is

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

required for implementation of the cloud.

For E.g. DNS, VPN etc.

➤ **Analytics-** This offers analytical tools for the data stored on the cloud. This may include warehousing, machine learning etc.

3. Advantages of Cloud Computing

Few advantages of cloud computing are:

- Data security- Cloud protects the data stored on the cloud from data theft, unauthorized access.
- Rapid Application deployment – Cloud computing helps development of new applications with quick deployment.
- Cost saving- As the need for expensive hardware, software and maintenance is reduced, cloud computing saves the cost.
- Ease of Access from anywhere – Cloud computing provides data access from anywhere and anytime.

Disaster Recovery- Cloud provides backup and recovery and therefore ensures complete data recovery in no time.

- Higher Performance – Data centres are updated with latest high-performance technologies which

enable better connectivity and high performance.

4. Work associated with Cloud Computing

As per a report submitted by NASSCOM (National Association of Software and Service Companies), by 2025, the demands for cloud computing skills are anticipated to bloom in Indian IT industry. The field of cloud computing will create more than 2.5 million jobs in India.

In this digitized era, every entrepreneur is trying to shift to cloud from the traditional methods. This field of cloud computing offers services to enormous fields which include business, education, management, technology etc. Proliferation of services offered by the cloud has boosted the human-computer interaction.

Present scenario is shown in the following figure.

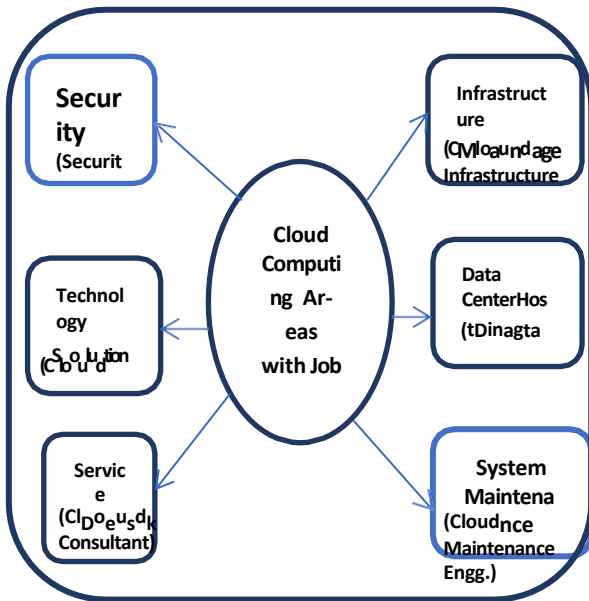


Fig. 2: Cloud Computing Areas with Job Roles

Cloud Computing unwraps abundant prospects across many domains.

Following are the domains with job roles offered by cloud computing:

1. Security: Cloud Security reflects the policies of cyber security, the best practices and controls which are followed to secure the applications, infrastructure and data in cloud environment. Cloud security aims to provide network as well as storage protection against access management, internal and external threats etc. In the area of Security, enduring the cloud security is the crucial task. Also maintaining the compliance standards is covered under this head. The Job titled “Cloud Security Engineer” is responsible for this said task.

2. Technology Solutions: For providing the solutions at technological end, the job role “Cloud Architect” is designated. Cloud Architect is responsible for designing and implementing the cloud solutions and services.

3. Service Desk: Service desk a communication centre which provides a single point of contact between companies or an organization and its customers or end- users. This generates a job titled “Cloud Consultant” who advises the clients on different cloud strategies and best practices.

4. Infrastructure Management: Cloud infrastructure management works like a command Center for cloud environments. For the management of infrastructure of the cloud, CIE is the job designation. “**Cloud Infrastructure Engineer**” builds and maintains the cloud infrastructure and network.

5. Data Centre Hosting: Data Centre is a repository that hosts computing facilities. Data centre hosting is the method of deploying and hosting a data centre on external service provider’s organization. “**Data Engineer**” is the job profile which is responsible for hosting a data centre.

6. **System Maintenance:** The process of maintaining, control and oversight of cloud computing structure, resources and services in Private, Public and Hybrid cloud environments is called Cloud Management. **Cloud Maintenance Engineer** along with the Maintenance Staff develops and implements new strategies for enhancing the system performance and maintenance.

Other opportunities are:

7. **DevOps Cloud Engineer:** A cloud DevOps engineer is proficient in developing and operating cloud based applications and services.

8. **Full Stack Developer:** A full stack developer develops both front-end and back-end applications by using the cloud framework.

The management and utilization of computing resources by the organizations has been transformed by cloud computing, which has increased the need for qualified experts to handle its complexity. To improve user experience and manage upcoming issues, there is an increasing need for personnel with cloud computing competence in addition to technical expertise.

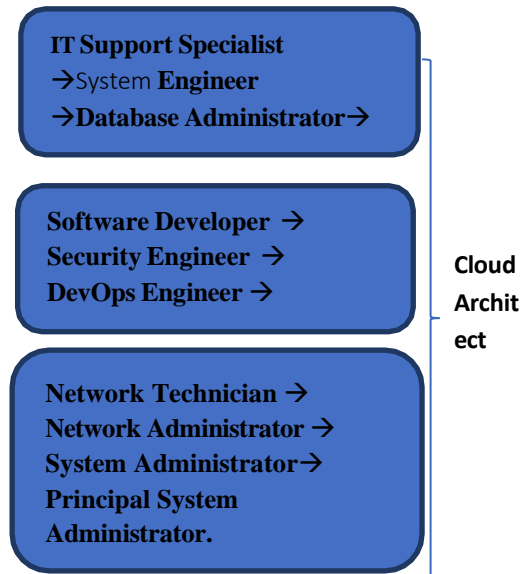


Fig. 3. Job Roles to become Cloud Architect

Fig. 3. Shows how IT support specialist , software developers , Network Technicians can reach the position of Cloud Architect by escalating stepwise.

Additional skills required for professionals in field of Cloud are:

1. Expertise the cloud service platform.
2. Knowledge of Programming Languages.
3. Good Command over APIs.
4. Database Management
5. Network Management
6. Fundamentals of Machine Learning
7. Basics of Artificial Intelligence
8. Cloud Security

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Fig.4. Shows the in-demand skills for jobs in the field of cloud computing.

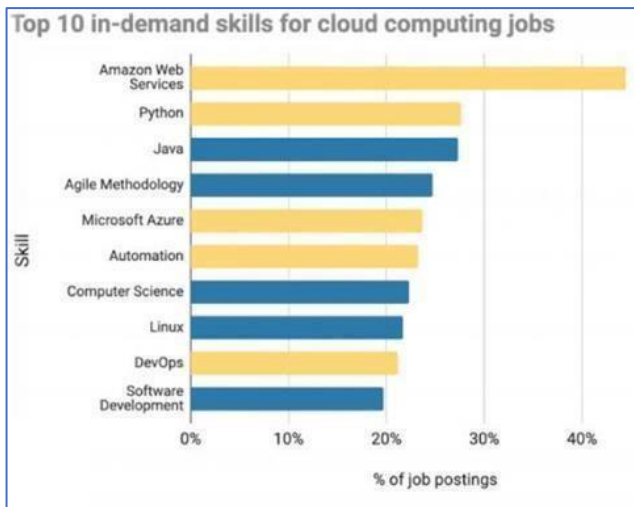


Fig.4: In-Demand Skills for Cloud Computing jobs.(KnowledgeHut)

This shows percentage of job postings Vs Skills. As the skills escalate the job postings show remarkable hike.

Conclusion

In this digitalized era, cloud computing has embraced almost all fields because of its services and ease of use and all time availability. Thus cloud computing unwraps the potential employability. In near future the field of cloud computing is expected to gain deep grounds and thereby offer more job prospects for skilled professionals. To spread the awareness among the budding IT experts, knowledge of cloud computing must be introduced

at early stage in the education system at Secondary School Level. Then interested candidates can adopt proper skill channels to enter this field to contribute as potential employees.

Challenges in Job opportunities in Cloud Computing

Working with the cloud can be time consuming due to its complexity and great demand for research. It calls for great deal of subject-matter, knowledge and proficiency. Despite of large number of experts in this sector, many positions are still vacant as there aren't many skilled cloud engineers, developers and other specialists. Up-skilling is required for the experts to actively comprehend and administer and develop cloud based applications with fewest possible problems and highest possible reliability.

Acknowledgment

This review and the research behind it would not have been possible without the exceptional support of Dr. Maneesh Deshpande. His generosity and expertise comments improved this study in innumerable ways and saved us from many blunders; those that inevitably remain are entirely our responsibilities. We are also grateful to our Head of the Department,

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

M.Sc. IT, Dr. Diwakar Tripathi, for his kind support, guidance and co-operation throughout the work.

References

1. AmanpreetKaur, V.P. Singh, Sukhpal Singh Gill, "The Future of Cloud Computing: Opportunities, Challenges and Research Trends", 2nd International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud), DOI: 10.1109/I-SMAC.2018.8653731, 2018.
2. Amir Taherkordi, FerozZahid, YiannisVerginadis, and Geir Horn, "Future Cloud Systems Design: Challenges and Research Directions", IEEE Access, Volume: 6, DOI: 10.1109/ACCESS.2018.2883149, pp. 74120 – 74150, November 2018.
3. Stephen, A. Arul Anitha, L. Arockiam, "Cloud Computing: Opportunities and Challenges", ReTeLL, Vol. 21, June 2019.
4. Blesson Varghese, RajkumarBuyya, "Next Generation Cloud Computing: New Trends and Research Directions", Future Generation Computer Systems, doi.org/10.1016/j.future.2017.09.020, Volume 79, Part 3, pp. 849-861, February 2018.
5. Colin Ting Si Xue, Felicia Tiong Wee Xin, "Benefits and Challenges of the Adoption of Cloud Computing in Business", International Journal on Cloud Computing: Services and Architecture (IJCCSA) Vol. 6, No. 6, December 2016.
6. DibyenduMahato, Dr. Ajay Jain, "Discussing the Challenges and Future Trends of Cloud Computing", International Journal of Mechanical Engineering, DOI: <https://doi.org/10.56452/7-12-34>, Vol. 7 No. 12, December 2022.
7. Hazzaa N. Alshareef, "Current Development, Challenges and Future Trends in Cloud Computing: A Survey", (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 14, No. 3, 2023.
8. Matthew N.O. Sadiku, Sarhan M. Musa, and OMonowo d. Momoh, "Cloud computing: Opportunities and challenges", IEEE Potentials, Volume: 33, Issue: 1, pp. 34 - 36 Jan.-Feb. 2014.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

9. MajedBalkhi, "Opportunities of Cloud Computing", International Journal of Innovation and Scientific Research, Vol. 4 No. 1, pp. 33-41, Jul. 2014.
10. MbasajoaquimMolo, Joke A. Badejo, EmmanueAdetiba, Vingi Patrick Nzanzu, EtinosaNoma-Osaghae, "A Review of Evolutionary Trends in Cloud Computing and Applications to the Healthcare Ecosystem", Applied Computational Intelligence and Soft Computing, Article ID 1843671,doi.org/10.1155/2021/1843671, 2021.
11. Nasser Taleb, Elfadil A. Mohamed, "Cloud Computing Trends: A Literature Review", Academic Journal of Interdisciplinary Studies, Doi: 10.36941/ajis-2020-0008, Vol 9 No 1, January 2020.
12. OzcanOzyurt, Fatih Gurcan, Gonca Gokce Menekse Dalverenand Mohammad Derawi, "Career in Cloud Computing: Exploratory Analysis of In-Demand Competency Areas and Skill Sets", Applied Sciences,https://doi.org/10.3390/ap12199787, volume 12, Issue 19,2022.
13. Prantosh Kumar Paul, Mrinal K. Ghose, "Cloud Computing: Possibilities, Challenges and Opportunities with Special Reference to its Emerging Need in the Academic and Working Area of Information Science", Procedia Engineering, Volume 38, pp. 2222-2227, 2012.
14. Prince Kwame Senyo, Erasmus Adade, Richard Boateng, "Cloud Computing Research: A Review of Research Themes, Frameworks, Methods and Future Research Directions", International Journal of Information Management, Volume 38, Issue 1, pp. 128-139, February 2018,
15. Rafia Islam, Vishnu Vardhan Patamsetti, Aparna Gadhi, Ragha Madhavi Gondu, Chinna Manikanta Bandaru, Sai Chaitanya Kesani, Olatunde Abiona, "The Future of Cloud Computing: Benefits and Challenges", Int. J. Communications, Network and System Sciences, doi.org/10.4236/ijcns.2023.164004, 2023.
16. Sameer A. Nooh, "Cloud Cryptography: User End

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

- Encryption”, International Conference on Computing and Information Technology, Volume: 01, Issue: ICCIT- 1441, pp. 397 - 400, 9th & 10th Sep. 2020.
17. Seema Pathak, Anil Kumar Tiwari, Khirodra Bhoi, “Cloud Computing: New Trends and Research challenges”, Research Journal of Engineering and Technology, DOI: 10.5958/2321-581X.2020.00013.6, Vol 11, issue 2, April- June, 2020.
18. Siraj Munir, Syed Imran Jam, “Current trends in cloud computing”, Indian Journal of Science and Technology, doi.org/10.17485/IJST/v13i24.358, 13(24): pp. 2418-2435, 2020.
19. Jamsheela O., Mohd Abdul Hameed, “Recent Trends in Cloud Computing”, International Journal of Computer Sciences and Engineering, vol.7, issue5, doi.org/10.26438/ijcse/v7i5.1846 1851, pp.1846-1851, May 2019
- *****

IMPACT OF BENGALI LITERATURE IN INDIAN CINEMA

Partha Das

Research Scholar Ben-
goli

Abstract

This study explores the mutually beneficial relationship that exists between Bengali literature and film, following the development of these mediums from the early 20th century to the present. The investigation covers the difficulties of recording Bengali cinema's past, the cohabitation of commercial and artistic productions, and the complex legacy of writers like as Tagore and Chatterji. The paper used scholarly works to traverse Gooptu's alternative interpretation of Bengali film, Chatterjee's examination of transcultural influences, and Raju's research on the international cooperation within the business. The impact of Tollywood, or Bollywood, on society is delineated, and the influence of Bengali literature on Bollywood—as demonstrated by the adaptations of famous works—is examined. Bengal's rich cultural legacy is shaped and reflected by the dynamic interplay between literature and cinema, which is the overall focus of the paper. The criticism of Bollywood's distortion emphasizes the need for realistic portrayals.

Keywords: Bengali Literature, Indian Cinema, Tollywood, Satyajit Ray, Rabindranath Tagore, Bollywood.

1. INTRODUCTION

Bengali words for "film" are frequently *boi*, which in a real sense means "book." While most of more youthful Bengalis utilize the expressions "cinema" and "film" routinely, "book" is as yet inseparable from "film" among the senior age. The way that the expressions "film" and "book" are utilized reciprocally features the critical impact that Bengali fiction from the nineteenth and twentieth hundreds of years has had on Bengali filmmaking in the current day.

Bengali culture regularly involves film as a "text" for analysis. Bengali works of art being adjusted for the big screen regularly modify accounts to address significant worries confronting Bengali and Indian culture today. Inferable from the educated Bengali moviegoer's obligation to the idea of "message," it is generally normal to hear benefactors of a performance center whining that the content has distorted the soul of the "book."

Famous movies are not quite as regarded as literature by the by and large educated Bengali public. As a rule, contemporary Bengali cinema can be isolated into two classifications: workmanship films and famous/business films. Fruitful screenplays are every now and again propelled by the "incredible books" of Bengali literature. Bengali cinema, similar to all Indian

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

cinema, shows a reasonable distinction between the overall type of famous and workmanship films, regardless of whether the two classifications unreservedly incorporate notable scholarly works. Business Bengali movies created in Calcutta and by far most of business Hindi movies delivered in Bombay contrast fundamentally in how orientation jobs are depicted and in Bengali movies' overall eschewment of realistic sex and fierce scenes. In any case, the Bombay equations have acquired more noteworthy influence over all territorial Indian movies during the 1990s.

Bengali business and workmanship films have much of the time, but in different ways, drawn motivation from the works of art of the class' literature. The works of art give business producers trustworthy, great plots and, thus, huge monetary possibilities. Business films tend to demolish character improvement, imagery, and visual symbolism in their screenplays of notable Bengali literature by over and over projecting the famous early show icons of Calcutta in the featuring jobs, a strategy used to guarantee film industry achievement.

2. LITERATURE REVIEW

Gooptu, S. (2010) guaranteed that a reasonable history of Bengali cinema offers an option in contrast to the current perspective on Hindi cinema as the "Indian" or "public" cinema. It says that Bengali cinema's set of experiences features the seriously challenged region of "public" cinema and the development of a "elective fanciful." The creator contends that Bengali cinema arose as a public space that laid out a conclusive talk of contrast concerning the "all-India" Hindi film, prominently known as Bollywood, and pre-empted its subsumption into Bombay Hindi cinema. It is the primary complete history of Bengali cinema and a significant expansion to Film and Social Investigations and South Asian Examinations.

Chatterjee (2022) analyzed the transcultural and transhistorical effect of the Victorian novel on the way of life, legislative issues, and narrating customs of journalists, specialists, and erudite people in postcolonial Bengal, India, and inquires: for what reason would it be a good idea for someone from contemporary South Asia, such a long ways from Victorian Britain in space, time, and culture, care about its literature? The venture analyzes how the English- instructed Bengali working class of India has generally consumed and indigenized the figures of speech, characters, and reformist liberal ethos from Charles Dickens, George Eliot, Elizabeth Gaskell, and Anthony Trollope into their own Bengali books and mainstream society north of 150 years, from the mid 1800s to the 1960s.

Bose, B., and Chakravarty, P. (2012) investigated current metropolitan Bengali film and planned and historicized the primary examples corresponding to city legislative issues. The article probably looks to exhibit the fundamental patterns in metropolitan Bengali film- production present 1990s and on mindfully concentrate on two contemporary Bengali movies to plan this novelty. The article initially investigates three new Bengali cinema prospects: internal looking, frequently objective draws that celebrate liberal turn of events and psychosomatic guilty pleasures; wistful, local area based films that occasionally accept political changes and attempt to connect the provincial metropolitan gap; and religion ish movies of a

more up to date family that show eagerness with old Left and moderate qualities and are in fact exploratory. Second, the article examines two contemporary movie producers, Moinak Biswas and Suman Mukhopadhyay, and places their works in this age.

Raju, Z. H. (2023) inspected the development and change of Kolkata and Dhaka's enthusiastic Bengali cinema enterprises. Hiralal Sen's moving scenes from 'The Bloom of Persia,' shot in Kolkata in 1898, are viewed as the main Bengali-Indian cinema. The entertainment world in the two Bengals has gone through various progressive phases starting from the primary film, including indigenization, improvement, and solidification, until the globalization stage started in 2010. From indigenization to globalization, the movie business has created numerous incredible movies and striking chiefs who have investigated various issues. The part finds that Bengali films from the two Bengals are currently cooperating as a transnational screen media area to target overall crowds in spite of their seriousness.

3. SATYAJIT RAY AND THE BENGALI ART CINEMA

The supposed workmanship cinema of Satyajit Ray, Mrinal Sen, and Ritwik Ghatak (which presently incorporates Gautam Ghosh, Buddhadeb Dasgupta, Aparna Sen, and Utpalendu Chakravarty) has been significantly more extremist in its social and political scrutinize than Bengali business cinema, which has kept on producing lukewarm variations of notable books. It is now and again neglected that these movie producers base large numbers of their movies on abstract materials. Satyajit Ray (1921-92), the most outstanding figure on this rundown, has over and over adjusted brief tales, novellas, and books to film, representing the "other" Bengali inclination.

Ray was naturally introduced to a moderate, change disapproved of group of artists, scholars, and specialists with solid connections to the Bengali Renaissance. His folks had a print machine and a kids' magazine, which Ray resuscitated in 1961, the year he turned into a well-known youthful essayist. Ray picked *Pather Panchali* by Bibhutibhusan Bandopadhyay for his presentation film and made three more in light of it. Tagore was one more essayist Ray respected all through his life. *Charulata*, *Youngster Kanya*, and *GhareBaire* are Tagore-propelled. Ray gave Prabhat Mukhopadhyay the story thought, connecting himself to Tagore. In the politically charged late 1960s and mid-1970s, Ray adjusted Sunil Ganguly's *Aranyer Rakti* and *Pratidwandi*, which veered off enormously from Bandopadhyay and Tagore's liberal humanist work. In Calcutta's metropolitan wilderness, his legends are young fellows captured in a futile daily existence, attempting to maintain their convictions notwithstanding selling out and think twice about. Since these three writers inspired Ray's important and diverse films, it would be beneficial to study *Pather Panchali*, *Charulata*, and *Pratidwandi* to examine his cinematic manipulation of the written word. First, Ray's thoughts on text-film relationships must be examined.

4. BENGALI CLASSICAL LITERATURE IN BOLLYWOOD FILMS

In the 18th and 19th centuries, Bengal produced intellectuals in academia, politics, music, literature, social science, and more. Raja Ram Mohan Roy and Vidhyasagar fostered societal

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

awakening by banning wicked rituals like Sati and creating contemporary laws with the support of the British government, such as the Widow Remarriage Act. In his Chicago Conference, Swami Vivekananda reinterpreted Hinduism and quoted Sri Ramakrishna denouncing materialist thought. One of India's most energetic liberation fighters was Netaji Subhas Chandra Bose.

In literature, Bengali legends have had the greatest impact on film, even 50 years after their creation. Bankim Chandra Chatterji, known as the Monarch of Literature, nurtured Bengali from its Sanskrit-oriented origins like Lord Mahadeva brought the Ganges from his knotted hair (jata) and wrote classic novels like *Kapalkundala*, *Anandamath*, *Devichowdhurani*, and others. His song *Vandemataram* inspired patriotism and affection for the motherland and formed the basis of India's freedom movement and national anthem after independence. “*Anandamath*” was adapted into a 1950 Bollywood film starring Pradeep Kumar, Bharat Bhushan, and Prithviraj Kapoor.

In 1913, Nobel Prize-winning writer Rabindranath Tagore inspired creativity with his short tales, poetry, prose, dramas, songs, and revolutionary ideas in Bengali and Hindi films. In 1957, Tapan Sinha directed *Kabuliwala*, starring Chabi Biswas, the greatest Bengali actor, as an Afghan father who left his country, came to Kolkata to sell his mewa and pesta, and loved a small Bengali girl named "mini" who reminded him of his daughter back home. The everlasting prices of Tagore inspired Tapan Sinha's *Khudito Pashan*, *Atithi*, 1965, Satyajit Ray's *Teen Kanya*, 1961, and *Gharebair*, 1984. Bimal Roy, a multiple Filmfare award-winning director, directed *Kabuliwala* with Balraj Sahani in 1961. The film didn't have the same impact as *Kabuliwala*, but Indians loved the classic literature. In 1953, Salil Chowdhury's *Do Begaana* was a Bollywood film with a superb script and direction.

Sarat Chandra Chatterji, aka *Katha Sahitwik*, inspired Bollywood films the most because his language was accessible to the masses and his observations on rural Bengal's social and economic concerns resonated with readers and filmgoers. In 1955, Bimal Roy's *Devdas* made Dilip Kumar the Tragedy King and cemented his image. Even after 70 years, Sanjay Leela Bansali's version of *Devdas* proves its timeless appeal. Sarat Chandra Chatterji's *Parineeta* was filmed by Bimal Roy in 1953 with Meena Kumari. Pradeep Sarkar recently remade the film, which was favourably received by Indians for its intensity and depth of thought.

5. BENGALI FILM INDUSTRY IMPACTS SOCIETY

West Bengal and the Bengali-speaking community are heavily influenced by Tollywood. The Bengali film industry impacts society in these ways:

- Bengali films reflect cultural values, beliefs, and traditions prevalent in Bengali society, promoting preservation and promotion.
- Bengali films promote and preserve the language, fostering cultural identification among Bengali-speaking individuals.
- Bengali films may educate and raise awareness by addressing societal concerns and

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

conveying vital messages to a broad audience.

- Bengali films offer enjoyment and escape, relieving stress and enriching lives.
- The Bengali cinema industry is a significant economic contributor to West Bengal, creating jobs and boosting the economy through production and distribution. Throughout West Bengal and the Bengali-speaking community, the Bengali cinema industry has a lasting impact on culture and society.

6. BENGALI LANGUAGE AND CULTURE AS AESTHETICS IN BOLLYWOOD

Bollywood ignores Bengali culture and language from Devdas to Bulbul on Netflix. It seeks to box West Bengal and its culture in preconceptions imposed by Northern Indian authors, screenwriters, and directors. These representations aim to create a 'other' and appropriate it as the glorious and convenient past for the Indian nation-state by shifting political, economic, and cultural focus from Bengal and Kolkata to the Hindi belt, with Delhi as the epicentre. Thus, a false Bengali culture that is similar yet different is constructed to accommodate the Indian state's political and cultural prejudice. Stuart Hall's "Cultural Identity and Diaspora" theory says representation creates identity. Hall says, "Perhaps instead of thinking of identity as an already accomplished fact, which the new cultural practices then represent, we should think instead of identity as a 'production', which is never complete, always in the process, and always constituted within and not outside, representation". 'Indianization' of Bengali culture is perpetuated by these movie representations. Thus, localised cultural differences are removed to offer the spectator a sense of familiarity, recognition, and attenuated exotica. Through cinema, the Hindi belt understands modern Bengal and Kolkata. Mixing north Indian and Bengali cultural elements creates a composite Indian identity that transcends political and cultural sub-national divisions.

The latest film *The Night Manager*, featuring Aditya Roy Kapoor as charming half-Bengali Shaan Sengupta, emphasises his Bengali roots and surname in every scene. He proves his Bengaliness with what? Some Bengali swear phrases might make you giggle! Bollywood's favourite trope for representing Bengal's diverse culture is a pot-bellied middle-aged man who speaks Hindi with a Bengali accent and hurls obscene Bengali cuss words in every scene or a mysterious long black-haired, traditional, doe-eyed beauty who is seductive to the opposite sex. The neglect of Bengal's diverse history and culture is appalling. This "North-Indianification" of a culture that revolutionised Indian academia and culture is ancient. The feminist Web Series *Bulbul*'s colonial Bengal depiction is unpleasant.

7. CONCLUSION

In summary, the complex interrelationship between Bengali literature and film has been crucial in forming the story and character of Bengal's film industry. Bengali cinema has traversed the crosscurrents of cultural, historical, and political shifts, from the radical creativity of filmmakers like Satyajit Ray to the commercial adaptations of great literature. Literary luminaries like Sarat Chandra Chatterji, Bankim Chandra Chatterji, and Rabindranath Tagore have had a significant influence on Bollywood as well as Tollywood's development. Bengali

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

films are a valuable source of cultural values, language promotion, and social awareness; yet, the Bollywood misrepresentations highlight the importance of truthful depictions that honour Bengal's multifaceted culture and rich past. A more complex understanding of this dynamic interaction between literature and film is emerging as academics investigate it more, highlighting the significance of genuine narratives that encapsulate Bengal's literary and cultural legacy.

REFERENCES

1. Bhattacharya, S. (2020). *The action heroes of Bengali cinema: industrial, technological and aesthetic determinants of popular film culture, 1980s–1990s*. In *Popular Cinema in Bengal* (pp. 111-134). Routledge.
2. Bose, B., & Chakravarty, P. (2012). *Kolkata turning: Contemporary urban Bengali cinema, popular cultures and the politics of change*. *Thesis Eleven*, 113(1), 129-140.
3. Chatterjee, S. (2010). *Remapping transitions of Bengali cinema into the 50s*. *Journal of the Moving Image*, 9, 117-146.
4. Chatterjee, S. (2022). *Morality, Modernity, and the Indigenization of the Victorian Novel in Bengali Literature and Cinema*. Ohio University.
5. Gooptu, S. (2010). *Bengali cinema: 'an other nation' (Vol. 34)*. Routledge.
6. Raju, Z. H. (2014). *Bangladesh Cinema and National Identity: In search of the modern?*. Routledge.
7. Raju, Z. H. (2023). *Two Cinemas in Two Bengals: From Indigenization to Globalization of Bengali Film Industries of Bangladesh and West Bengal*. In *Two Bengals: A Comparative Development Narrative of Bangladesh and West Bengal of India* (pp. 305- 330). Singapore: Springer Nature Singapore.
8. Ray, S. (2022). *Contemporary Bengali Cinema*. *A Companion to Indian Cinema*, 260.
9. Scrase, T. J. (2002). *Television, the middle classes and the transformation of cultural identities in West Bengal, India*. *Gazette (Leiden, Netherlands)*, 64(4), 323-342.
10. Sen, P. (2020). *The Literary Poetics of Bengali Cinema (1947–67): History, Sensibility and Cosmopolitan Consciousness (Doctoral dissertation, New York University)*.

INVESTIGATING PROFESSIONAL EDUCATION OPPORTUNITIES FOR INDIA'S SCHEDULED TRIBES

Sandhya Singh

Research Scholar Sociol-
ogy

Abstract

This study looks into the professional education options that India's Scheduled Tribes (STs) have access to, as well as ways to improve their involvement in and access to professional education. One of the main groups of the underprivileged or historically marginalized segments of society are the Scheduled Tribes. Since independence, there have been numerous programs to support formal education, but the Scheduled Tribes' literacy rate has remained low, and their female literacy rate is still lower than the national average. Children from Scheduled Tribes are expected to receive an education, not only as required by the constitution but also as an essential component of the overall development of their communities. In the end, this study adds to the conversation about inclusive education and socioeconomic development by illuminating the challenges and opportunities that India's Scheduled Tribes confront while trying to pursue professional education paths.

Keywords: *Scheduled Tribes, Professional Education, Socio economic development, inclusive education*

1. INTRODUCTION

In India, clans make up 8.14% of the all out populace and have unmistakable societies, lingos, and financial pursuits in various natural settings. They have been a subject of strategy producers since freedom because of their geological segregation, backwardness, modesty of contact, and crude characteristics. They have been alluded to as dasyus, daityas, rakshasas, and nishads in antiquated Indian texts and authentic archives. They are conceptualized as Planned Clans under Article 342 of the Indian Constitution.

Booked Clans are possessed in all states aside from Haryana, Punjab, Chandigarh, and Delhi. They are powerless against social bad form, separation, barbaric concealment, and financial abuse because of their geological confinement. The Public authority of India has made exceptional arrangements for their insurance and advancement, yet these endeavors have neglected to limit the hole between the ancestral and non-ancestral populace. The STs possess the most minimal crosspiece in the instructive stepping stool, with a lower proficiency rate than

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

everyone. Their schooling is additionally dreary, with just 4.3% of the all out understudies enlisted at more significant levels being from the ancestral local area.

- Need will be agreed to opening elementary schools in ancestral regions.
 - There is a need to foster educational programs and devise informative material in ancestral dialects at starting stages with game plans to switchover to provincial dialects
 - Promising Planned clan adolescents will be urged to take up showing in ancestral regions.
 - Ashram Schools/Private Schools will be laid out in a huge scope in ancestral regions.
 - Motivation plans will be formed for Planned Clans, keeping in view their extraordinary requirements and way of life.

2. LITERATURE REVIEW

Dar and Najar's (2018) examined the connection between Indian tribal groups and educational systems, emphasizing the value of encouraging responsible citizenship among tribal populations. They stressed that in order to create inclusive educational interventions, it is essential to comprehend socioeconomic, linguistic, and cultural origins. Additionally, they promoted the inclusion of indigenous knowledge systems in official curriculum to create learning opportunities that are culturally appropriate.

Thamminaina et.al. (2020) systematic review examines the challenges faced by girls from Particularly Vulnerable Tribal Groups (PVTGs) in accessing education, including socio-economic constraints, cultural norms, remoteness, and inadequate infrastructure. It also highlights opportunities and enablers, such as government policies and community initiatives, to improve access and empower girls, guiding future research and policy interventions.

Marchang's (2019) study investigated the economic, occupational, and livelihood changes among Scheduled Tribes in North East India. Through an examination of various socio-economic factors, the author explored how these indigenous communities had experienced shifts in their traditional occupations and livelihood patterns over time. The study likely delved into the impacts of modernization, globalization, and government policies on the livelihood strategies of Scheduled Tribes in the region. By analyzing these changes, likely aimed to provide insights into the socio-economic dynamics affecting indigenous communities and to inform policymakers and stakeholders about the challenges and opportunities faced by Scheduled Tribes in North East India.

Kumar et.al. (2019) conducted a study on vocational training in India, focusing on the determinants of participation and its effects on wages. The research likely explored factors influencing individuals' decisions to engage in vocational training programs in India. Additionally, the authors probably investigated the impact of vocational training on participants' wages, aiming to assess the effectiveness of such programs in enhancing employability and economic outcomes. Through empirical analysis, the study likely provided

insights into the socio-economic dynamics of vocational education and training in India, contributing to the broader discourse on skill development and labor market outcomes in the country.

3. SCHEMES AND PROGRAMS FOR SCHEDULED TRIBES' EDUCATION

National Overseas scholarship scheme for Higher Studies Abroad:The plan, which has been in activity beginning around 1954-55, gives monetary help to chosen ST understudies chasing after higher examinations in Designing, Innovation, and Science fields. It offers four yearly "Section Awards" to ST and PGT competitors, who are getting merit grants for post-graduate investigations, exploration, or preparing abroad. The awards are given straight by the Service through the Indian Mission.

Rajiv Gandhi National Fellowship:The plan, sent off from 2005-2006, offers monetary help to ST understudies for higher examinations like M.Phil and Ph.D. at perceived colleges/organizations, with cooperation rates for Junior Exploration Colleagues and Senior Exploration Colleagues.

Scheme of Top Class Education for ST student:The Service of Ancestral Undertakings presented a Top Class Training grant plot for ST understudies from 2007-2008, planning to urge commendable ST understudies to seek after degree or post-certificate concentrates on in 125 endorsed establishments across the executives, medication, designing, regulation, and business courses.

Vocational Training Centers in Tribal Area:The 1992-93 ST Adolescents Improvement Plan means to upgrade their abilities for different positions and independent work, working on their financial circumstances. The plan gives 100 percent awards to States, UTs, and relationship, with monetary help gave through awards to ancestral examination organizations, research partnerships to understudies, and backing for projects on ancestral issues.

Coaching For Scheduled Tribe Students:The Service of Ancestral Undertakings is supporting a plan with the expectation of complimentary training for Booked Clan (ST) competitors from hindered foundations to work on their odds of coming out on top in serious assessments. The plan covers instructing expenses, month to month allowances, and boarding/dwelling charges for outstation understudies. The monetary standards were modified from 2007-2008.

Strengthening education among Scheduled Tribe girls in low literacy districts:The Service of Ancestral Undertakings' orientation plot plans to increment proficiency rates among ancestral ladies by working with 100 percent enrolment in recognized regions, especially in Naxal impacted regions and regions occupied by Crude Ancestral Gatherings. The plan covers 54 locale in 12 States and 1 Association Region with a 25% or more ancestral populace and female proficiency rate underneath 35% or its part.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Tribal Research Institutes: 14 Ancestral Exploration Organizations in Andhra Pradesh, Assam, Bihar, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, West Bengal, Uttar Pradesh, Manipur, and Tripura give arranging inputs, research, information assortment, and preparing.

Table 1: Rates of ceiling per course

| S. No | Course | Cost of one set (One set for 2 students) |
|-----------|------------------------------|--|
| I | Degree Courses | |
| 1 | Medical | Rs 8000/- |
| 2 | Engineering | Rs 8000/- |
| 3 | Veterinary | Rs 6000/- |
| 4 | Agriculture | Rs 5000/- |
| 5 | Polytechnic | Rs 3000/- |
| II | Post Graduate Courses | |
| 1 | Medical and Engineering | 6000/- |
| 2 | Business Management | |
| 3 | Law | |
| 4 | Bio Science | |

Table 2: Extend Scheduled Tribe Population in India

| Year | Total Population | ST's Population | Percentage |
|------|------------------|-----------------|------------|
| 1981 | 500 | 35 | 7.9 |
| 1991 | 600 | 40 | 7.9 |
| 2001 | 785 | 60 | 8.5 |
| 2011 | 935 | 70 | 9.5 |

The data offered provides an overview that compares the populations of Scheduled Tribes (STs) and the general population in India during four census years: 1981, 1991, 2001, and 2011.

India's total population grew substantially throughout these three decades, rising from 500 million in 1981 to 935 million in 2011. Similar to this, the number of Scheduled Tribes increased with time, from 35 million in 1981 to 70 million in 2011. In spite of this increase, the proportion of STs in the overall population stayed largely stable, ranging from 7.9% to 9.5%. This implies that while the population as a whole and the number of STs both increased over time, the percentage of STs in the overall population was mostly constant. These figures illustrate the importance of Scheduled Tribes in India's demographic landscape and the necessity for focused policies and programs to address their particular socioeconomic problems and advance their welfare and integration into society at large.

3. SUCCESS STORY AND BEST PRACTICES

The publication titled "Success Stories and Best Practices" showcases excellent situations and effective initiatives that have led to enhanced chances for those belonging to India's Scheduled Tribes to participate in professional education. These stories frequently involve activities that were carried out by educational institutions, governmental organizations, non-governmental organizations (NGOs), or efforts that were led by the community. One example of a successful program may be a vocational training program that is designed exclusively for Scheduled Tribes. This program has provided Scheduled Tribes with a large rise in their employability as well as their income levels. An other illustration of this would be a scholarship program that is geared for students from ST groups and offers them financial assistance and support in order to continue higher education in professional domains. Additionally, best practices may include innovative initiatives such as mentorship programs, career counselling services, or partnerships between educational institutions and industry to support internships and job placements for students who are studying science, technology, engineering, and mathematics (ST). Ultimately, these success stories and best practices serve as significant models for replicating and expanding initiatives to improve professional education possibilities for Scheduled Tribes across India. This ultimately contributes to the socio-economic empowerment of Scheduled Tribes and to the creation of inclusive communities.

4. CONCLUSION

The information offered offers a thorough analysis of the population trends of India's Scheduled Tribes (STs) throughout the course of four census years: 1981, 1991, 2001, and 2011. It shows that over this time, both the number of STs and India as a whole have consistently increased. In spite of this increase, the proportion of STs in the total population was mostly same, suggesting that STs have always made up a significant share of the nation's population. These numbers highlight the Scheduled Tribes' continuing significance in India's rich cultural mosaic. The constant percentage of STs in the face of population expansion underscores the need of ongoing focus on the particular socioeconomic difficulties that ST communities face. It highlights the significance of focused policies and initiatives meant to reduce the socioeconomic divide between the populations of STs and non-STs, especially in areas like social inclusion, work, and education. Despite the fact that India's population has grown dramatically over the years, the data emphasizes how crucial it is to continue addressing the

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

unique requirements and advancing the welfare of Scheduled Tribes in order to promote inclusive development and equal advancement throughout the country.

REFERENCES

1. Arya, V., Page, A., Dandona, R., Vijayakumar, L., Mayer, P., & Armstrong, G. (2019). The geographic heterogeneity of suicide rates in India by religion, caste, tribe, and other backward classes. *Crisis*.
2. Dar, W. A., & Najar, I. A. (2018). Educational anthropology, tribal education and responsible citizenship in India. *South Asia Research*, 38(3), 327-346.
3. Devarapalli, S. S. K., Kallakuri, S., Salam, A., & Maulik, P. K. (2020). Mental health research on scheduled tribes in India. *Indian Journal of Psychiatry*, 62(6), 617-630.
4. Gulzar, D. (2021). Inclusive Policies and their impact on Tribals of Jammu and Kashmir: A Case of Gujjar Tribals. *International Journal of Rural Development, Environment and Health Research*, 5(3).
5. Jain, M., Korzhenevych, A., & Hecht, R. (2021). Two decades of urban and rural restructuring in India: An empirical investigation along Delhi-Mumbai Industrial Corridor. *Habitat International*, 117, 102444.
6. Kumar, D., Pratap, B., & Aggarwal, A. (2020). Affirmative action in government jobs in India: Did the job reservation policy benefit disadvantaged groups?. *Journal of Asian and African Studies*, 55(1), 145-160.
7. Kumar, R., Mandava, S., & Gopanapalli, V. S. (2019). Vocational training in India: determinants of participation and effect on wages. *Empirical Research in Vocational Education and Training*, 11(1), 1-17.
8. Malkani, R., & Rose, R. (2018). Learning from the Voices of First Generation Learners in a Remote Community of Maharashtra, India. *International Journal of Whole Schooling*, 14(2), 104- 127.
9. Marchang, R. (2019). Economic, occupational and livelihood changes of Scheduled Tribes of North East India. *Institute for Social and Economic Change*, 1-22.
10. Thamminaina, A., Kanungo, P., & Mohanty, S. (2020). Barriers, opportunities, and enablers to educate girls from Particularly Vulnerable Tribal Groups (PVTGs): A systematic review of literature. *Children and Youth Services Review*, 118, 105350.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

A Methodical Approach to Overcoming Important Obstacles in Software Development Adopting a DevOps Practices

PRASANNA THALARI

Abstract:

To increase involvement and communication, DevOps is a collection of applications and cultural activities that focuses on separating the difficulties between performance associates and evaluation. Many businesses cling to the DevOps foundation because of its fantastic viewpoints, which include low production tempo, increased correctness, and durability. Disregarding the worldwide presumption of DevOps and its structure, there are no interpretive studies, fundamental concepts, implementation, or problems associated with carrying out DevOps processes. This research study's main goal is to look into and evaluate problems related to DevOps applications and culture (DVC). The systematic literature study (SLR) examines the difficulties in implementing the DevOps culture in software development (SD). In addition, it covers all aspects of DevOps, including how it functions in the industry, and it looks into the cultural challenges that the industry has when implementing DevOps. Ten obstacles that need to be addressed for DevOps culture to be accepted are revealed in this study. The findings indicate that these ten barriers—a lack of coordination and collaboration, a lack of talent and expertise, a complex infrastructure, a lack of management, a lack of a DevOps strategy, and issues with trust and confidence—should be taken into consideration when implementing a DevOps culture.

INTRODUCTION

To achieve better relationship and durability between efficient and effective professionals in software development endeavours, software assessment procedures are switched. The promotion of the newest electronic technologies both demonstrates grave problems and gives firms independence. Apart from delaying, computer scientists in the DevOps field provide useful programs and hardware to the customer promptly in the context of rapid software transportation. The main objectives of DevOps, which is a collection of applications and civilization values, are to integrate businesses, identify obstacles, foster collaboration, and communicate in an efficient manner that connects with assessment and operational coordination. DevOps is a collection of frameworks designed to increase cooperation and connection between developers and

operational teams to identify and address. The development and operations teams come together to form the DevOps personnel. The operation team consists of system engineers, software production experts, database and organization executives, and tester programmers. The development team consists of developers, quality assurance professionals, and programmers.

Everyone is motivated by this to create exceptional software, including programmers, testers, and cohesive teams. Programmers and operational staff are not segregated; rather, they collaborate and work inside a software development framework with no longer being limited to certain tasks. The field of DevOps has a strong emphasis on encouraging collaboration and association across all contributors, which is essential for delivering software. The main pillars of DevOps practices are civilization, applications, and implementations. A logical and fundamental methodology character is described by civilization. Applications lead civilization back to significant success; numerous approaches are favored to carry out the process.

Agile processes allow for constantly updated IT resources to seize market opportunities, slow down the pace, and grasp consumer requirements. The four guidelines of DevOps principles—CAMS, civilization, computerization, and quantifications—affect the current software circle requirements. Despite the existence of numerous global appliances, DevOps remains a mere jargon devoid of any tangible means of explanation. Therefore, this current study acknowledges that software for participants is constantly produced by the culture of shared authority and collaboration between the two teams in development and function.

The present era is seeing an increase in demand for DevOps due to its rapid deployment and the delivery to the organization fast and at an affordable price. The program's partnerships with individual construct cycles are tested and implemented quickly thanks to the combination of operational staff and evaluation. Eighty-eight percent of industries use the DevOps concept, according to Capgemini's annual standard overview report for 2016–2017. DevOps apps increased the number of DevOps employees from 19% in 2015 to 22%

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

in 2016 to 27% in 2017, according to reports. The DevOps idea has gained considerable traction in the industry due to customers' demands for a highly attainable continuous release and pragmatism strategy that can be applied anywhere, anytime. DevOps applications have been approved by Google, Netflix, Amazon, LinkedIn, Spotify, Flickr, and Etsy to allow software in excellent shape. The fundamental tenet of the IT sector is to present new, improved applicants with higher quality to customers, who constitute the primary stakeholders within the company. Despite the growing popularity of DevOps, there is a need to embrace DevOps techniques because the DevOps methodology is not easily understood. Because the DevOps method is a strong pillar and it might be challenging for sectors to choose which way to embrace and advance, DevOps demands more investigation. Adapting the traditional IT industry framework to the DevOps tradition impacts every member of the development team since the DevOps discipline must look at new tools, knowledge, and general requirements.

Between evaluation and functioning to execute DevOps techniques, traditional substitution presents a difficult obstacle. Customs play a major role in the software industry and are essential to DevOps research due to the field's widespread acceptance. The operating group and the people of the software industry establishment are geographically separated, making it difficult to emphasize cooperation and introduce changes to the commune with the personnel.

Keeping that in mind, the primary goal of our research is to understand the DevOps discipline, recognize its benefits and challenges, and investigate ways to embrace DevOps. There are relatively few studies on the DevOps discipline that are carried out, even though various research indicates that DevOps is becoming more and more accepted in the IT industry. Considering this, the current study carried out an LR to determine the obstacles that the software industries of today face in the field of DevOps. Software organizations that are implementing DevOps apps and encountering difficulties can benefit from this study.

The following are some noteworthy contributions made by the suggested systematic research study:

- Try to describe the culture of DevOps, identify its benefits and drawbacks, and investigate ways to embrace DevOps.
- Create an SLR to determine the difficulties that the software industry's DevOps discipline is right now addressing.
- After identifying the key obstacles impacting DevOps in GSD, an empirical study is conducted to determine the problems influencing DevOps culture in GSD.

Moreover, the PLS-SEM technique is utilized to assess outcomes of the carried-out SLR to emphasize the importance to the recognized elements in the DevOps culture in GSD.

Additionally, utilizing the data gathered from the questionnaire, several quantitative tests have been carried out to validate the application of the suggested systematic framework.

The categories for this research are shown in Fig 1. In Section I, the DevOps culture within GSD is introduced, along with the difficult difficulties that impact DevOps within GSD. The research study's backdrop is presented in Section II, and the methodology is shown in Section III. In Section IV, the results are explained and rationalized. The study's future directions are shown in Section V, and Section VI presents the study's conclusion and recommendations for further research.

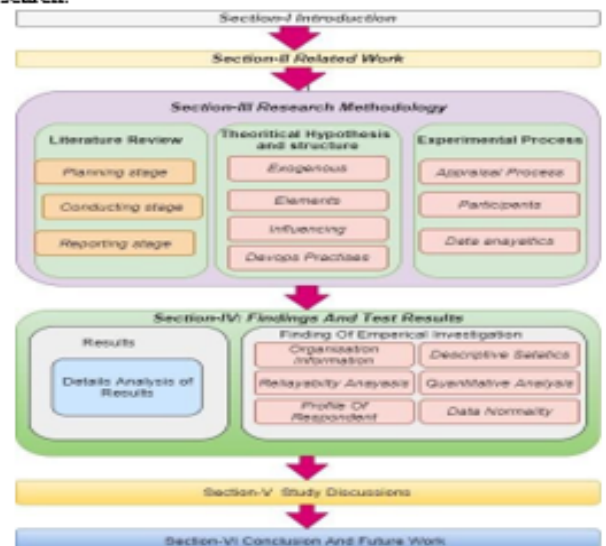


Figure :1 Basic Overview of Research Study

Related Work-II

Today's competitive, fast-paced technological advancements and mechanization, along with sophisticated software development, sometimes require technology developers to be familiar with the electronic mechanism foundation that enables them to quickly release software to clients. The IT sectors are transitioning from outdated digital era frameworks to the most recent ones, which allows them to provide stakeholders with prompt and coherent solutions. Traditional programming methods are very time-consuming, and stakeholders must wait a long period for the most recent updates before providing their replies. Many programming development processes, such as incremental, agile, and waterfall mock-ups, are antiquated and take a while to reveal to customers. Several software development processes, such

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

as incremental, agile, and waterfall, are antiquated and labor-intensive. legal and regulatory frameworks to adopt DevOps culture. The primary problem with DevOps in

The software life cycle uses a classic paradigm calendarly organization is a lack of curiosity, which prevents the waterfall paradigm, which is easy to use and adheres to participants from learning confidential knowledge and sequential process. Within the waterfall paradigm, business employee commerce.

software product is unmanageable and operates on a single As a result, other businesses do not accurately software layer across several environments [30]. Every DevOps as it is more reliable than embracing tools. development activity has its distinct stage, involving a long employee skepticism is further demonstrated by the amount of time for the execution of the phase that cost-effective DevOps data sources and fewer recommendations. The purpose of SLR is to encourage

On the other hand, the agile process combines the incremental and iterative approaches, segmenting the process into distinct iteration phases. It takes two to three weeks to complete the specific iterations. The agile approach is typically used in stable domains—except complex software. DevOps idea seems to promote implementations to customers with a high standard and prompt service. DevOps was created during the 2008 Agile process in Toronto when Patrick identified it as a cornerstone of advancement and effectiveness. Coordination and cooperation result in quick services that meet customer needs. Nonetheless, research indicates that people are resistant to change and prefer to operate according to traditional methods. The alliances between the development and operations teams, as well as cooperation and teamwork, are essential to the successful implementation of the DevOps culture.

The term "Wall of Confusion" should not be used by the author. The integration of development and operational staff had an impact on a team where several knowledgeable individuals collaborated and shared their knowledge with the entire group. Not every industry benefits equally from DevOps endorsements. When DevOps methodologies were first introduced, the software industry was unaware of the many realities surrounding incomprehensible software projects a) procedures. When DevOps methods are endorsed, several issues are identified. Team members who are both developers and operations personnel must understand the most recent technological knowledge, and implementation strategies, and extraordinary efforts are chosen to set up the operation activities appropriately. The major flaw in the DevOps practices is to certified and address the DevOps operations aimed at improving machine performance and market values. There are several situations where DevOps and Agile are similar and different. Since DevOps is a theoretical approach that requires departmental civilizations to change, Agile offers an alternative to logic. Scrum and significant programming are examples of agile processes that are absent from DevOps. Wide and varied scales of protocols and instructions that are effectively carried out in a certain domain are held by DevOps.

It will take less time for any software industry with fewer employees to implement the most recent

acceptance of DevOps and alleviate the practical challenges related to DevOps, as demonstrated in the studies. Few research has been done thus far on the effective implementation of DevOps culture and its uses in businesses. DevOps culture necessitates intelligible exploration considering science's rapid advancement to identify promising opportunities for clients.

Research Methodology-III

To address the study concerns, a methodological approach is necessary. The current study uses a quantitative method to identify limited studies and extract the relevant data. The other authors similarly follow an LR to identify the problems.

Literature Review

Software engineers are familiar with LR's attentiveness, and authors have embraced Kitchenham and Charter's guidelines. Using search strings based on research questions, an LR is the most recent technique for conducting the necessary study, and it differs greatly from theoretical studies. LR enables users to compile information following their tastes and industry acceptance. LR finds accurate, real, and less biased results than the study analysis. Planning, carrying out, and reporting are the three processes that makeup LR.

Planning Stage

guidelines, but it will take longer for an industry v For easier understanding, the mechanism's interpolation is dependent upon below. The systematic overview of the planning phase for carrying out a systematic literature review is shown in Fig. 2.



Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Figure 2: Stage of planning for the proposed research project

a: Research Questions

In the LR process, creating a search query is the primary stage. The framework of the research questions considers the earliest findings and looks at all the details. The present study's introduction already specified the research questions that are appropriate for our investigation.

RQ-1: What obstacles exist for promoting DevOps?

RQ-2: What are the obstacles facing the DevOps movement in the Indian industry?

RQ-3: Do the factors found in the LR and those found in an empirical investigation differ in any way?

b: Sources of Data

The SLR research process strikes a compromise between investigating every relevant study and avoiding encountering significant unfavorable outcomes. The selected publications are sourced from five distinct digital libraries, including Google Scholar, ACM Digital Library, Science Direct, Springer Link, and IEEE Explorer, after our search area.

There are two stages to the planning process.

- Ascertain the need for analysis.
- Define and verify proper SLR protocol.

There are five stages in the conducting step.

- Finding the primary literature using the search title.
- Study selection based on inclusion and rule-breaking.
- Evaluate the literature's caliber
- A planned data extraction is used to remove the final studies that were chosen.
- Make plans to extract data from the literature.

The results are gathered and reported in the final reporting stage. A relatively well-received and widely recognized LR has been established through the recommended research.

c: Erection of Search Strings

Following the formulation of research questions, phraseologies aid in the intention to produce search terms. Subsequently, an experiment search is carried out throughout several databases, including IEEE Xplore, ACM, Digital Library, Springer Link, Google Scholar, and Science Direct, to probe the appropriate research now available about DevOps culture.

The subsequent search method is used while taking the search string into account.

1. Research questions that examine inhabitants, involvement, and outcomes are chosen to eliminate important titles.

2. For the primary titles, many forecasts and expressions are established.

3. The validated search terms in any relevant research.

d: Inclusion Criteria

The proposed study employs the following guidelines to delve into relevant research and extract pertinent data. The primary focus is on studies that address difficulties related to the DevOps culture. The following is a definition of the inclusion rules:

The study ought to be pertinent to the DevOps mindset.

Researches detailing the obstacles vendors have when developing DevOps operations.

Research embellishes strategies for identifying the cultural hurdles in DevOps.

Research exaggerates the relationship between DevOps culture and vendors.

Embellished real-world studies to achieve a successful DevOps culture.

English-language studies are chosen for inclusion.

e: Disqualifying Standards

The following is a definition of the extrication rules:

studies that fail to mention the difficulties posed by the DevOps culture.

The studies chose similar but distinct databases.

research lacking the complete text.

Editorials, slides, and books were also extracted.

studies not related to English language studies.

f: Research Selection

Following the addition and removal procedure, 380 studies from various databases were chosen for the suggested investigation. After carefully examining the chosen studies, we have ultimately chosen 66 that adequately address the current research's goal. The selection of research using the tollgate approach is shown in Table 1.

| Sources | Search Query |
|---|---|
| ACM Library, IEEE Explorer, Google Scholar, Science Direct, Springer Link | (DevOps OR "continuous integration" OR "software automation" OR "cross-function collaboration" OR "continuous deployment") AND (culture OR values OR literature) AND (challenges OR issues OR barriers) AND (vendor OR supplier OR trader). |
| Wiley Online Library | ("Challenges" OR "Barriers" OR "Hurdles" OR "Problems" OR "Difficulties" OR "Negative Impact" OR "Implement" OR "Utilize" OR "") AND ("DevOps" OR "Development and Operation team" OR "High performance team" OR "Continuous stream-line" OR "Continuous development" OR "Continuous Deployment") |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| Sources | Research by Applying search string | Research by Primary string | Research by Final Decision |
|----------------------|------------------------------------|----------------------------|----------------------------|
| Google Scholar | 6580 | 184 | 38 |
| Springer Link | 3543 | 110 | 15 |
| ACM Library | 114 | 31 | 8 |
| Science Direct | 1233 | 20 | 8 |
| IEEE | 290 | 53 | 8 |
| Wiley Online Library | 53 | 16 | 6 |
| Total | 11813 | 414 | 83 |

Table 1 A review of the search query strings used to identify relevant research

g: Analytical Principles for Study Selection

The chosen studies were evaluated to investigate their values from different angles. The following are the three questions that the quality assessment uses to gauge the overall state and dependability of the primary research that has been adopted.

| # | Challenges | Frequency | Percentage |
|----|---|-----------|------------|
| 1 | Lack of Management | 58 | 52 |
| 2 | Lack of DevOps Approach | 57 | 69 |
| 3 | Security Issues | 30 | 50 |
| 4 | Poor Quality | 40 | 55 |
| 5 | Legacy Infrastructure | 30 | 45 |
| 6 | Complicated Infrastructure | 50 | 62 |
| 7 | Criticism Practices | 60 | 70 |
| 8 | Lack of skill and Knowledge | 64 | 53 |
| 9 | Lack of Collaboration and Communication | 52 | 75 |
| 10 | Trust and Confidence problems | 54 | 49 |

Q checklist inquiries

Q1: Does the study acknowledge the questions it studied?

Table 2: Tollgate approach of relevant studies

Q2: Do the writers discuss the difficulties with DevOps?

Q3: Are the research findings accessible?

The questions for the quality assessment included specific values, such as 0, 0.5, and 1. taking into consideration the research that reported results to support value estimation

Table 3: a list of the most significant problems that LR emphasized

queries. A research demonstrating modest possession was chosen with a 0.5 weight. Research unrelated to questions

about quality estimate received a score of 0. Table 4 contains the quality inspection records for the adopted studies.

| Article | Q1 | Q2 | Q3 | Total Score |
|---------|-----|-----|-----|-------------|
| [1] | 1 | 1 | 0.5 | 2.5 |
| [2] | 0.5 | 1 | 0.5 | 2 |
| [3] | 1 | 1 | 0 | 2 |
| [4] | 0.5 | 1 | 1 | 2.5 |
| [5] | 1 | 0.5 | 1 | 2.5 |
| [6] | 1 | 1 | 1 | 3 |
| [7] | 1 | 0.5 | 0.5 | 2 |
| [8] | 0.5 | 0.5 | 1 | 2 |
| [9] | 0.5 | 1 | 0.5 | 2 |
| [10] | 0.5 | 1 | 0 | 1.5 |
| [11] | 1 | 1 | 0.5 | 2.5 |
| [12] | 0.5 | 1 | 0.5 | 2 |
| [13] | 0.5 | 1 | 0.5 | 2 |
| [14] | 0.5 | 1 | 0.5 | 2 |
| [15] | 0.5 | 1 | 0.5 | 2 |
| [16] | 0.5 | 0.5 | 0.5 | 1.5 |
| [17] | 1 | 1 | 0.5 | 2.5 |
| [18] | 0.5 | 1 | 0.5 | 2 |
| [19] | 0.5 | 0.5 | 0.5 | 1.5 |
| [20] | 0.5 | 1 | 0.5 | 2 |
| [21] | 0.5 | 1 | 1 | 2.5 |
| [22] | 0.5 | 1 | 1 | 2.5 |
| [23] | 1 | 1 | 1 | 3 |
| [24] | 0.5 | 1 | 0 | 1.5 |
| [25] | 0.5 | 1 | 0 | 1.5 |
| [26] | 1 | 1 | 0.5 | 2.5 |
| [27] | 1 | 1 | 1 | 3 |
| [28] | 0.5 | 1 | 1 | 2.5 |
| [29] | 0.5 | 1 | 0 | 1.5 |
| [30] | 0.5 | 0.5 | 0.5 | 1.5 |
| [31] | 0.5 | 1 | 0.5 | 2 |
| [32] | 1 | 1 | 1 | 3 |
| [33] | 0.5 | 1 | 1 | 2.5 |
| [34] | 0.5 | 1 | 0.5 | 2 |
| [35] | 0.5 | 1 | 0 | 1.5 |
| [36] | 1 | 1 | 1 | 3 |

Table 4: A description of the chosen papers' assessment of quality

2) Conducting the Review

The review process is the next step in the SLR activity. It is carried out to put an analysis entente into action. The steps that are implicated are listed below and are depicted in Figure 3.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

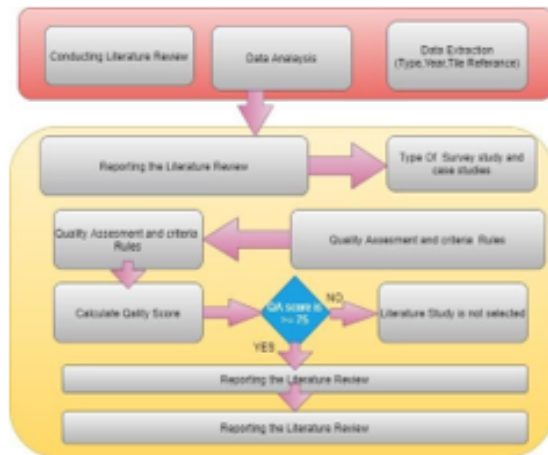


Figure 3: Overview of the LR for conducting the Literature review.

a: Extracting Data

The information was extracted from the adopted studies and incorporated into the quality assessment. The category of research, such as survey, experiment, case study, or SLR. A year of promotion. The journal or conference that the research, as described, was referenced to.

Those articles considered the essential components of DevOps.

b: Analyzing Data

Ten difficulties were investigated after a thorough examination of all adopted studies. Table 3 lists each of the issues addressed in the chosen research separately.

3) Summarizing the Analysis

After observing the audit entente in action, reporting is carried out. This stage consists of three phases.

a: Study Types

based on methods of study Throughout the process, five different research categories—SLR, experiments, case studies, interviews, and surveys—were investigated. Empirical papers make up 83% of research papers. Out of these papers, 16% are experimental studies, 29% are case studies, 26% are surveys, and 12% are interviews. A methodical literature review approach is included in the remaining 17% of studies.

b: Distribution Over Time

The selected research papers span the years 2011

through 2022 and are all the most recent. Fig. 4 below shows the distribution of the selected papers by year of publication.



Figure 4: Temporal distribution of the literature studies that have been selected for the study that was suggested.

c: Evaluation of Quality

The selection of research projects was based on the application of the quality criteria rule. These guidelines have been identified and placed on the QA list. The selected papers are listed in Table 4. According to, a quality score of less than 50% will not be taken into consideration; on the other hand, a score of 50% or higher will be regarded acceptable. Sixty-six research papers met the criteria after the QA checklist was applied; the other papers were rejected.

d: Research Approaches

In this section, the investigators addressed the main concerns raised by the SLR research and provided answers to the research questions. Table 3 lists the ten topics that have a negative impact and are investigated using SLR. The recommended study must consider those obstacles whose percentage is greater than or equal to 20. The other writers follow the same process in their investigations. Additionally, the distribution % analysis for the chosen research based on empirical, theoretical, framework preposition, systematic literature review, and exploratory investigations is shown in Fig. 5.

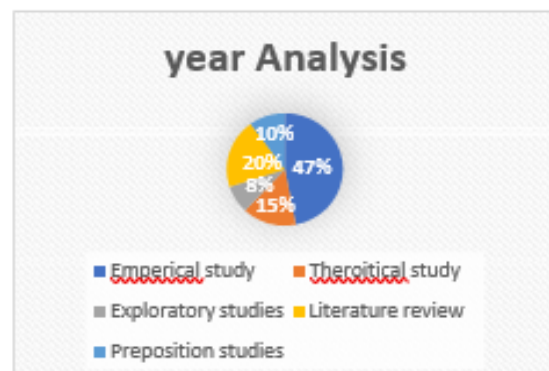


FIGURE 5. Distribution analysis of the adopted framework based on classification study.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

B. Proposed Theoretical Structure and Hypothesis Evolution

This section relates to the theoretical framework and its hypothesis. The present study's conceptual framework encompasses ten external components, namely: insufficient cooperation and communication (LCC), inadequate skill and knowledge (LSK), criticism practices (CP), absence of a DevOps approach (LDA), inadequate management (LM), trust and confidence issues (TCP), complex infrastructure (CI), poor quality (PQ), security issues (SI), legacy infrastructure (PI), and one internal component, namely DevOps culture (DVC). As illustrated in Fig. 6, each of these ten external components has a significant impact on the DevOps culture.

The theoretical framework and its hypotheses are related to this section. The conceptual framework of the current study includes ten external components: inadequate trust and confidence issues (TCP), complex infrastructure (CI), poor quality (PQ), security issues (SI), legacy infrastructure (PI), criticism practices (CP), lack of a DevOps approach (LDA), inadequate management (LM), and one internal component, namely DevOps culture (DVC). Every one of these ten external elements has a major influence on the DevOps culture, as shown in Fig. 6.



Figure 5: DevOps In GSD influencing by Exogenous elements.

1) Lack of Communication and Collaboration (Lcc)

Insufficient cooperation and communication is investigated as a significant problem with a 68% recurrence rate. The programmers and IT operations staff obstruct their plans and goals and make it difficult for the software to interact correctly, which causes the software to be delayed. Professionalism and the environment among employees make it difficult to interact effectively. All the goals will be lost if there is no management. Establishing a culture of shared teamwork is a noteworthy accomplishment because it requires employees and reorganizes employee responsibilities.

2) Inadequate Knowledge and Skill (Lsk)

Previous research has revealed a significant obstacle of 56% recurrence: a lack of ability and

understanding. DevOps applications require the development and operation of both personnel skills and awareness of self-perceptions, which are lacking in many organizations. In addition to not understanding the benefits, there is a lack of practical expertise and interpretation of the theories, practices, tools, and problems associated with implementing DevOps. Certain industries have individuals who are focused on their domain skills and create a lot of problems but lack professional teaching and inspiration to learn DevOps.

3) Practices for Criticism (Cp)

According to earlier research, it also poses a 50% barrier to DevOps. According to the poll, considering team culture to include the human element is a major barrier to choosing DevOps because it is more complex than the technical aspect [49]. An intolerant atmosphere that prioritizes scolding, fighting, placing blame, and adopting a pessimistic viewpoint creates a hostile work environment and increases employee resistance. Integrating DevOps into an organization where employees have diverse viewpoints that primarily stand in the way of successful industrial adoption is the most significant problem.

4) Absence of a DevOps Strategy (Lda)

47% of respondents cite the absence of a DevOps approach as a major barrier to adopting DevOps. In certain software companies, there are instances where the IT operations and development teams work independently and lack DevOps expertise. The industry and staff find it difficult to integrate the newest apps and methods since there is a lack of common understanding about what DevOps needs in the workplace and real-world scenarios. DevOps is carried out in huge programs and lacks a systematic structure.

5) Insufficient Management (Lm)

The role of management is crucial in any industry. According to earlier studies, it is also regarded as a major issue with 45% of assurance. In large corporations, a shift in leadership is required to keep workers functioning while allowing for fundamental adjustments to their roles. Encourage staff members to fulfill their job responsibilities as well. Project failure results from misunderstandings caused by poor team management. Management and DevOps have different priorities if the head indicates that the data interferes with their personal life. The discussion then shifts to the conflict in the programming and significant changes to their roles and property issues.

6) Issues with Confidence and Trust (Tcp)

The results of earlier research point to difficult concerns, such as issues with confidence and trust, while implementing a DevOps culture at a rate of 45%. A problem with DevOps is the lack of trust among employees in any firm and their fear

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

of losing their jobs and power due to cultural differences. The primary civilizing threat that demonstrates the confrontational mindset due to fear of losing a job is the trust issue and disagreement. In this culture of distrust, adopting DevOps is very difficult because of poor acculturation, a lack of face-to-face communication, and conferences. An organization loses clients, prestige, and revenue because of this.

7) Complex Infrastructure (Ci)

An LR also identifies that the complex structure in the software sector hurts the overall production process. Three-quarters of the challenges come from embracing the DevOps ethos and complicated infrastructure. The adoption of DevOps is impacted by using the newest appliances, which complicate the industry framework and increase costs for some. Moving forward from the paradigm of fundamental organizations to a more detailed level, DevOps culture addresses significant obstacles due to its insurmountable industrial tectonic and cultural barriers. The difficult task is evolving into a fantastic, organized culture. This enables groups to be cost-effective, dependable, and innovative.

8) Low caliber (Pa)

With the certainty of 33%, one additional issue is investigated: low quality. Because they lack a clear understanding of the intended result and no guarantee of its status, the operating sections lack confidence when it comes to integrating software into the construction. The majority of teamwork focuses on practical calculations and strategies without guidance, which can result in poor software quality and delay software release. Any software industry experiencing high throughput will see delayed software releases, which will also cause a delay in bug patches and answers, as well as a failure to deliver high-quality software on schedule.

9) Matters of Security (Ms)

Any industry's success is influenced by security. An SLR examines how, with 29% frequency, security concerns pose a significant obstacle to embracing DevOps. If secure securities staff are not present, certain candidates may approach confidential information that, in certain situations, such as financial networks, might be problematic. Additionally, some participants may have access to databases containing sensitive information. Permitting staff members to access internal data when necessary while preventing them from doing so when not is the primary challenge. Employees are the primary cause of the problems in this scenario if a safety strategy has not been thought through beforehand. They identify admitted protocols to implement safety by ignoring the risks related to safe

10) Older Technology (Pi)

A legacy structure that is seen in the literature 23% of the time is the crucial issue. Software corporations that dominate traditional processes exhibit a lack of expertise in those procedures, which negatively impacts cultural norms and has political repercussions. Consent mechanisms are designed for cultural practices that persuade businesses to maintain the benefits of cutting-edge technology, which is difficult to invest in.

C. Testing Theoretical Structure Experimentally

This part presents an explanation of the conducted empirical inquiry and its outcomes. Additionally, the survey was conducted using a questionnaire in response to RQ2 in the software sectors.

1) Evaluation and Data Assembly Process

The present study employed the quantitative analysis technique to examine and list the obstacles associated with the adoption of DevOps culture. Following an SLR analysis, a questionnaire survey was conducted to carefully evaluate the major obstacles that impede the adoption of a DevOps culture. The survey questions were carefully constructed about the obstacles that the SLR process examined. The obvious reason for going above and beyond the questionnaire was to obtain up-to-date information about the current situation, which is unquestionably impossible to gather from the earlier study. The closed-ended questions were created and sent to software industry professionals with prior experience implementing DevOps culture.

As a result, the candidates' responses to closed-ended questions were straightforward. First, a few basic questions were created, which were then improved by running countless validity tests and carrying out a feasibility study. For the survey, a five-point Likert scale was used to collect practical feedback: "Strongly Agree," "Agree," "Neutral," "Disagree," and "Strongly Disagree." As most studies have noted, there is no flaw in the Neutral option's engagement. Additionally, there is no impact when adopting the Neutral option, and applicants are allowed to express their opinions by their practices. Before administering the survey, it is required to take a pretest. This makes it easier to test the limitations and deficiencies of the queries. The examination of the validity of. When it comes to face validation, the superiority considers the facet expressed in a sample and validates the experiment that is being recovered on its face. In contrast, content validity requires skilled workers who assess the accuracy, coherence, and integrity of the survey questions and determine which statements should be included in the questionnaire. The Appendix Table displays the questionnaire questions.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

2) Participant Selection

The purpose of the current study is to identify the challenges encountered in implementing DevOps culture, which is why the researcher chose to focus on software businesses that have successfully implemented DevOps culture. The questionnaire survey is being completed by the following applicants: developers, testers, analysts, designers, team managers, and project managers. The candidates were chosen using the snowball method, are additionally contacted in this manner via emails, Facebook, and LinkedIn, and some were contacted through the candidate's associates. The entire set of data was gathered between December 2, 2022, and February 20, 2023. Out of 220 candidates, 340 received the survey without error. Every comment was taken into consideration, and incomplete surveys were removed.

3. Data Analysis Method

Since the variables in this study are formative, the authors used partial least square structural equation modeling (PLS-SEM), which is the best technique for this conceptual structure as suggested. PLS-SEM has two models and is a multivariate evaluation technique. Both structural and measurement models are used; the latent variables in the structural model are related, and the measurement model describes how the survey data are related to one another. Applying SEM has the advantage of allowing for the simultaneous assessment of endogenous and exogenous factors. This study's sample size exceeded the suggested range of 100–150 applicants. The program utilized to compile the information for the survey was

Results and Findings-IV

This section provides a detailed explanation of the SLR finding, followed by the presentation of the factual probe theoretical framework. Finally, the survey is examined to verify the theoretical model and distinguish the results.

A. LR Results

This Section addresses RQ1 by going over the issues encountered when implementing a DevOps culture and the topics covered in the SLR. Ten (10) obstacles were found, and their frequencies and percentages are entered into Table 3. It is observed that a substantial majority of all cases involve a lack of cooperation and communication. Following that, the second-highest factor (73%), according to reports, in establishing a DevOps culture is a lack of experience and

understanding. Therefore, while implementing a DevOps culture, issues with trust and confidence at 59%, lack of management at 62%, lack of DevOps methodology at 74%, and criticism procedures at 67% are troublesome. In contrast to the intricate design, subpar craftsmanship, security concerns, and legacy It seems like you're referring to "LR Results" notes, but without additional context, it's unclear what specifically you're asking about. "LR" could stand for many things, such as "Logistic Regression," "Linear Regression," or something entirely different depending on the context. Similarly, "Results" could refer to the outcomes of a study, experiment, analysis, or some other process, as well as an endogenous construct related to challenges encountered in the adoption of DevOps culture. As a result, PLS Model B is an additional tool that the authors use to estimate formative assessment. Because of this, PLS model B—the innovative formative model

TABLE 6 Percentage of the exogenous elements affecting the DevOps culture

B. Empirical Investigation's Findings

A description of the factual analysis that was done and its follow-up are provided in this section. The survey was conducted in software industries where the DevOps culture is embraced to address RQ2. Every experiment and its follow-up were also closely examined.

1) Demographically Based Respondent Profile

When doing a practical appraisal, a thorough examination of a questionnaire is required. The benefit of more accurate results is provided by a close-up view of the candidates, such as significant industry data. To obtain precise survey results, the current study gathers information on the candidate's demographics as well as statistics relevant to the software business. Regarding RQ2, this subdivision considers the completed questionnaire and practical examination. For PLS-SEM, a precise sample size of 200 or more is required. A sample size of 220 participants was attained for this research study, and the table includes information on the applicants, including their age, sex, experience, and employment status.

2) Information About the Organization

Information on the field area from which a survey is conducted is necessary. Table 6 lists the specifics of the software, including its kind and the number of workers in the sector. It is crucial to look at the number of employees and the date that

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

DevOps was implemented in the company. The current paper focuses exclusively on DevOps-adopting software organizations.

3) Examining the Dependability of a Questionnaire Survey

The internal stability and reliability of the questionnaire used in the current research study were examined using Cronbach's alpha test. For numerous scale items, Cronbach's alpha is used to determine whether the items are correlated. Under ideal circumstances, Cronbach's alpha should be 0.70 or higher, however, a value of 0.60 is also acceptable. On the other hand, a value of 0.80 is regarded as good, but a number higher than 0.90 is not as exceptional because of the potential for duplication. For the reliability investigation, each construct's Cronbach's alpha value was examined separately. The Cronbach's alpha test results are displayed in the table below, which indicates that the test. 4) Analysis of Quantitative Data

4) Analysis of Quantitative Data

PLS-SEM is the framework used in this study. Additionally, the structural model was employed in the first section, and the measurement model was used in the second. The measurement model was determined by carefully examining the construct's authenticity and exactitude in the first part, and the relationship between the construct is examined in the second. A well-designed methodology was used in the study, and the model estimation delivers more reliable results for route coefficients related to the sequel.

5) Normalcy of Data

Before performing any additional statistical analyses, the data utilized in this investigation needs to be normalized. Consequently, to perform statistical measurements, normal divisions of the variables utilized in the relevant concept are required. Should data quality not be enhanced, it could be feasible for the outcomes of analysis or evaluation to vary. Using descriptive analysis or visual inspection, which may include the probability plot and histogram, the normalizing of the gathered data is to be verified. The distribution of the data will be regarded as normal if the

Experimental data follows the diagonal lines. One possible method to examine the data normalization further is to use multivariate indices, such as skewness and kurtosis. One considers data with a uniform distribution to be an extreme example [99]. within the specified limits, the data indicates that it is regularly distributed.

6) Sixth-Descriptive Statistics

The questionnaire's descriptive statistics for each item in the construct are shown in this section. Table 6 provides a detailed presentation of the mean, standard deviation, skewness, and kurtosis for each item in the recognized construct.

a: Model of Measurement

The present study introduces a formative theoretical framework that encompasses ten exogenous constructs identified through various research studies, as well as an endogenous construct related to challenges encountered in the adoption of DevOps culture. As a result, PLS Model B is an additional tool that the authors use to estimate formative assessment. Because of this, PLS model B—the innovative formative model used in this paper—was applied to the evaluation.

b: Structural Model

Wrap PLS 7.0 was used to quantify the path coefficient values with effect size and R2 coefficient as well as the T-values of the endogenous construct for the assessment and hypothesis. More weight should be given to the T-value criterion than 1.64 or 1.96. The path coefficient divided by the standard errors is used to quantify it, and the threshold's P value was less than 0.05 [89]. Wrap 3 was the most popular technique for calculating the path coefficient of the structural model's formative representation category. A thorough examination of the path coefficient, effect size (ES), value of T, and results of the hypothesis experiment is conducted in

| Item | Mean | Std.Dev | Skewness | kurtosis |
|------|------|---------|----------|----------|
| LCC1 | 2.25 | 1.049 | 0.369 | -0.14 |
| LCC2 | 2.30 | 0.911 | 0.612 | 0.885 |
| LCC3 | 1.96 | 0.705 | 0.882 | 1.390 |
| TCR1 | 2.25 | 0.886 | 0.328 | -0.307 |
| TCR2 | 2.58 | 1.091 | 0.232 | -0.733 |
| TCR3 | 2.41 | 0.905 | 0.219 | -0.902 |
| CP1 | 2.25 | 0.886 | 0.328 | -0.307 |
| CP2 | 2.58 | 1.091 | 0.232 | -0.733 |
| CP3 | 2.41 | 0.905 | 0.219 | -0.902 |
| LDA1 | 2.28 | 1.040 | 0.369 | -0.14 |
| LDA2 | 2.30 | 0.911 | 0.612 | 0.885 |
| LDA3 | 1.96 | 0.705 | 0.882 | 1.390 |
| LM2 | 2.25 | 0.886 | 0.328 | -0.307 |
| LM2 | 2.58 | 1.091 | 0.232 | -0.733 |
| LM3 | 2.41 | 0.905 | 0.219 | -0.902 |
| TCF1 | 2.25 | 0.886 | 0.328 | -0.307 |
| TCF2 | 2.58 | 1.091 | 0.232 | -0.733 |
| TCF3 | 2.41 | 0.905 | 0.219 | -0.902 |
| CI1 | 2.25 | 1.049 | 0.369 | -0.14 |
| CI2 | 2.30 | 0.911 | 0.612 | 0.885 |
| CI3 | 1.96 | 0.705 | 0.882 | 1.390 |
| PG1 | 2.25 | 0.886 | 0.328 | -0.307 |
| PG2 | 2.58 | 1.091 | 0.232 | -0.733 |
| PG3 | 2.41 | 0.905 | 0.219 | -0.902 |
| SI1 | 2.25 | 0.886 | 0.328 | -0.307 |
| SI2 | 2.58 | 1.091 | 0.232 | -0.733 |
| SI3 | 2.41 | 0.905 | 0.219 | -0.902 |
| LI1 | 2.25 | 0.886 | 0.328 | -0.307 |
| LI2 | 2.58 | 1.091 | 0.232 | -0.733 |
| LI3 | 2.41 | 0.905 | 0.219 | -0.902 |

Figure 7: exogenous elements affecting the DevOps in GS

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| Challenging Elements | Percentage | Rank | Survey % | Rank | Average Rank |
|----------------------|------------|------|----------|------|--------------|
| CI | 62 | 1 | 54 | 6 | 7 |
| PQ | 60 | 2 | 25 | 9 | 8 |
| SI | 56 | 3 | 65 | 7 | 9 |
| LI | 45 | 4 | 45 | 10 | 3 |
| LSK | 83 | 5 | 63 | 2 | 7 |
| LCC | 95 | 6 | 54 | 4 | 1 |
| CP | 57 | 7 | 34 | 8 | 3 |
| LM | 42 | 8 | 62 | 3 | 4 |
| LDA | 46 | 9 | 78 | 1 | 2 |
| TCP | 56 | 10 | 56 | 7 | 5 |

7) Comparing the Experimental Study and LR

This section summarizes the empirical research and SLR, focusing on the similarities and differences between the two sets of data. Table 11 displays the order of the components removed from the SLR as well as the results of the survey. The researchers in this study used closed-ended survey questions based on the difficulties encountered when implementing the DevOps culture. The questionnaire's affirmative answers, such as strongly agree and agree, have been chosen by the authors.

Figure 8: Percentage analysis of SLR and survey studies for exogenous elements.

Discussion and Significance-V

This paper's main goal was to identify every obstacle an organization can encounter when implementing a DevOps culture. The 10 problems were investigated, and their impact was examined using LR. To list the impact of the components that were investigated on the culture of DevOps, a visionary framework was developed. A variety of software sectors were chosen to gather information about the key elements impacting the culture of DevOps and the obstacles to DevOps adoption. As was previously said, organizations must overcome numerous obstacles while implementing a DevOps culture, many of which are not considered realistic from the developer's point of view. This paper highlights the implications of these identified elements and examines the challenges encountered in implementing a DevOps culture. To address RQ1, LR was conducted to identify the obstacles that significantly impact the adoption of a

DevOps culture. Appropriately, twelve components from the 66 selected early SLR research studies were shown to have a significant impact on the adoption of a DevOps culture in the literature. The visionary framework was prompted to evaluate the prominence of the investigated problems. To address RQ2, a visionary framework and its conjecture were tested through quantitative inspection. Tenelements make up the presented structure: complicated infrastructure (CI), poor quality (PQ), security issues (SI), legacy infrastructure (PI), lack of collaboration and communication (LCC), lack of skill and knowledge (LSK), criticism practices (CP), lack of DevOps approach (LDA), lack of management (LM), trust and confidence problems (TCP), and lack of management (LM). Each of the ten factors' ascendancy is evaluated in this study. The results of this study's experiments contradict the assertion made in the literature that inadequate and critical procedures significantly affect the implementation of the DevOps culture. One argument against it is that, as time goes on, both components might become more apparent, and developers might become more knowledgeable, experienced, and proficient with new software and projects involving cutting-edge technology. The second explanation could be that the status of software organizations differs from the past, and as a result, the practitioners did not go through these parts that are vital to the execution of the DevOps culture. The software industries of today that embrace the DevOps culture are supported by this result. The experimental analysis's findings will help reduce the possibility that engineers will embrace a DevOps culture, which could lessen the likelihood that software projects will fail. Additionally, this analysis will assist organizations in concentrating on the most important issues. In a corporate setting, implementing a DevOps culture can improve performance and accomplish the tactical goal. To the best of our knowledge, no study that examines the difficulties in implementing the DevOps culture from the developer's point of view has likely been done.

Conclusion and Future Work-VI

Owing to its complexity, there is no concept of DevOps culture across multiple countries. The main goal was to identify the obstacles that significantly affect how the identified DevOps culture is implemented. The fact that DevOps culture is a relatively new concept and that there isn't much research on it limits the scope of our study. It is advisable to consider applying the DevOps culture for mitigation. Although the research strategy used in this study is quantitative, the authors plan to explore quantitative and qualitative methods in the future for mitigating concerns related to the execution of DevOps culture. Moreover, a case study approach might be used to identify the difficulties impairing the execution of the DevOps culture.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

REFERENCE

1. R. W. Macarthy and J. M. Bass, "An empirical taxonomy of DevOps in practice", *Proc. 46th Euramicro Conf. Softw. Eng. Adv. Appl. (SEAA)*, pp. 221-228, Aug. 2020.
Show in Context [View Article](#)
[Google Scholar](#)
2. A. Wiedemann and M. Wiese, *Are you ready for DevOps? Required skill set for DevOps teams*, 2018.
Show in Context [Google Scholar](#)
3. A. Omer, Gill, A. Lounish, I. Rivat, and S. Han, "DevOps for information management systems", *VINE J. Inf. Knowl. Manage. Syst.*, vol. 48, no. 1, pp. 122-139, Feb. 2018.
Show in Context [CrossRef](#) [Google Scholar](#)
4. W. P. Luz, G. Pinto and R. Bonifacio, "Adopting DevOps in the real world: A theory a model and a case study", *J. Syst. Softw.*, vol. 157, Nov. 2019.
Show in Context [CrossRef](#) [Google Scholar](#)
5. W. P. Luz, G. Pinto, and R. Bonifacio, "Building a collaborative culture: A grounded theory of well succeeded DevOps adoption in practice", *Proc. 12th ACM/IEEE Int. Symp. Empirical Softw. Eng. Meas.*, pp. 1-10, Oct. 2018.
Show in Context [CrossRef](#) [Google Scholar](#)
6. M. Senapati, J. Buchan and H. Osman, "DevOps capabilities practices and challenges: Insights from a case study", *Proc. 22nd Int. Conf. Eval. Assessment Softw. Eng.*, pp. 57-67, Jun. 2018.
Show in Context [CrossRef](#) [Google Scholar](#)
7. Z. Yiran and L. Yilei, *The challenges and mitigation strategies of using DevOps during software development*, Karlskrona, Sweden: Blekinge Inst. Technol, 2017.
Show in Context [Google Scholar](#)
8. T. Senniassila and S. Hyrynsalmi, "An assessment of DevOps maturity in a software project", *Comput. Sci.*, vol. 80, no. 10, pp. 1-87, Oct. 2017.
Show in Context [Google Scholar](#)
9. M. A. Akbar, "Identification and prioritization of DevOps success factors using fuzzy-AHP approach", *Soft Computing*, pp. 1-25, 2020.
Show in Context [Google Scholar](#)
10. J. Humble and J. Molesky, "DevOps: A software revolution in the making", *Cutter IT J.*, vol. 24, no. 8, pp. 6-12, 2011.
Show in Context [Google Scholar](#)
11. A. Katal, V. Bajoria, and S. Dahiya, "DevOps: Bridging the gap between development and operations", *Proc. 3rd Int. Conf. Comput. Methodologies Commun. (ICCMC)*, pp. 1-7, Mar. 2019.
Show in Context [View Article](#)
[Google Scholar](#)
12. N. Paz, "Versioning strategy for DevOps implementations", *Proc. Congreso Argentino de Ciencias de la Informatica y desarrollos de investigaciN (CACIDI)*, pp. 1-6, Nov. 2018.
Show in Context [View Article](#)
[Google Scholar](#)
13. M. Jonker, *DevOps implementation model for large IT service organizations*, 2017.
Show in Context [Google Scholar](#)
14. M. A. Akbar, J. Sang, A. A. Khan, and M. Shafiq, "Towards the guidelines for requirements change management in global software development: Client-vendor perspective", *IEEE Access*, vol. 7, pp. 76985-77007, 2019.
Show in Context [View Article](#)
[Google Scholar](#)
15. M. Shafiq, Q. Zhang, M. A. Akbar, A. A. Khan, S. Hussain, F.-E. Amin, et al., "Effect of project management in requirements engineering and requirements change management processes for global software development", *IEEE Access*, vol. 6, pp. 25747-25763, 2018.
Show in Context [View Article](#)
[Google Scholar](#)
16. O. Mironov, *DevOps pipeline with Docker*, 2018.
Show in Context [Google Scholar](#)
17. R. D. S. Barros, *DevOps technologies for tomorrow*, 2016.
Show in Context [Google Scholar](#)
18. M. M. A. Ibrahim, S. M. Syed-Mohamad and M. H. Husin, "Managing quality assurance challenges of DevOps through analytics", *Proc. 8th Int. Conf. Softw. Commun. Appl.*, pp. 194-198, Feb. 2019.
Show in Context [CrossRef](#) [Google Scholar](#)
19. M. A. Akbar, W. Naveed, S. Mahmood, A. A. Alsanad, A. Alsanad, A. Gumaei, et al., "Prioritization based taxonomy of DevOps challenges using fuzzy AHP analysis", *IEEE Access*, vol. 8, pp. 202487-202507, 2020.
Show in Context [View Article](#)
[Google Scholar](#)
20. J. Sandovalin, E. Insfran, and S. Abramo, "On the effectiveness of tools to support infrastructure as code: Model-driven versus code-centric", *IEEE Access*, vol. 8, pp. 17734-17761, 2020.
Show in Context [View Article](#)
[Google Scholar](#)
21. F. M. A. Erich, C. Amrit, and M. Daneva, "A qualitative study of DevOps usage in practice", *J. Softw. Eval. Process*, vol. 29, no. 6, pp. e1885, Jun. 2017.
Show in Context [Google Scholar](#)
22. J. Diaz, R. Almaraz, J. Pérez and J. Garbajosa, "DevOps in practice: An exploratory case study", *Proc. 19th Int. Conf. Agile Softw. Develop. Companion*, pp. 1-3, May 2018.
Show in Context [CrossRef](#) [Google Scholar](#)
23. A. Wiedemann, M. Wiese and H. Krcmar, "Integrating development and operations in cross-

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

functional teams—toward a DevOps competency model", *Proc. Comput. People Res. Conf.*, pp. 14-19, Jun. 2019.

Show in Context [CrossRef Google Scholar](#)

24. P. Frijs, R. Bierwolf, and T. Zijderhand, "Reframing security in contemporary software development life cycle", *Proc. IEEE Int. Conf. Technol. Manage. Oper. Decisions (ICTMOD)*, pp. 230-236, Nov. 2018.

Show in Context [View Article](#)

[Google Scholar](#)

25. G. S. Cogo, *Understanding DevOps: From its enablers to impact on IT performance*, 2019.

Show in Context [Google Scholar](#)

26. R. Feijter, *Towards the adoption of DevOps in software product organizations: A maturity model approach*, 2017.

Show in Context [Google Scholar](#)

27. A. Virtanen, *Transitioning towards continuous development within an established business organization*, 2017.

Show in Context [Google Scholar](#)

28. D. Edwards, "Introducing DevOps to the traditional enterprise", *InfoQueue/omag Issue*, no. 14, pp. 1-34, Jun. 2014.

Show in Context [Google Scholar](#)

29. E. Bobrov, A. Bucchiarone, A. Capozucca, N. Gualfi, M. Mazzara, A. Naumchev, et al., "DevOps and its philosophy: Education matters!", *arXiv:1904.02469*, 2019.

Show in Context [Google Scholar](#)

30. A. M. Zaki and N. R. Darwish, "Investigation of DevOps: Concepts tools and challenges", *CuTInt. J. Softw. Eng. Technol.*, vol. 11, no. 1, pp. 5, 2019.

Show in Context [Google Scholar](#)

31. C. Mamatha and S. R. Kiran, "Implementation of DevOps architecture in the project development and deployment with help of tools", *Int. J. Sci. Res. Comput. Sci. Eng.*, vol. 6, no. 2, pp. 87-95, Apr. 2018.

Show in Context [Google Scholar](#)

32. T. Masombuka and E. Mukandla, "A DevOps collaboration culture acceptance model", *Proc. Annu. Conf. South Afr. Inst. Comput. Scientists Inf. Technologists*, pp. 279-285, Sep. 2018.

Show in Context [CrossRef Google Scholar](#)

33. F. Elberzhager, "From agile development to DevOps: Going towards faster releases at high-quality experiences from an industrial context", *Proc. Int. Conf. Softw. Qual.*, pp. 33-44, 2017.

Show in Context [CrossRef Google Scholar](#)

34. R. Feijter, *Towards the adoption of DevOps in software product organizations: A maturity model approach*, 2017.

Show in Context [Google Scholar](#)

35. A. Virtanen, *Transitioning towards continuous development within an established business organization*, 2017.

Show in Context [Google Scholar](#)

36. D. Edwards, "Introducing DevOps to the traditional enterprise", *InfoQueue/omag Issue*, no. 14, pp. 1-34, Jun. 2014.

Show in Context [Google Scholar](#)

37. E. Bobrov, A. Bucchiarone, A. Capozucca, N. Gualfi, M. Mazzara, A. Naumchev, et al., "DevOps and its philosophy: Education matters!", *arXiv:1904.02469*, 2019.

Show in Context [Google Scholar](#)

38. A. M. Zaki and N. R. Darwish, "Investigation of DevOps: Concepts tools and challenges", *CuTInt. J. Softw. Eng. Technol.*, vol. 11, no. 1, pp. 5, 2019.

Show in Context [Google Scholar](#)

39. C. Mamatha and S. R. Kiran, "Implementation of DevOps architecture in the project development and deployment with help of tools", *Int. J. Sci. Res. Comput. Sci. Eng.*, vol. 6, no. 2, pp. 87-95, Apr. 2018.

Show in Context [Google Scholar](#)

40. T. Masombuka and E. Mukandla, "A DevOps collaboration culture acceptance model", *Proc. Annu. Conf. South Afr. Inst. Comput. Scientists Inf. Technologists*, pp. 279-285, Sep. 2018.

Show in Context [CrossRef Google Scholar](#)

41. F. Elberzhager, "From agile development to DevOps: Going towards faster releases at high-quality experiences from an industrial context", *Proc. Int. Conf. Softw. Qual.*, pp. 33-44, 2017.

Show in Context [CrossRef Google Scholar](#)

Optimization of surface integrity during dry turning of AISI 4130r steel using design of experiment (DOE), and multiple linear regression model.

Subhash Chandra^{*1}, Gezae Mebrahtu², Kishan Pal Singh³, Shiferaw Semu Dutebo⁴

^{1,2} Manufacturing Engineering, Faculty of Mechanical Technology, Federal TVTI, Lambert, Addis Ababa, Ethiopia. E-mail id: suchandra404@gmail.com, gezaemebrahtu@gmail.com

³ Mechanical Engineering Department, FET, Mangalayatan University, India

⁴ Student MSc Program Manufacturing Engineering, TVTI, Addis Ababa, Ethiopia

*Corresponding author

Abstract

This paper discusses the various machining parameters and tool geometry to optimize surface integrity in dry turning of AISI 4130r steel using carbide-inserted cutting tools. Four process parameters (factors) such as cutting speed, depth of cut, feed rate and tool nose radius have been selected to minimize surface integrity of machined workpieces. Each factor with three levels is considered for developing the regression model and predicting the optimal value of surface roughness that can be obtained for the given work and tool material used. The experiments on the conventional lathe machine were conducted on the basis of Taguchi Design L9 orthogonal array with cutting speed (75.4m/min, 49.5m/min and 35.8m/min), feed rate (0.03mm/min, 0.04mm/min and 0.05 mm/min), depth of cut (1mm, 1.2mm and 1.4mm) and tool nose radius (1mm, 1.25mm and 2mm). Signal to noise ratio analysis identifies that the surface roughness is affected most to least by cutting speed (vc), tool nose radius (r), feed rate (f), and lastly depth of cut (d) having their contributions 45.43%, 44.13%, 9.64% and 0.75% respectively. The multiple regression model acts as the optimization function. Thus, we can obtain the best possible surface roughness under given constraints. The min surface roughness (0.4 micron) is obtainable with cutting speed (75.4m/min), feed rate (0.03mm/min), depth of cut (1.4mm) and tool nose radius (2mm). Once the regression model is developed, what are the values of input parameters for the desired response, i.e. roughness can be calculated. If desired roughness is 1 micron, then input parameters are vc=57.57m/min, f=0.032 mm/min, d=1.31mm, r=1.51mm.

Key words: Surface roughness, design of experiment (DOE), Taguchi design, orthogonal array.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

1. Introduction:

Turning process is the most common method for metal cutting and especially for the finishing of circular machined parts in the manufacturing industries. Application of optimization techniques in turning process is an essential tool for increasing quality of product and minimum manufacturing time to sustain in the manufacturing industries. Getting the optimal value of process parameters for the desired response is cumbersome process. This paper presents the method to develop optimization model and also the input parameters with ranks for their effects on surface roughness. A conventional lathe machine with the CM6241X1000 model was used for investigational study for turning operation. The chemical composition of AISI 4130r steel was confirmed by using Spectrometer machine that mentioned in Table 1.1.

Table 1.1: Chemical composition of work material

| (C) | (Fe) | (Si) | (Mn) | (Mo) | (Ni) | (W) | (Cr) | (Cu) | (Al) |
|---------|--------|---------|---------|---------|----------|----------|---------|----------|-----------|
| 0.383 % | 97.9 % | 0.308 % | 0.978 % | 0.030 % | 0.0321 % | 0.0593 % | 0.146 % | 0.0228 % | 0.00982 % |

Optimization involves the determination of efficient machining parameters such as

cutting speed, feed rate and depth of cut in process planning. These parameters directly affect the production economics of machining processes in terms of meeting the minimum production cost, minimum production time, and maximum production profit. The quality of machined parts is one of the major challenges encountered during the turning process. Therefore, optimum- machining parameters suitable for turning operations must be selected in order to obtain the desired quality of the finished product

2. Literature Review:

Machining processes are the core of manufacturing industry, where raw material is shaped into a desired product by removing unwanted material [Deepak, 2012]. Cutting speed has a dominant effect on surface finish followed by nose radius, feed rate and least effect by depth of cut [M. N. Islam, 2011].

Researchers [Cus and Balic, 2000] study the effect of number of factors such as feed rate, cuttingspeed, depth of cut, work material characteristics, unstable built-up edge, tool nose radius, tool angles, stability of material, tool and work piece setup, use of cutting fluids, radial vibration, tool material, etc., on surface finish. The three primary factors in any basic turning

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

operation are speed, feed, and depth of cut. Quazi T Z, et. al. (2013) has made an attempt to review the literature on optimizing machining parameters in turning processes by Taguchi method. The settings of turning parameters were determined by using Taguchi's experimental design method. Taguchi design and ANOVA to determine the contribution of the cutting speed, feed, and depth of cut to surface roughness [M. Fan, 2014].

Orthogonal arrays of Taguchi, the signal-to-noise (S/N) ratio is used to for optimizing the machining parameters. Xie and Guo [2011] minimized the production cost in multi-pass turnings using GA combines with a pass repeating method. Gupta and Kumar (2015) investigated surface roughness and material removal rate for turning of unidirectional glass fiber reinforced plastics using principal component analysis. Taguchi method used by taking three tool rake angles, two nose radius, three cutting speeds. Feed rate is the factor, which has great influence on surface

roughness, followed by cutting speed [Krahmer, 2020]. Kara, S., Qureshi, F., Li, W., & Herrmann,

C. (2011) have discussed signal to noise (S/N) ratio for smaller-the-better criterion. This analysis was prepared using software MINITAB. Subramanian [2021] carried out optimization of turning parameters for surface roughness using RSM and GA. He describes an experimental study of roughness characteristics of surface generated in CNC turning of AISI 1040 mild steel and optimization of machining parameters based on genetic algorithm. Aaditya Kumar, et al. (2017) have optimized process parameter for material remove rate, surface roughness in turning operation. Wet machining of carbon steel AISI 4045 at various feed rates and depths of cut is done at various cutting speeds to determine the surface roughness. Trial machining was conducted in this investigation using CNC lathe [Fauzi, 2017]. Dry machining eliminates the danger of slippage during machining because it doesn't require coolants, making the workplace cleaner and more comfortable. However, due to the high temperature created by the lack of coolant during dry machining, cutting tool life is reduced [Ogedengbe et al. 2019]. Comparative research of dry and wet is done by A D Ababe [2021].

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

3. Material and Methods:

The research used round bars of AISI 4130r steel, which has strong strength as well as good machinability, as its sample material. The round bars were 30 mm in diameter and 20 mm in length. The

performance characteristic in the analysis of the S/N ratio, these are, lower-the-better, the higher-the-better, and nominal-the-best [Deepak, 2013].

For the smaller-the-better type of problem, S/N ratio being computed using Equation (1).

$$S/N = -10 \log \left(\frac{1}{n} \sum_{i=1}^n y_i^2 \right) \text{-----}$$

For the larger-the-better type of problem, the quality performance characteristic, we would like y to be as large as possible.

chemical composition of material is given in table 1.1. Minitab 21 software is used as fraction factorial Taguchi's L9 Orthogonal array to perform S/N analysis, and ANOVA.

Usually, there are three categories of the

Table 1.2: Work Material and Cutting tool

| | |
|-------------------------------|-------------------|
| Selected work material | AISI 4130r steel |
| Length of work piece | 20 mm |
| Diameter of work piece | 30 mm |
| Lathe used | CM6241X1000 model |
| Cutting tools | carbide-inserted |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

To find the S/N, we turn this into a smaller-the-better problem by using the reciprocal of the performance characteristic. S/N Higher the better

$$S/N = -10 \log \left(\frac{1}{n} \sum_{i=1}^n \frac{1}{y_i^2} \right)$$

quality loss function (Figure 1.1) and uses a statistical measure of performance called Signal-to-Noise (S/N) ratio.

The S/N ratio takes both the mean and the

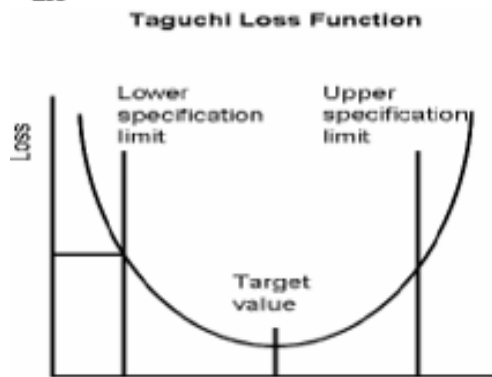


Figure 1.1 Taguchi's quadratic loss function

variability into account. The S/N ratio is the ratio of the mean (Signal) to the standard deviation (Noise). The ratio depends on the quality characteristics of the product/process to be optimized. The work piece details are shown in table 1.2. The four-factor design of 3 level is given in table 1.3. The standard S/N ratios generally used are as follows: Nominal is Best (NB), Lower the Better (LB) and Higher the Better. The full factorial

4. Data Analysis:

Taguchi Method is developed by Dr. Genichi Taguchi, a Japanese quality management consultant. The method explores the concept of quadratic

Table 1.3 Process parameters and levels

| No | Parameters | Units | Level 1 | Level 2 | Level 3 |
|----|-------------------------|--------|---------|---------|---------|
| 1 | cutting speed (V_c) | m/min | 35.8 | 49.5 | 75.4 |
| 2 | feed rate (f) | mm/rev | 0.03 | 0.04 | 0.05 |
| 3 | depth of cut (d) | mm | 1 | 1.2 | 1.4 |
| 4 | Nose radius (r) | mm | 1 | 1.25 | 2 |

design will include (L^F) experiments i.e.

Table 1.4: Taguchi 9 Orthogonal Array and surface roughness.

| Run No | V_c | f | d | r | Ra (μm) |
|--------|-------|------|-----|------|----------------|
| 1 | 35.8 | 0.03 | 1 | 1 | 1.635 |
| 2 | 35.8 | 0.04 | 1.2 | 1.25 | 1.592 |
| 3 | 35.8 | 0.05 | 1.4 | 2 | 1.270 |
| 4 | 49.5 | 0.03 | 1 | 2 | 0.850 |
| 5 | 49.5 | 0.04 | 1.2 | 1 | 1.510 |
| 6 | 49.5 | 0.05 | 1.4 | 1.25 | 1.580 |
| 7 | 75.4 | 0.03 | 1 | 1.25 | 0.836 |
| 8 | 75.4 | 0.04 | 1.2 | 2 | 0.630 |
| 9 | 75.4 | 0.05 | 1.4 | 1 | 1.290 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

=81 experiments: L stands for Levels and F for factors). But Taguchi orthogonal array i.e. fractional factorial design will include only 9 orthogonal array (experiments).

considerations for all the levels are given below in table 1.5.

It is necessary to determine the average response for each of the three control parameters at each of its three levels if there are more than one replication. The S/N ratio for each level of all the factors is calculated by Minitab and is shown in table 1.5.

The same is plotted on graph in figure 1.2.

The cutting velocity is dominating over depth of cut and feed rate. The impact of depth of cut is least.

The following multiple linear regression equation is found using data in table 1.4: Roughness as independent variable and V_c , f , d , and r as predictors.

Regression Equation.

$$Ra(\mu m) = 2.5106 - 0.014731 V_c + 13.650 f - 0.1$$

The equation is used as optimizing function in MS Solver tool either to find most optimal surface roughness or to find values of input parameters for a desired roughness.

Surface roughness values obtained for each experiment for DOE are given below in table 1.4.

The S/N ratio of R_a for the factors under

Table 1.5: Surface Roughness Signal to Noise ratios (Smaller the better) for each level of the four factors.

| Level | Cutting velocity | Feed rate | Depth of cut | Nose radius |
|-------|------------------|-----------|--------------|-------------|
| 1 | 1.4990 | 1.1070 | 1.2817 | 1.4783 |
| 2 | 1.3133 | 1.2440 | 1.2440 | 1.3360 |
| 3 | 0.9187 | 1.3800 | 1.2053 | 0.9167 |
| Delta | 0.5803 | 0.2730 | 0.0763 | 0.5617 |
| Rank | 1 | 3 | 4 | 2 |

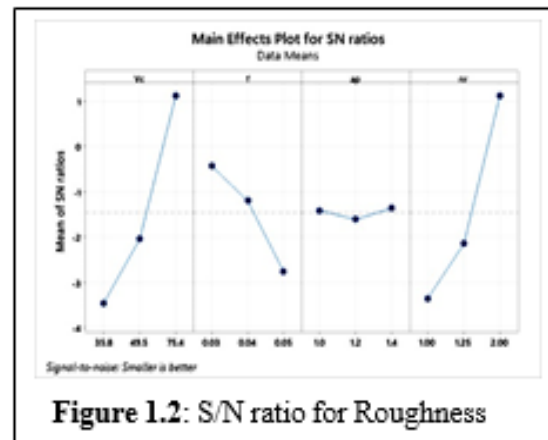


Figure 1.2: S/N ratio for Roughness

To get surface roughness of $1 \mu m$
 $V_c = 57.57 m/min$, $f = 0.032 mm/rev$,
 $d = 1.32 mm$, and nose radius $r = 1.52 mm$.
 The most optimal surface roughness can be obtained under given constraints.

Optimal surface roughness = $0.414 \mu m$

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

and the values of input process parameters;

$V_c = 75.4 \text{ m/min}$, $f = 0.03 \text{ mm/rev}$, $d = 1.4 \text{ mm}$,
and nose radius $r = 2 \text{ mm}$

5. Results and discussions:

It is evident from the S/N ratio that the order of high impact to low impact on surface roughness by process parameters is cutting velocity $V_c \rightarrow$ nose radius $r \rightarrow$ feed rate $f \rightarrow$ depth of cut d .

The linear regression model developed is applicable to given work material and tool material. Any machinist or operator using any cutting velocity, depth of cut, feed rate and nose radius can calculate what will be the surface roughness produced by the turning machine. If the objective is to produce a certain roughness as per product specification, then the values of input parameters can be obtained very easily.

6. Conclusion:

The present paper gives an insight as to how roughness model can be developed for given machining parameters. The same model can be developed for material removal rate. High material removal rate can save cutting time thus increase the productivity. This paper has considered fraction factorial Taguchi design rather full factorial design. This reduces the experimental time and cost and still

provides the same results in terms of coefficients of linear regression model and ranking of parameters.

7. References

1. Deepak, S. S. K. (2012), A Geometric Programming Model for Production Rate Optimization of Turning Process with Experimental Validation, International Journal of Engineering Research and Applications (IJERA). Vol. 2(5), 1544-1549
2. Deepak Pal et. al. (2013), Optimization of Turning Process Parameters for Their Effect on En 8 steel Material Work piece Hardness by Using Taguchi Parametric Optimization Method" International Journal of Mechanical and Industrial Engineering (IJMIE), Volume-1, Issue-3.
3. M. N. Islam (2011), An investigation of surface finish in dry turning, Proceedings of the World Congress on Engineering, Vol I, WCE, July 6 - 8, London, U.K.
4. Cus F and Balic J (2000), Selection of Cutting Conditions and Tool Flow in Flexible Manufacturing System, the International Journal for Manufacturing Science and Technology, Vol. 2, pp. 101-106.
5. S. Xie, Y. Guo, et. al. (2011), Intelligent Selection of Machining Parameters in Multi-pass Turnings Using a GA-based Approach, journal of computational information system, vol. 7:5, pp. 1714-1721.

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024

6. Gupta, Kumar (2015), Investigation of surface roughness and MRR for turning of UD-GFRP using PCA and Taguchi method, Engineering Science and Technology, an International Journal, vol. 18, pp-70-81.
7. Kara, S., Qureshi, F., Li, W., & Herrmann, C. (2011), Unit process energy consumption models for material removal processes. CIRP Annals, 60, 37-40.
8. Subramanian, P., et.al. (2021) "Optimization of process parameters for CN turning of Al7075- T6 using RSM and GA to minimize the vibration amplitude." Advances in Natural and Applied Sciences, vol. 11, no. 4, 2017, p. 250+. Accessed 12 June 2021.
9. A. D. Abebe, M. G. Jiru, G. Kabeta, and A. Science, "Comparative Study on Dry and Wet Machining During Double Tool Turning of AISI 1045 Steel," vol. 8, no. 9, pp. 71–101, 2021.
10. Aaditya Kumar Sunil Kumar Yadav (2017), Optimization of Process Parameters in Turning Operation – A Review, - International Journal for Scientific Research & Development| Vol. 4, Issue 11, 2017 | ISSN (online): 2321-061
11. D. M. Krahmer, G. Urbicain, and A. J. S. Egea, "Dry machinability analyses between free cutting, resulfurized, and carbon steels," Mater. Manuf. Process., vol. 00, no. 00, pp. 1–9, 2020, doi: 10.1080/10426914.2020.1734615.
12. T. S. Ogedengbe et al., "The Effects of Heat Generation on Cutting Tool and Machined Workpiece," J. Phys. Conf. Ser., vol. 1378, no. 2, 2019, doi: 10.1088/17426596/1378/2/022012
13. T. N. Fauzi et al., "Study on Surface Integrity of AISI 1045 Carbon Steel

when machined by Carbide Cutting Tool under wet conditions no. January, 2017, doi: 10.1051/matec/conf/20179701075

"Transformative Approaches to Physical Education and Education in Higher Learning Institutions: Leveraging Smart Technologies"

1. Dr. I. M. MAKKUBHAI

M.P.Ed.,
M.A., N.I.S.,
M.Phil.,
Ph.D., Ph.D.

Assistant Professor / Head Department of Physical Education and Sports
Nehru Arts, Science and Commerce College Hubballi Karnataka India

2. AVIA KRIPA D'SOUZA

M.Ed., (Ph.D.)

Head Mistress, St. Ann's High School, Nelamangala, Bengaluru Karnataka India

3. Prof. K. KALEEMULLA

M.P.Ed., M.Phil., (Ph.D.)

Assistant Professor / Head Department of Physical Education and Sports
Anjuman Arts, Science, Commerce College and P. G. Centre, Anjuman Abad,
Karnataka India

4. Prof. SHARADAMMA B.

M.P.Ed., M.Phil., (Ph.D.)

Assistant Professor / Head Department of Physical Education and Sports
Government First Grade College Gauribidanur, Chikkaballapur Karnataka India

ABSTRACT

In the rapidly evolving landscape of higher education, the integration of smart technologies has emerged as a transformative force, particularly within the realm of physical education. This paper explores the profound impact of leveraging smart technologies to enhance both the delivery of physical education and overall educational practices in higher learning institutions. By adopting innovative approaches such as wearable devices, virtual reality simulations, and data analytics, educators can revolutionize traditional pedagogical methods, offering more personalized and interactive learning experiences. This paper synthesizes current research findings and practical implementations, shedding light on the potential benefits and challenges associated with integrating smart technologies into physical education and education more broadly. Furthermore, it examines the implications for student engagement, performance, and overall well-being, as well as the implications for faculty professional development and institutional policies. Ultimately, this paper underscores the importance of embracing transformative approaches in leveraging smart technologies to advance physical education and education within higher learning institutions, paving the way for a more dynamic and effective learning environment in the digital age.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Keywords: Transformative, Physical education, Higher learning institutions, Smart technologies, Wearable devices, Virtual reality, Digital age.

1. INTRODUCTION

In the contemporary landscape of higher education, the convergence of digital technologies and pedagogical innovation has ushered in a new era of transformative approaches to teaching and learning. Across various disciplines, educators are increasingly leveraging smart technologies to enhance educational experiences, promote student engagement, and achieve learning outcomes. One area where this transformation is particularly evident is in the domain of physical education within higher learning institutions. Traditional models of physical education instruction are being re-imagined and revitalized through the integration of smart technologies, offering unprecedented opportunities for both educators and students. The aim of this research paper is to explore the multifaceted dimensions of leveraging smart technologies to advance physical education and education more broadly in higher learning institutions. By examining current trends, research findings, and practical implementations, this paper seeks to provide insights into the potential benefits, challenges, and implications of adopting transformative approaches in this domain.

Physical education holds a unique position within the academic landscape, encompassing not only the development of physical fitness and motor skills but also promoting holistic well-being and lifelong health habits. Traditionally, physical education curricula have been characterized by standardized activities and assessments, often overlooking individual differences and preferences. However, the advent of smart technologies offers the promise of personalized and adaptive learning experiences tailored to the unique needs and abilities of each student. Central to the discussion is the role of wearable devices in monitoring and tracking physical activity, providing real-time feedback, and facilitating data-driven instruction. Wearable technologies such as fitness trackers, smart watches, and heart rate monitors enable students to quantify their performance, set personalized goals, and monitor progress over time. Moreover, these devices offer opportunities for gamification, social interaction, and immersive experiences, enhancing motivation and engagement among students.

Furthermore, virtual reality (VR) simulations have emerged as a powerful tool for experiential learning in physical education. By immersing students in virtual environments, VR technology allows for the exploration of diverse physical activities, environments, and scenarios that may not be feasible or accessible in traditional settings. From simulated sports competitions to interactive fitness challenges, VR simulations offer a safe and dynamic platform for skill development, decision-making, and teamwork. In addition to enhancing student experiences, the integration of smart technologies in physical education also holds implications for faculty professional development and institutional policies. Educators must adapt to new pedagogical approaches, acquire technical skills, and navigate ethical considerations related to data privacy and security. Moreover, institutions must invest in infrastructure, support services, and policies that foster an inclusive and equitable learning environment for all students.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024



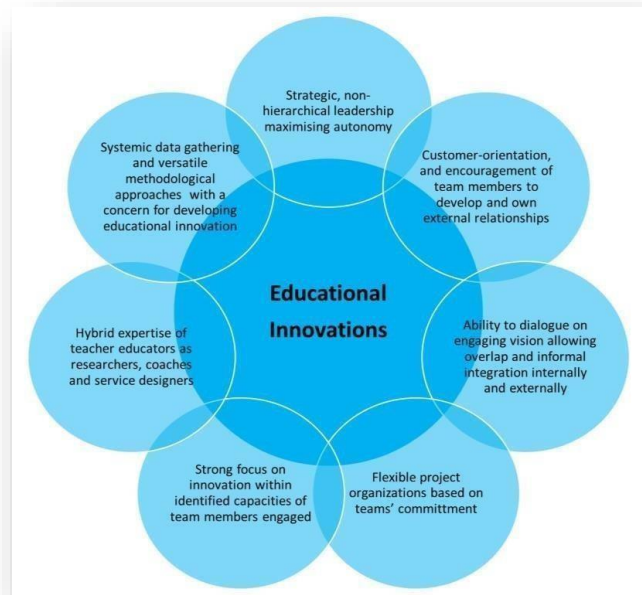
In summary, this research paper aims to shed light on the transformative potential of leveraging smart technologies in physical education and education within higher learning institutions. By exploring the integration of wearable devices, virtual reality simulations, and other smart technologies, this paper seeks to contribute to the ongoing dialogue surrounding innovative pedagogical practices, student engagement, and educational outcomes in the digital age.

2. The Consequential of College Physical Education and Education Teaching Innovation under the Smart Technologies

College education advocates innovative education, and advocates that students participate in teaching through the guidance and inspiration of teachers. At present, my country's higher education still has deficiencies in educational innovation, especially in physical education, the original teaching concepts and teaching methods are still retained. Innovation, so that all physical education activities are carried out around the Internet, teachers teach through the Internet, students learn online, and there are many online teaching forms, such as MOOCs, micro-courses, quality resource sharing courses and video publicity.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024



These will help the physical education of colleges and universities to break through the time and space limitations existing in traditional teaching, realize teachers' teaching in accordance with their aptitude and teaching at different levels, and also make students' learning more autonomous, make full use of fragmented time for learning, and improve learning's efficiency.

3. Its Situation & Development of Physical Education, Education Teaching in Colleges & Universities

Classroom Haphazard

Physical education, education classes are often regarded as unimportant classes by students, which is closely related to the examination-oriented education students received in the early days. Therefore, in college physical education classes, there is often a phenomenon of loose classrooms, and students are on the edge of the classroom. Even if teachers assign corresponding physical education tasks in class, students are not able to complete them well. Students are relatively loose in physical education, education classes, which to a certain extent reflects that students did not take physical education as their main subject in the process of growing up. At the university stage, the main purpose of students to study sports is for their own credits and grades, not to really fall in love with sports, nor to keep fit, so students are relatively loose in the classroom and cannot learn from the physical education class. Gaining more sports knowledge will not improve your physique.

Students do not develop good exercise habits

With the development of the economy, people's material living conditions are getting better and better, and college students are becoming more and more lazy in the process of growing up. This is a visible fact. College students have not developed good exercise habits, which is closely related to their daily routines and daily habits. During the process of growth and learning, due to the emergence of electronic products such as mobile phones and computers, their lifestyles have changed. In order to change, they exercise less, which leads to a serious decline in their physical quality, so in the process of physical education, students are not

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

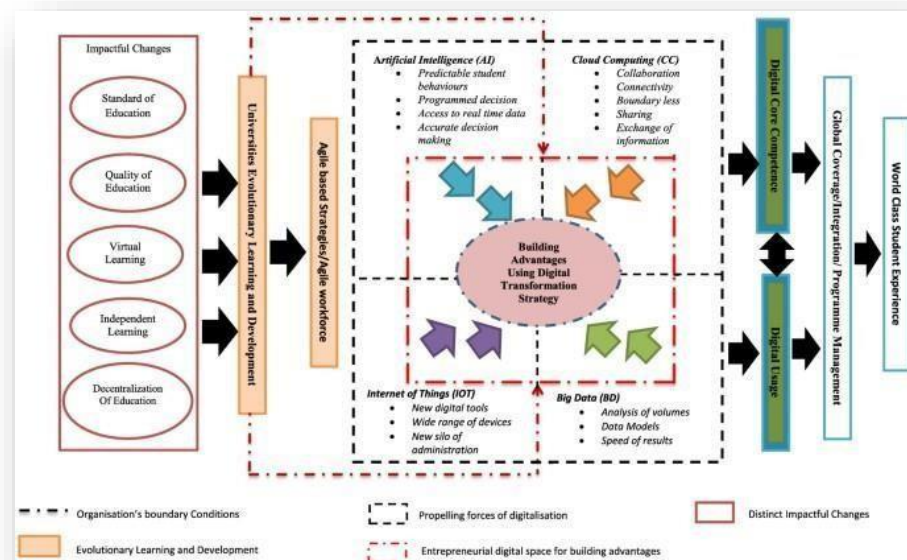
interested in sports, thinking that their sports are not as good as electronic products, which can bring their own The excitement of college students is strong, so in the process of college students' physical education, due to the decline of their physical fitness, they cannot meet their psychological needs in the physical education class.

4. Tactics to realize the Innovation of Physical Education, Education in Colleges and Universities under the Smart Technologies

Change the traditional teaching concept

Influenced by the traditional physical education teaching concept, there is still such a phenomenon in the physical education teaching of most colleges and universities in my country: teachers instill a lot of theoretical information into students through theoretical classes, in practical classes, teachers make demonstrations, and students imitate teachers to learn, This method of teaching seems to improve teaching efficiency, but in fact it ignores the main role of students, and students will be disgusted with physical education in the long run.

Based on the smart technologies, innovative physical education teaching can use information technology to transmit relevant knowledge and information. Through the use of mobile Internet, teachers can transmit relevant knowledge to students in the form of micro-courses in their spare time. There are both in-class tutoring and after-class supplements, which will definitely play a role in promoting the physical development of students. With the rapid development of the mobile Internet many communication software's have been developed one after another, such as QQ, which is commonly used by us. During the teaching process, teachers and students can discuss certain issues on these communication platforms. During the discussion, students also Actively participate in teaching and management, so as to form a positive and interactive teaching atmosphere.



Teachers can also publish teaching methods, teaching content, teaching steps, etc. on the exchange platform, so that students have a general understanding of the knowledge to be learned, so that they will not appear in a hurry in the classroom, which is conducive to the

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

smooth development of physical education teaching. In addition, students can put forward some opinions to teachers through the Internet according to their own understanding, thus avoiding some embarrassment and saving a lot of time. Teachers seriously think about the deficiencies in teaching according to the suggestions made by students, and make improvements, so as to improve their own teaching. At the same time, it also achieves the purpose of teaching and learning

Utilizations of Smart technologies to strengthen independent learning

The task of higher education is not only to cultivate students' overall development of morality, intelligence, physique, beauty and labor, but also to cultivate students' autonomous learning ability, so that students can establish the concept of lifelong learning, learn to learn, and become qualified socialist builders and teachers. Under the smart technologies, colleges and universities can develop MOOCs, sports quality resource sharing courses and sports video open courses, and advocate that students use smart phones, tablet computers and other network information devices to learn sports knowledge independently according to their needs. For example, a yoga teacher can record standard yoga exercises, in which the technical essentials should be narrated or narrated together with the exercises using an online platform to build an online course for students to learn, so that students can combine the technical essentials to practice yoga movements, Really integrate the two and enter the realm of yoga.

5. Adhere to the Wisdom of Teaching Methods & Promote the Three-Dimensional Teaching Content

In the process of traditional physical education in colleges and universities, teachers usually adopt the following methods. First, the sheep-herding style, teachers give students full freedom of study in the classroom. Second, the "3+2 style", the teacher will lead the students to prepare for jogging for three laps, and then lead the students to relax for two laps. The rest of the time is left to the students' independent physical fitness exercises and activities. , the learning initiative is poor, and this autonomous teaching method cannot guarantee the teaching quality of the course. Third, the option type, students can choose their favorite special projects to practice before the class starts, and with the support of the Internet big data platform and intelligent equipment, they can obtain a more scientific and intelligent sports experience. Based on the teaching activities supported by the smart physical education system in colleges and universities, students can get the following good experiences that are different from traditional teaching methods.

Intelligent sports classroom

The intelligent college physical education teaching system is equipped with professional electronic classrooms for students to meet the individual learning needs of students. Teachers can comprehensively evaluate students' physical fitness and athletic ability through the equipped physical health equipment, and help students formulate scientific study plans and exercise prescriptions. By issuing sports bracelets to students or guiding students to install related sports APPs on their mobile phones, it helps students to realize real-time data recording during exercise, reasonably analyze exercise intensity, build students' complete exercise files, and provide students with personalized guidance services.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

In addition, the classroom is equipped with virtual reality and sports simulation technology, which can be used in extreme weather or physical education situations with limited conditions. For example, on rainy days, students cannot complete tennis learning activities outdoors. However, students can come to the smart electric classroom, turn on the smart terminal, and use the smart webcam with the sensor chip to practice. Some high-end projects, such as golf, have stricter requirements on the venue, which reduces students' interest in learning to a certain extent.

Based on this situation, virtual reality technology can provide students with golf clubs with sensing equipment. Experience realistic golf in a picturesque meadow. The three-dimensional scene and real-time data feedback supported by the smart classroom make the mechanical golf more vivid. In addition, this technology can also be applied to fierce confrontation projects such as Sanda and boxing. Teachers can give appropriate guidance to students through intelligent monitoring devices such as smart bracelets to avoid accidents. In the early stage of intense exercise, teachers should use professional physical fitness testing equipment to measure students' cardiopulmonary function and body fat ratio and other technical data, and make reasonable training plans for students after mastering the students' basic information.

6. Approach to Innovate & Build an Efficient & Intelligent Physical Education, Education System

Use Smart Technologies to promote the reform of physical education, education teaching in colleges and universities

Smart Technologies thinking is an open, innovative and shared thinking. In college physical education classrooms, every teacher should not rest on their laurels, but should use open, innovative and shared thinking to promote the continuous development of college physical education classrooms. Each teacher puts forward his own point of view so that other teachers can know his own point of view. At the same time, if other teachers feel that a certain classroom format is good and adapts to the development of their own classrooms, they can use this model to play the function of book education. value. Therefore, the use of Internet thinking should carry out exploration and transformation of physical education teaching. Physical education should try to form various online teaching modes. Through this method, the wisdom of physical education teaching can come alive and the sports in colleges and universities can take off. The main purpose of applying smart physical education in physical education classroom is to let students feel the efforts made by teachers in promoting the development of physical education classroom. Therefore, teachers not only need to use Internet thinking, but students also need to use Internet thinking to play the role of smart sports in the classroom.

Accentuation on intra-curricular and extra-curricular activities to promote the diversification of the evaluation system

In the process of building a physical education, education classroom, we must build a large curriculum view of life, not only to strengthen the construction of the connotation of the classroom, but also to let students develop the habit of physical exercise outside the classroom. Extra-curricular exercise and intra-curricular physical education are an organically linked

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

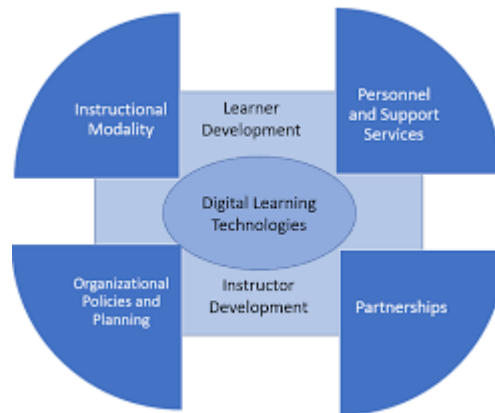
system. In this way, students can pay attention to the importance of extra-curricular exercise. When encouraging students to exercise after class, they can adopt a diversified evaluation system, ranging from Comprehensive assessment of students' exercise from multiple dimensions can mobilize their enthusiasm for extracurricular exercise, prevent them from exercising only in the classroom and fail to achieve the effect of physical education, and promote students to actively participate in exercise outside of class, so that Results of sports performance are more reliable. In addition, in the development of college sports classrooms, smart instruments can also be used to assess students' extracurricular exercise. For example, a big data platform can be used to collect statistics on students' extracurricular exercise. As long as students install relevant information on their mobile phones equipment, then enter your student number, physical fitness test and other information in the corresponding management system. The school's academic affairs office can incorporate all situations of students' physical exercise outside of class into the performance evaluation system, which can not only reduce physical education teachers workload. Supervise and manage work, and also help students to exercise better outside of class.

Harnessing the three-dimensional form to carry out the teaching of complex techniques

Physical education, education in colleges and universities is not limited to the improvement of students' physical fitness, but also to cultivate students' psychological quality, so that students can achieve a comprehensive and healthy development of body and mind. In physical education, complex physical activity technology is the focus of physical education, education in colleges and universities, and it is also a difficult point for students to learn, such as shot put throwing, triple jump and so on. Aiming at the teaching problems of such complex sports technology, in actual teaching, in order to help students master this kind of sports technology faster and more accurately, physical education teachers must combine sports technology teaching with practice. However, in the actual teaching process of complex sports technology, many factors such as teaching experience, teachers' physical quality and psychology will affect the teaching of sports technology, resulting in non-standard sports movements, and thus affecting the understanding process of students. In response to this problem, in the teaching process, physical education teachers can combine television, online video and other media with strong three-dimensional sense to carry out concrete teaching of complex physical activity technology, and use video courseware to repeat and slow down. Standardized display of sexual sports technology and specific explanations of each detail and action, so as to use novel ways to display sports technology, thereby attracting students attention and stimulating students interest in learning, so as to improve sports activities. Lay the foundation for development, so as to achieve the improvement of the level of physical education in colleges and universities.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024



In the physical education, education teaching in colleges and universities, combining the three-dimensional media to teach the complex sports technology and related knowledge can make the students' physical and mental development in an all-round and healthy way, and also meet the relevant requirements of quality education. By promoting the combination of physical education and Internet technology in colleges and universities, using more attractive and novel teaching methods to carry out physical education work, and strengthening the communication between students and the Internet, it can better stimulate students' enthusiasm for learning, and is conducive to training And to improve students' divergent thinking and innovative thinking, to promote students to be able to develop in an all-round way. For example, when teaching football and its related knowledge and skills, college physical education teachers can design appropriate multimedia courseware for different teaching contents. For example, for the "offside" rule in football, they can find some football games, screen out the game clips with offside behavior and make them into multimedia courseware. In classroom teaching, physical education teachers can use multimedia equipment to display videos or pictures involving "off sides" formulated before class, so as to help students more accurately distinguish off sides from off sides.

7. Conclusion

The integration of smart technologies presents transformative opportunities for advancing physical education and education more broadly in higher learning institutions. Through the adoption of innovative approaches such as wearable devices, virtual reality simulations, and data analytics, educators can revolutionize traditional pedagogical methods, offering personalized, interactive, and immersive learning experiences for students.

The research presented in this paper has highlighted the potential benefits of leveraging smart technologies in physical education, including enhanced student engagement, motivation, and skill development. Wearable devices enable students to track their physical activity, set goals, and receive real-time feedback, promoting a sense of ownership over their health and fitness. Virtual reality simulations offer opportunities for experiential learning, allowing students to explore diverse activities and environments in a safe and dynamic manner. Moreover, the integration of smart technologies holds implications for faculty professional development and institutional policies. Educators must adapt to new pedagogical approaches, acquire technical skills, and address ethical considerations related to data privacy and security. Institutions must invest in infrastructure, support services, and policies that foster an inclusive and equitable learning environment for all students.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

Looking ahead, further research is needed to explore the long-term effects and outcomes of integrating smart technologies in physical education and education. Additionally, continued collaboration between researchers, educators, policymakers, and technology developers is essential to ensure that smart technologies are effectively utilized to support teaching and learning goals. By embracing transformative approaches and leveraging smart technologies, higher learning institutions can enhance the quality, accessibility, and effectiveness of physical education and education, ultimately empowering students to thrive in the digital age and beyond.

REFERENCES

1. Anderson, M., & Chabot, E. (2019). Integrating wearable technology into physical education: A systematic review. *Journal of Teaching in Physical Education*, 38(1), 76-85.
2. Chen, L., & Russo, C. J. (2020). Virtual reality in physical education: A review of recent literature. *Journal of Teaching in Physical Education*, 39(1), 102-112.
3. Fitzpatrick, A., & Sanderson, M. (2018). Wearable technology and its implications for pedagogy in physical education teacher education. *Sport, Education and Society*, 23(6), 557-569.
4. Gibbone, A., & Oliver, K. (2019). The role of wearable technology in physical education: A systematic review. *Journal of Physical Education, Recreation & Dance*, 90(5), 8-15.
5. Gillett-Swan, J. (2017). The challenges of wearable devices in all levels of physical education. *Physical Education and Sport Pedagogy*, 22(5), 503-516.
6. Greenleaf, C., & Heilig, A. (2019). Virtual reality applications in physical education: A review of literature. *Journal of Teaching in Physical Education*, 38(4), 373-381.
7. Liu, J., & Plowman, T. (2020). Wearable technology in physical education: A systematic review. *Journal of Physical Education, Recreation & Dance*, 91(3), 43-49.
8. McMahon, E., & Penney, D. (2019). The potential of wearable technology in physical education: A literature review. *European Physical Education Review*, 25(4), 1079-1096.
9. Muller, A., & Appel, A. (2018). The impact of virtual reality on learning in physical education: A systematic review. *Journal of Teaching in Physical Education*, 37(3), 254- 263.
10. Zeagler, C., & Forrester, S. (2017). Wearable technology in physical education: Student and teacher perspectives. *Journal of Physical Education, Recreation & Dance*, 88(8), 46-51

THEMES AND TECHNIQUES OF AUTOBIOGRAPHICAL ELEMENT WITH SPECIAL FOCUS TO KAMALA DAS AND ADRIENNE RICH WORKS

RAJAT MISHRA
Enrollment No. AR19BPHDEL002
ENGLISH
Dr. SHOBHA SHARMA
Supervisor
SARDAR PATEL UNIVERSITY, BALAGHAT

Abstract:

It has drawn comparisons between Kamala Das and Adrienne Rich's cognitive processes and autobiographical reflection in their poems in this particular situation. The cultures of Adrienne Rich and Kamala Das are very different from one another. Indian society has never been thought to be as developed as American culture. Due to practices like child marriage, the murdering of unborn children, dowries, the lack of equal rights for women, and the status of women in general, Indian society is seen as archaic and tradition-bound, and even though advancements can be beneficial, changes are not readily welcomed. In this article, themes and techniques of autobiographical element with special focus to kamala das and Adrienne rich works has been discussed.

Keywords: Autobiographical Element, Kamala Das, Adrienne Rich.

INTRODUCTION:

The poetry of Kamala Das bears witness to the catastrophic effects of societal oppression on women in India. When it comes to American society, these kinds of social problems don't exist. Traditional customs do not bind or chain women; they are aware of their rights. However, the way the human mind functions in two quite distinct social and cultural contexts is nearly identical. Kamala Das, an Indian woman from an ordinary middle-class household who did not benefit from schooling, sounded a lot like her highly educated American counterpart, who lived in a society that had supposedly progressed and had a long history of feminism and women's emancipation. These authors' poems frequently contain autobiographical information, whether on purpose or by accident.

AUTOBIOGRAPHICAL ELEMENT:

These two women had very fond memories of their grandmother. Rich tells us about both her paternal and maternal grandmothers in her poem "Grandmothers." She describes her maternal grandmother, Mary Gravely Jones, who seldom visited them, in the opening section of the poem:

Grandmother Jones was the formal guest under my father's roof, and we didn't have any nicknames or diminutives for her. She was a rare visitor.

She talks about her memories and how her life may have ended differently if she had been able to give her creativity a genuine outlet. Her mentality revolves around the idea that her potential was wasted and that neither marriage nor children could have helped her develop her gifts. Rich remembers spending a summer evening with her grandmother. She writes:

You sat with my sister and me one summer night.

Long after dusk, the wooden glider held us there with torrents of suppressed speech.

You looked as though your emerald eyes were clinched against resistance, and you could quote every poet I had ever heard of, including Amiel, Bernard Shaw, and The Opium Eater.

She discusses her paternal grandma, Hattie Rice Rich, in the second poem in Grandmothers. She recalls that she catered to everyone's needs and that her friendly demeanor made other people's lives easier.

Everyone found your kindness of soul to be convenient.

How you boiled your own egg, woke up with the birds and the kids,

Hours of fishing on a pier with your umbrella out,

took the streetcar to go shopping in the city. For-

ever at your son's whim

We also learn that, as a widow without a real home, her grandmother spent the last years of her life traveling between Rich's father and his sister.

You were always just "Anana," not "Grandmother Rich."

Despite having personal wealth, Hattie, the widow of Samuel, was without a matriarch and lived among her children and grandchildren.

In Kamala Das's memories, her grandmother was never far away. Her poetry frequently conveys the impression of grandma. Her grandmother comes to mind every time she looks out to sea. She discusses the profound love and understanding she experienced from her grandmother in her family home in her poem "My Grandmother's House." With nostalgia, she says:

There used to be a house far away from me where I used to feel loved.

We also find references from her grandmother, who tells us about the time she went to her hometown and her grandma asked her to stay the night. In her poem "Composition," she pens:

I was requested to stay one night at the former family house by my grandma.

We'll chat, darling, she said.

We'll talk all night long.

Another poem, "Nani," from the collection "The Old Playhouse and Other Poems," tells of a grandmother's desire for her granddaughter to move past any negative experiences that might have an impact on her life.

These poets' poems don't list the events in their lives in any particular chronological order. It flashes through their recollections at different times. We learn about the individuals who have impacted their lives in one way or another. Their relationship with their family members and how they remember them are documented in their poetry.

In contrast to Kamala Das's loving grandma, her father comes across as a self-centered monster who never made an effort to comprehend her wants or feelings. According to Das, she is the one to blame for all the hardships she experienced in life. If she's fallen short

My way, and now ask for love—if not in modest change—at the door of a stranger?

She adds that she was completely unprepared for her marriage, which his father arranged. She always associates her father with having condemned her to hell. She composes "An Introduction," a poem.

Well, it seems like it. I asked for love, not knowing what else to ask for, and he pulled a sixteen-year-old into the bedroom before shutting the door. Even though he didn't beat me, my depressed body felt like it had.

Even though she frequently berated her father for not loving her, she still harbored some affection for him. She writes in her poem "My Father's Death" that throughout her father's hospitalization and coma:

Well, well, well, well. My father was the one I feared.

He only seemed close to me while he was in a coma, and I whispered my love for him to him.

Wholeheartedly, she yearned for his affection. She hoped that you had asked me honestly who I was and that you had hugged me once, father, and held me to your breast.

Rich and her father have a close bond, whereas Das does not. In her poem "After Dark," she expresses her sorrow at her father's passing and laments the end of their relationship, all the while remembering her resentment and annoyance at his condescending behavior toward her and his continual monitoring of her texts. She was appreciative of him at the same time, since he was the first to see her ability and make her pursue it. It was he who demanded that she become a proficient poet and woman of letters by learning the craft of poetry and mastering rhymes and metric. She claims that he was the one who knew her the best.

Years of hardship, places I went, and even languages I didn't know well—I know you better than you know yourself. I have a deeper understanding of you than you do. I knew you till I hobbled away, ripped from my roots, and self-maintained.

In the poem "Sources," she makes a similar reference to her father and discusses how he raised her like a son, but she also admits that there are moments when he treats her cruelly, which makes her ideal for poetry. She also criticizes him for raising her without acknowledging her Jewish heritage.

I battled with you for years over your classifications, theories, will, and the cruelty that was inescapably linked to your love.

I'd been carrying on arguments with you in my brain for years.

I imagined myself as the oldest daughter in a household without a male, brought up as a son, educated to read and write with reverence, and taught to study but not to pray.

Why poets share details of their own lives is a question that arises when we read such autobiographical poetry or memoirs. What kind of impression do these writers and poets hope to make on their readers? Canker provides a really articulate response to these queries. He claims that someone wrote it.

In order to survey the enormous expanse of his own soul, react painfully and tremblingly from one abyss of his soul to another, and seek the light of day, he must not by any means put himself on display like a prostitute. This is his sole purpose. (Irena Avesenik Nabergoj, "Reality and truth in literature: from ancient to modern European literature")

Therefore, we might define autobiographical reflection as an echo of the poet's personal experiences and memories of those experiences.

Kamala Das's poems reveal that her marriage was a living hell. Her lover was imprisoned by "skin lazy hunger," unable to reach her soul. Her womanly figure pleased him. She says in "The Old Playhouse":

You were happy with my body's reaction, the weather, and my typical shallow convulsions. Your spit-
tle trickled into my mouth, filling every nook and crevice, and your bitter-sweet liquids embalmed my
weak lust.

She goes on to say that. Cowering

Under your hideous ego, I consumed the magic loaf and shrank down to dwarf size. I murmured mean-
ingless answers to all of your questions since I had lost all motivation and rationality.

She makes a comparison between her husband's hand and a hooded serpent in her poem "The Stone
Age."

Ask me, everyone, what he perceives in me and why he is referred to as a lion.

During his free time, he should describe the flavor of his mouth and explain why his hand sways prior
to clasping my pubis like a hooded snake. Why does he lean across my breasts and sleep like a fallen
giant tree? Why is love so fleeting and life so short?

Her husband was unable to see past her physical appearance; therefore, the things she yearned for
remained unrealized dreams. Her writings occasionally mirror these things, which were so vividly im-
printed in her mind. She began looking for love outside of marriage as a result of her husband's inaction,
and we learn more about this from her poems in "An Introduction."

All rights reserved. I loved a man that I met. He is every man who desires a woman, just as I am every woman seeking love. Call him what you will. In me, the oceans' ceaseless waiting, and in him, the ravenous hurry of rivers.

She also pens a poem titled "Substitute."

Love then turned into a reversible door.

One departed, and another entered.

Then I became overwhelmed, as always, in my arms.

Served as a stand-in for another stand-in.

Well, what use was it to explain? The mob had no names and no faces.

Rich fully embraced womanhood and expected everything to be as prosperous as her academic and writing careers, but she discovered that having children was far more difficult than she had imagined. She was fighting for her identity as a woman, and she wanted to win. She poses the query:

Not that everything is completed flawlessly, but is it completed at all? Indeed, consider the odds! or ignore them indefinitely.

Rich experienced the same yearning for love in her married life that Das did, but all he got was passion masquerading as love. In her poem "Two Songs," she says:

He seems incredibly attractive to me all day, like a treasure one could ruin their tranquility for.

If love didn't require so many years, I would refer to it as love, but lust is also a gem, a lovely blossom, and what pure joy it is to know that all of our deep questions are bred into a vibrant animal.

In a world dominated by men, Rich discovers that women are relegated to the status of bodies. In the poem "Planetarium," she makes the following claim:

In an attempt to convert pulsations into visuals for physical comfort and mental repair, I am a woman-

shaped instrument.

Rich made the decision to divorce her spouse because she felt suffocated in her marriage. But she was unable to fully detach from her thoughts. She had unspoken feelings of concern for his first husband. She called him as soon as she learned of his poor health because she wanted to save him. Her poem "For the Dead" captures this moment in her life:

I had a dream that I gave you a call.

Saying: Take better care of yourself, but you weren't well and couldn't respond.

This is how my love is wasted.

Attempting to protect you from yourself I've always been curious about the residue.

Water of energy pouring down a slope

long after the last drop of rain.

She was unable to move on from her first husband's death, and memories of him would constantly rush across her head. In "From a Survivor," a poem:

She discusses the nature of her relationship with him.

The agreement we reached was just the typical agreement between a man and a woman back then—I'm not sure who we believed we were—that our personalities could withstand the defeat of the race. She claims that his body is just as vivid as it used to be and that she can clearly feel her feelings for him.

Functioning of mind does not have any fixed order. Streams of memory can flow in any direction.

CONCLUSION:

Adrienne Rich, like Kamala Das, was not content with her status as a conventional wife, mother, and housewife. Although she was intelligent and had a creative mind that seeks and develops opportunities, she felt confined by her duty as a housewife, which clogged her thoughts and made her life unpleasant. She was becoming less of a poet and was overworked with housekeeping duties. She describes this predicament in her poem "Snapshots of a Daughter-in-Law":

Your mind is currently rotting away like a wedding cake, crumbling beneath the sharp edge of simple

fact, rich with rumors, suspicion, and fantasy, and heavy with worthless experience. At the height of your abilities.

She likens her spouse to a monster that is obliterating her dreams.

A reflective lady sleeps with monsters; she becomes the beak that clutches.

REFERENCES:

Adrienne Rich: Adrienne Rich's Poetry, Op-cit, Page 12.

Adrienne Rich: Adrienne Rich's Poetry, Op-cit, Page 13.

Adrienne Rich: Adrienne Rich's Poetry, Op-cit, Page 28.

Adrienne Rich: Selected and New, W.W. Norton & Company, Newyork, Page 221.

Adrienne Rich: sources, W.W. Norton & Company, Newyork, 1983, Page 6.

Irena Avesenik Nabergoj: Reality and truth in literature: from ancient to Modern European literature.

Kamala Das: Only Soul Knows How to Sing, Page 146.

Kamala Das: Only Soul Knows How to Sing, Page 38.

Kamala Das: Only Soul Knows How to Sing, Page 65.

Kamala Das: Only Soul Knows How to Sing, Page 82.

Kamala Das: Summer in Calcutta, Op-cit, Page 63.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

A STUDY ON USE OF E-RESOURCES IN COLLEGE LIBRARIES OF UTTAR PRADESH

Prem Prakash Yadav

Research Scholar

Email- impppyadav@gmail.com

And

Dr. Dharam Vir Singh

Associate Professor

Email- hodlibrary@gmail.com

Department of Library & Information Science, Mangalayatan University, Aligarh - U. P.

ABSTRACT

The use of E-Resources through Information and Communication Technology (ICT) is increasing day by day for latest Information. E-Resources focus on the various aspects. Digital technology has made it more easy, speedy and comfortable to apply the stored intellect. The advent of technology has made the libraries to add new things to its collection. Print sources are more digitalized. E-resources information sources are very important for the academic community i.e. college library Paper presentation an overview of these resources few advantages and some disadvantages and address of few web sites. This collected information through the ages has to be used for further research; betterment and overall development of the society. Electronic resources are easily accessible in remote areas. Electronic resources solve storage problems and control the flood of information. E-Resources is the most important resources for present scenario.

Keywords: E-Resources, E-Books, E-Journals, E-Thesis, E-Newspaper and ICT.

1. INTRODUCTION

An electronic resource is defined as a resource which requires computer access or any electronic product that delivers a collection of data refer to full text bases, electronic journals, image collections, other multimedia products and numerical, graphical or time based, as a commercially available title that has been published with an aim to being marketed. These may be delivered on CD ROM, on tape, via Internet and so on.

These are more useful due to inherent capabilities for manipulation and searching, providing information access is cheaper to acquiring information resources, savings in storage and maintenance etc. and sometimes the electronic form is the only alternative. The web resources and the use of web as a tool is changing the way users live and learn. While in the early phase, the World Wide Web was mainly used for push type applications to provide information and resources to users, the development of Web 2.0 and the spread of open sources and shared use concept have focused on user generated content and applications for sharing. This has led to the rapid development and popularity of electronic resources. E-Resources are occupying a significant portion of the global literature E-Resources is increasing day by day.

. The different types of e-resources are:

- ☐ E-books,
- ☐ E-journals,
- ☐ CDs/DVDs,
- ☐ E-conference proceedings,
- ☐ E-Reports,
- ☐ E-Maps,
- ☐ E-Pictures/Photographs,
- ☐ E-Manuscripts,
- ☐ E-Theses,
- ☐ E-Newspaper,
- ☐ e-Databases
- ☐ e-Journals, e-Magazines
- ☐ e-Books/
- ☐ e-Audio/
- ☐ e-Images,

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

- ☐ Digital Library Projects
- ☐ Electronic Exhibitions
- ☐ e-Subject Guide
- ☐ e-newsletters
- ☐ E-conferences proceedings

The e books are help easy portability and its feature of incorporating more than one book in a single hand-held device. The published materials are also available on open access platform. This helps the poorer also to get the information required free of cost and bridge the digital divide. They need not worry for licensing and usage of the information.

According to Dr.S.R. Ranganathan, in his fifth law Library is a growing organism. "Library is not a store house of books; it is a knowledge centre. Every reader visits the library with the intention to get the solution for his problem. Library should fulfill the needs of user.

2.DEFINITION:

According to AACR2, 2005 Update, an electronic resource is Material (data and/or program(s)) encoded for manipulation by a computerized device. This material may require the use of a peripheral directly connected to a computerized device (e.g., CD-ROM drive) or a connection to a computer network (e.g., the Internet).

According to Wikipedia, Electronic Resources means Information (usually a file) which can be stored in the form of electrical signals, usually on a computer; Information available on the Internet

According to Gradman glossary, A publication in digital format which must be stored and read on a computer device. There are two types: Direct access: these are physical objects such as CD-ROMs, diskettes, computer tapes, and computer cards, containing text, images.

3. NEED OF E-RESOURCES:

E-Resources enable the librarian to provide better service to the users. The few considerable points are mentioned below;

- (a). To get access to an information source by the more than one user.
- (b). E-Resources can be searched quickly.
- (c). Found easily by the user.
- (d). Resources can be stored in huge amount.
- (e). Amount of time spent on the E-Resources use.
- (f). Analyses the purpose of using e-resources by respondent
- (g). Know different types of e-resources commonly used by respondents
- (h). To collect, store, organize information in digital form.
- (i). To promote efficient delivery of information economically to all the users.

4. TYPES OF E-RESOURCES

| No. | E-Resources Type | Description |
|-----|------------------------------------|---|
| 1. | E-Book | E-books is the many formats competing for prime time, including Adobe |
| 2. | E-Journal | e-journal is very important part of every library collection. E-journals are one application of information technology. |
| 3. | E-Newspaper | An is also known as online newspaper or web newspaper that exists on the World Wide Web or internet. |
| 4. | E-Magazines | An E-Magazine is very important part of every library collection. E-Magazines are one application of information technology. |
| 5. | E-newspaper | These are the reference sources which provide bibliographic information about journal including abstracts of the articles |
| 6. | Indexing and Abstracting Databases | Today are either free or with charges. E-databases is an organized collection of information of a particular subject or multidisciplinary subject areas, information within e-databases can be searched and retrieved electronically. |
| 7. | Full text database | These are many Dictionaries, Almanacs, and Encyclopedias, which are available on internet in electronic format. |
| 8. | Reference database | These databases contain the numerical data useful for the mass community. |
| 9. | Image collection | Multimedia products. |
| 10. | E-Thesis | These databases are contained with PhD thesis and Dissertation published through e-format |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | |
|-----|-------------|---|
| 11. | E-Clipping | The main objective of e-clipping is retrospective search and comprehensive analysis of new items. |
| 12. | E-Patents | E-patents is the exclusive right granted by the government to make use of an invention for a specific period of time. |
| 13. | E-Standards | Written definition, limit rule, approved and monitored for compliance by authoritative agency. |

5. SELECTIONS OF E-RESOURCES

The selection of E-Resources should be done according to the need and demand of users. As a librarian one should consider the following steps at the time of selection.

- ☐ To know the needs of users.
- ☐ To know content and scope of e-resources.
- ☐ To examine quality of the e-resources and search facility among them.
- ☐ To maintain cost effectiveness.
- ☐ To check either subscription based or web based at the time of purchasing.
- ☐ To check the license copy.
- ☐ To evaluate educational support and training.
- ☐ To check the compatibility and technical support.

6. CHARACTERISTICS OF E-RESOURCES

- The software can help the users in retrieving the desired information.
- e-resources is quicker than print resources
- Users can be guided to the document by providing a link.
- Text easy search.
- Electronic format can be collection of any media.
- Ownership not that important
- Access to every document by anyone; from any where
- In electronic environment the interaction between user and librarian is frequent.

7. E-RESOURCES ON LIBRARY AND INFORMATION SERVICES

E-resources It has made simple and speedy purchase of information sources librarians need quick access to books, journals and electronic publications. Internet access is the simple and efficient method for access and updating the documentation and interface of catalogue of all libraries. The request for Inter Library Loan (ILL) can be sent via e-mail and the photocopies may be sent by post fax, via e-mail after scanning the documents. Managing these electronic resources involves providing the library's user with convenient ways to find and access them and providing library staff with the tools to keep track of them. Most of the Library resources in the recent past are being made available in electronic formats such as e-journals, e-books, databases, etc. Libraries are moving from print to e-resources either subscribing individually or through consortia because of it advantages over print resources. As licensing electronic resources has greatly increased in recent years.

8. UTILITIES OF E-RESOURCES

- ✓ E-publishing may be less costly than paper.
- ✓ E-Resources are created in any file format like text, audio, video and images.
- ✓ E-resources are available for 24 hours of a day and save library space.
- ✓ The E-resources search is easy because of user friendly interface.
- ✓ They provide users faster, more convenient and anytime access from home, campus or library.
- ✓ E-resources can be accessed by the support of advanced search and retrieval system
- ✓ The content can be reproduced, forwarded, modified and leading to problem with copyright protection and preserving authenticity.
- ✓ The electronic environment enables to library to integrate with other libraries and make use of their resources also.
- ✓ Those who have limited time to access to the libraries can effectively access to the libraries by dialing up process.
- ✓ The libraries provide access to very large amount of information resources.
- ✓ Libraries are focused on providing access to primary information.

9. E-RESOURCES ISSUES

- (a). Licensing: E-Resources need the license from the publisher to the library.
- (b). IPR: E-Resources can be easily copied and forwarded to another person so librarian should be alert about IPR (Intellectual Property Rights)
- (c). Standards of metadata:
There are standards for metadata description like MARC21 but the available e-resources in the market are not standardizing by MARC21.
- (d). Low budget:
Libraries are non-profit organization so they cannot purchase and afford the costly electronic resources.

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

(e). Skill manpower:

to handle the electronic collection the proper skills are required among the staff but libraries are lacking of skill manpower.

(f). Lack of infrastructure:

Electronic collection is supported by Information and communication Technology components.

CONCLUSION

E-resources is an important role for users. E-Resources helpful to ensure exhaustive and pinpointed information. The e-resources provide themselves various search options to the user and library manages. Using of e-resources enable the library to save space of library and time of the users. E-resources are useful for libraries as well as each and every users of the society who are starving to get a variety of information through the globe. The Developments in the information and Communication Technology services are available in the present made wonderful changes in the library operations. Its advantages are for technocrats, usage of the electronic products improve the knowledge of user. E-mails and RSS alerts carry the information for the individual to become aware of the user. Enhancement in Infrastructure like high-speed network, wi-fi in the campus, LAN portals at various rights to use points in the campus and also in departments can be prepared to improve the practice effectively. Now a day E-Resources is increasing rapidly.

References:

- Min, Shao and Yi, Yang (2010) 'E-resources, services and user surveys in Tsinghua University Library. Program', *Electronic Library and Information Systems*, 44(4), pp.314-327.
- Pareek, Namita and Gangrade, Anita (2016) 'Role of the Libraries as Information Resources in Globalization', *International Journal of Librarianship and Administration*, 7(1), pp. 13-23
- Saklani, Vipin Kumar (2020) 'Modernization of Libraries: Use of e-resources in the Academic Library', *IP Indian Journal of Library Science and Information Technology*, 5(2), pp. 86-87.
- Sarasvathy, P. and C., Swapna (2022) 'A Survey on Mysore University Library Resources and Services during Covid-19 Pandemic: Challenges and Opportunities', *International Journal of Research in Library Science (IJRLS)*, 8(1), pp. 258-265.
- Shi Xiaodong (2015) 'Application of Computer Technology in Library Resources Management', *Proceedings of the Information Science and Management Engineering III (SME2015)*, pp. 287-290
- Singh, Archana, Krishna, K. M. and Jaiswal, Shikha (2014) 'Use of ICT based Library Resources and Services and its Impact on Users : A Case Study of University of Allahabad', *SRELS*, 51(2) 'pp.93-98.
- Zhixian Yi, Damian Lodge and Sigrid McCausland (2013) 'Australian academic librarians' perceptions of marketing services and resources', *Library Management*, 34(8/9), pp.585-602
- Madhusudhan, Margam. (2010). Use of Electronic Resources by Research Scholars of Kurukshetra University. *The Electronic Library*, 28 (4). 492-506.
- Barman Badan, (2012), *Library and Information Science: UGC NET guide*, DVS Publishers, Guwahati. 125-126.
- Gowda, Vasappa and Shivalingaiah, D. Training needs of researchers in the changing information environment: a case study of university libraries in Karnataka. Kanniyappan, E., Nithyanandam, K. and Ravichandran, P. (2008). Use and impact of e resources in an academic and research environment: a case study. *Information Studies*, 14 (3). 151-162.
- Kaur, Baljinder and Verma, Rama. (2009). Use of Electronic Information Resources: A Case Study of Thapar University. *The Electronic Library*, 27 (4). 611-622. Kaur, N., (2007)., E-resources and collection development: Emerging issues for the academic libraries, Caliber 2007.
- Natrajan M., (2007), *Access in learning objects in E-Libraries: Problems and Allied*.
- Abbas Khan, A. A., Minhaj F. & Ayesha, S. (2007), *E-resources: E-books and E-journals in E-Libraries: Problems and perspectives*, Ed. by Ramiah, Sankara Reddy and Hemant Kumar. Allied, New Delhi.
- Bhat, Ishwar. (2009). *Increasing the Discovery and use of e-resources in University Libraries. 7th International CALIBER-2009*,
- Girish Kumar H, Vasant R. & Praveen J.K., (2005), *Use of electronic resources by research scholars in CFTRI, Mysore: A study. ILA Bulletin*, 41(3), 16-20.
- Jagdish Arora and Kruti Trivedi. (2010) *INDEST-AICTE Consortium: Present Services and Future Endeavours*, *DESIDOC Journal of Library & Information Technology*, Vol. 30, No. 2, March 2010, pp. 79-91
- Sutar, Dhanajay, (2010), *UGC NET guide in Library and Information Science*, Universal Publisher, Pune 86-105.
- Okello-Obura, Constant. (2010). *Assessment of the Problems LIS Postgraduate Students Face in Accessing E-Resources in Makerere University, Uganda. Collection Building*, 29 (3). 98-105.
- Ganski, Kate L. (2008). *An Evaluation of the Accessibility of E-resources from Theological Library Websites. Theological Librarianship: An Online Journal of the American Theological Library Association*, 1 (1). 38-45.
- Sunil Kumar Satpathy & Biswanath Rout (2010) *Use of E-Resources by the Faculty Members with Special Reference to CVRCE, Bhubaneswar, DESIDOC Journal of Library & Information Technology*, Vol. 30, No. 4, July 2010, pp. 11-16.

Design and Fabrication of Die-set for Compacting the Powder to Synthesize Green Pallet of Nickel-based Solid Lubricant Nano-composites

Shams Tabrez^a, Sudesh Singh^{a*}, Vineet Kumar^{a**}, Kumresh Kumar Gaur^b, Radhe Shyam Ojha^a,
Mohan Maheshwari^c

^aDepartment of Mechanical Engineering, Sharda School of Engineering and Technology, Sharda University, Greater Noida, U.P., India-201310.

^bDefence Research and Development Organization, Lucknow Road, Timarpur, Delhi 110054, India

^cDepartment of Mechanical Engineering, Mangalayatan University, Aligarh, U.P 202146, India

sponding author: *sudesh.sengar@gmail.com; **Vineet.kumar5@sharda.ac.in

Abstract

In powder metallurgy, the design and fabrication of the die-set are crucial steps because the die characteristics and form directly impact the finished product. The current study aims to design and fabricate a die-set for cold compression to produce a cylindrical specimen or green pallet. The compaction die-set is a deciding aspect of the powder metallurgy process since it is used to shape the loose powder to the desired shape. The die-set is developed according to ASTM requirements and AISI D3 steel has been used as raw material for it. The study demonstrates the design considerations, computations, 2-D drawings, and 3-D models of die-set. To fabricate the die, facing, turning, drilling, grinding, wire-cut EDM and heat Treatment operations were used. The design has been further analyzed using Solidworks 14 and ANSYS 2023R1.

Keywords: Powder metallurgy, Compaction Die-set, Mechanical Properties, Punch.

1. Introduction

In powder metallurgy (PM), the materials in powder form are blended in the desired quantity, compacted to make a green pallet in the desired shape, and further sintered in the atmospheric or controlled environment to get the final components [1]. With the help of this quickly growing technology, a vast range of materials may be developed as alloys and composites. Applications of powder metallurgy extend across various industries, including automotive, medical, aerospace, electronics, and consumer goods. Common products manufactured using powder metallurgy include gears, bushings, filters, bearings, cutting tools, and magnets. After sintering, different processes can be performed to densify a material thoroughly, typically involving applying heat, pressure, or a

combination of heat and pressure to close residual pores [2].

Due to its ease of processing and control, the PM process creates bespoke materials or components that would be difficult to manufacture using conventional techniques [3-4]. Research has revealed that cold-forming ferrous and nonferrous powder preforms have several advantages, including better surface finish, more accuracy, and increased strength from geometric work and hardening. However, the drawbacks of hot forging include oxidation, decarburization, excessive die-set wear, insufficient surface polishing, and heat stresses. Further research on PM steels has investigated manufacturing, alloying, mixing, and powder categories for steels [5]. This technique may minimize the requirement for metal removal operations, thereby cutting the production cost [6]. The results show that low-alloy PM steels from elemental powders, such as those containing Cr, Mo, Si, Fe-Si, Cu, and Mn, are suitable for precision automotive engines and gearbox parts [7-8].

The PM process offers an advantage as it allows the component fabrication without material decomposition or dissolution, thus, averting the change in materials property in the solid-liquid phase [9]. Sintered powder materials need much research on plastic deformation because of their unique densification and plastic deformation properties during hot and cold forging. Alloying, heat treatment, and densification may strengthen sintered PM low alloy steels [10-11]. Powder operations give higher flexibility than other manufacturing techniques like casting, extrusion, and forging due to the controlled characteristics of the generated materials [12]. The research considers a novel yield function that computes yield stress using numerical integration and hydrostatic stress. The findings indicate that the yield stress ratio in porous material to completely dense material rises with densification due to plastic deformation. Porous materials' yield and plastic deformation were explained using a non-associated flow rule. Carbon nanotube (CNT) reinforced composites demonstrated better mechanical capabilities, but their macro-scale use was limited by issues like uniform dispersion and carbide reduction [13-15].

According to studies, the intermetallic composites, porous solids, and aggregates produced by the powder processing technique have better material properties. The most straight-forward technique, known as uniaxial compaction, compresses powder under high pressure within a closed die chamber [16-17]. The study found that the addition of CNT has increased its compressive strength, affecting various machine and press tool applications [18-20]. Metal powder compaction is commonly performed at pressures ranging between 150 MPa and 1000 MPa, with the die held vertically with a punch. The powder is squeezed into the correct form, then expelled and sintered at a predetermined

temperature [21-22]. Increased permeability and concentric micro-cracking on green compacted surfaces, which are mostly formed during compaction and intensified during sintering due to friction with the die wall and powder particles, are two drawbacks of pressure compaction [23-25]. The procedure involves three steps: mixing compaction to get the desired shape and sintering to diffuse powder particles, allowing for the straight-forward manufacture of finely designed components [26- 28]. This method reduces manufacturing costs by eliminating or reducing the need for metal removal processes [29-30].

The PM technique provides higher flexibility and regulated end qualities than conventional production processes, thus proving useful in creating ceramic-metallic composites and porous alloys with increased properties [31-32]. Cold compaction is the most effective technique for powder compression since it includes exerting a larger vertical downward force in a die cavity [33]. After the compression into the appropriate shape, the compacted sample was withdrawn from the die cavity, and sintering was performed at a pre-defined temperature under a desired atmosphere to bind the powder particles to provide an appropriate strength between the particles [34-38]. However, current research focuses on designing and fabricating the pressure compaction die-set for compacting the Ni-Ti₃C₂Tx (MXene) blended powder. The porosity created during compaction, mechanical properties at maximum pressure, and compaction behavior are used to assess the performance of the die-set experimentally. Solidworks14 and Ansys 2023R1 were used to develop and test the die-set in simulated settings. The die-set was successfully tested by producing the green pallet of Ni-Ti₃C₂Tx (MXene) powder under an applied load of 800 KN using a Universal Testing Machine (UTM).

2. Materials and Method

2.1 Die and Punch Material

Due to its increased hardness and wear resistance, previous research demonstrated that die steel is a suitable material for tooling applications such as powder metallurgy tooling, draw dies, and blanking and shaping tools [38]. So, the die and punch were fabricated from AISI D3 die steel, also known as high carbon (C) and high chromium (Cr) cold work steel. The die-set dimensions were selected according to the American Society for Testing and Materials (ASTM) standards. AISI D3 steel has a density of 7.7 g/cm³ and a maximum compressive stress of 2151 MPa [39]. AISI D3 die steel, was procured from a local supplier and was characterized using EDX. Table 1 shows the compositional characteristics of AISI D3 steel. Depending on the heat treatment parameters, AISI D3 steel may have hardness values ranging from 30 to 69 HRC, tensile strengths of 990 to 2900 MPa, and yield

strengths of 705 to 2400 MPa [40].

Table 1 Chemical composition of AISI D3 Steel (wt.%).

| Element | Cr | C | W | V | Mn | Si | Ni | Cu | P | S |
|-------------|----|-----|---|---|-----|-----|-----|------|------|------|
| Content (%) | 12 | 2.1 | 1 | 1 | 0.6 | 0.6 | 0.3 | 0.25 | 0.03 | 0.03 |

2.2 Die-set Design and Safety Calculations

The compaction die-set was developed for manufacturing green pallets of Ni-Ti₃C₂T_x(MXene) composite having a diameter of 25 mm. The following is the design of the compaction die-set: Ultimate yield strength of the AISI D3 steel (σ_y) = 2100 MPa

Inner diameter of die block (D_i) = 25mm

Outer diameter of die block (D_o) = 80mm

Applied working Load (F) = 800 KN

Cross Section area of inner chamber (A) = $(\pi/4) \times D_i^2 = 491.07 \text{ mm}^2$

For applied working load, the stress (σ_1) = $F/A = 1629.09 \text{ MPa}$

Hence, $\sigma_1 < \sigma_y$ (upper punch in a Safe working condition)

Stress generated in the die block as load is applied on the upper punch is given by

$$\sigma_2 = \sigma_1 [\{R_o^2 + R_i^2\} / \{R_o^2 - R_i^2\}]$$

$$\sigma_2 = 1629.09 [\{40^2 + 12.5^2\} / \{40^2 - 12.5^2\}] = 1981.71 \text{ MPa}$$

Hence, $\sigma_2 < \sigma_y$ (Safe working condition for the die chamber)

Therefore, Both die and punch can easily sustain the applied load of 800 KN and are safe to use up to 800 KN.

2.3 2D Drawing Compaction Die and Punch Set

Figure 1 depicts the 2D designs of the individual components of the die-set. The design is based on ASTM B925-08 guidelines. The designs were designed separately in Solidworks14, entirely with the appropriate dimensions and geometry, as shown in Fig. 1.

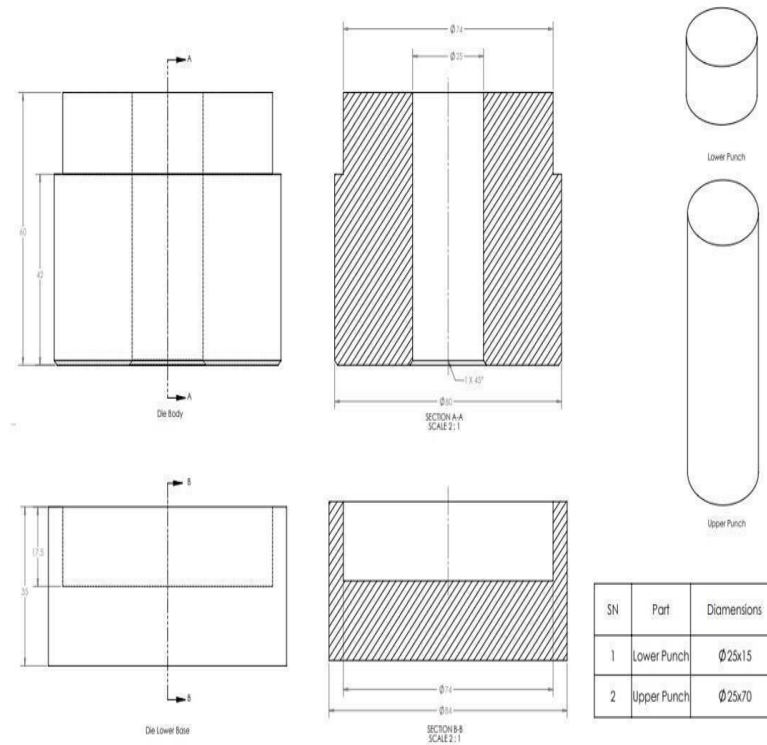


Fig. 1 2D drawing of individual components of die-set.

2.4 3D Design of Die-set

SOLIDWORKS 14 software was used to create the 3D model of the die-set, which includes the modes of the die block, lower punch, and upper punch. 3D models of the individual parts and die- set assembly were prepared, as illustrated in Fig. 2. The relief in the punch minimizes the contact with the die cavity wall, resulting in less wear and friction. The lower and upper punches have been provided with a clearance of 0.5 mm

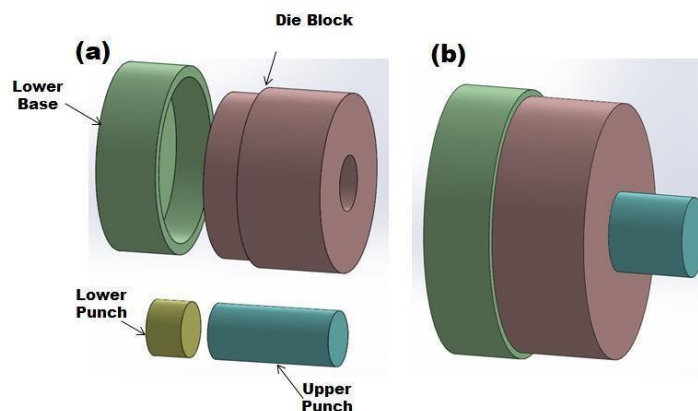


Fig. 2 (a) 3D design exploded view of the die and punch (b) Assembly view of Die-set.

3. Fabrication of Die-set

AISI D3 steel rod of $\phi 90 \times 130$ mm was selected for making the die block, and $\phi 30$ mm \times 100 mm was selected for making the punch. Both materials were procured from Mittal Metal Alloys Private Ltd., Chaudhary Road, Ghaziabad, India. The high-speed steel and carbide tools were employed for machining operation. A power hack saw was used to cut the materials into the appropriate size for the die block, upper punch, and lower punch. Figure 3 shows the standard lathe machine operations (facing, turning, drilling, and boring) performed to pre-machine the die block, upper punch, and lower punch. After pre-machining, the die block and punch set have undergone the three stages of heat treatment in a muffle furnace: stress relieving, hardening, and tempering. After heat treatment, the surface was finished using the cylindrical and flat grinder[41-42] and the final die-set, as illustrated in Fig. 4, has been fabricated and ready to use to make green pallets.

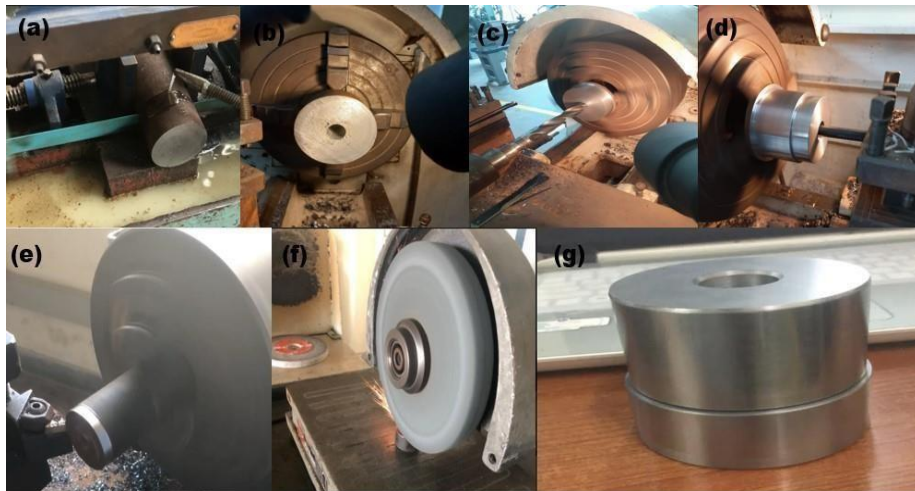


Fig. 3 Representation of (a) Power hack saw (b) Facing (c) Drilling (d) Boring (e) Turning (f) Grinding operations employed to machine the raw material (g) Die block after the machining process

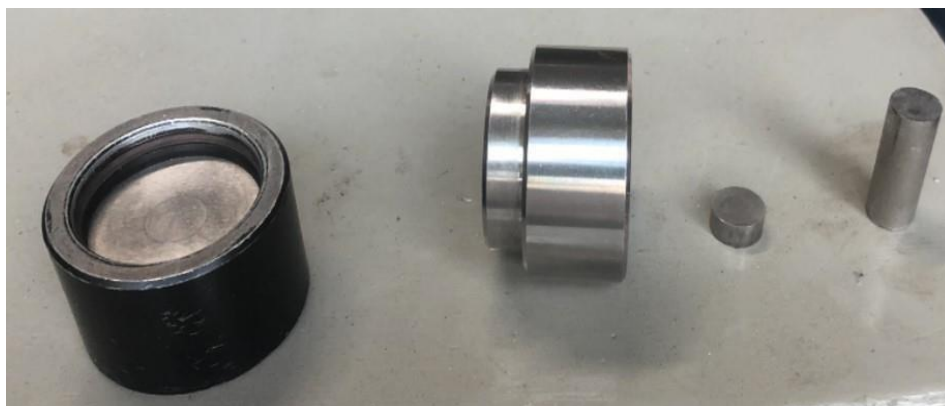


Fig. 4 Digital images of fabricated die and punch components.

4. Testing of Compaction Die-set.

The suitability of the fabricated die-set for its application was experimentally evaluated by compacting Ni-Ti₃C₂T_x blended powder using a universal testing machine (Maximum capacity-1500 KN) at Material Testing Laboratory, Sharda University, Greater Noida, Uttar Pradesh, India. Figure 5 illustrates how the die and punch were used for compression to make a green pallet of Ni-Ti₃C₂T_x. After providing graphite powder lubrication on the interior of the die block, 25 gm of Ni-Ti₃C₂T_x powder was placed into the die block, which was closed from the downside through the lower punch. After filling the powder, the die block was also closed from the upper side using the lower punch. The graphite powder was also provided to the periphery of the lower and upper punch to facilitate its easy removal after compacting. Then, the powder was pressed gradually to a working load of 800 KN, as shown in Fig. 5(a), and after reaching to 800 KN, the compaction was held for 10 min to achieve uniformity. After that load was removed, and compacted powder was taken out from the die-set. Thus, the green pallet of Ni-Ti₃C₂T_x was synthesized, which was further sintered and used for mechanical and tribological analysis.

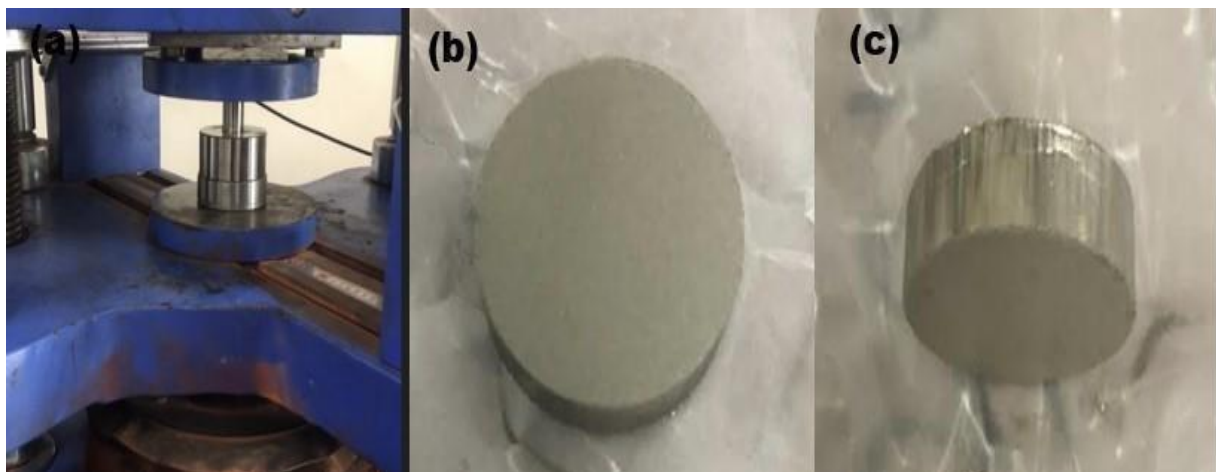


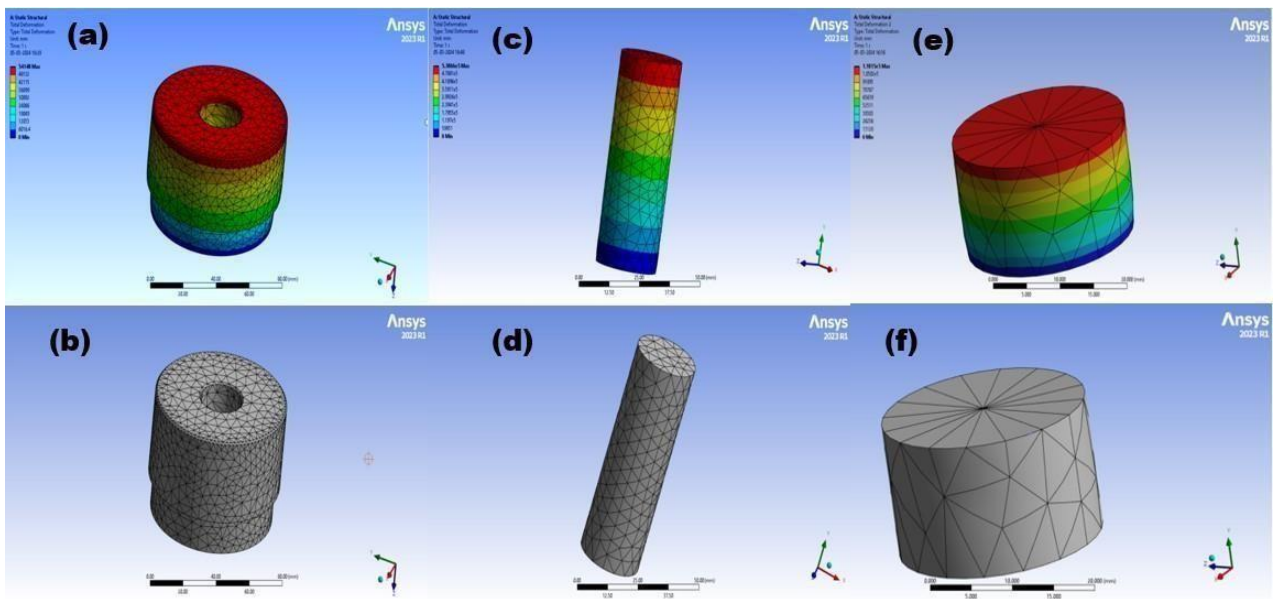
Fig. 5 (a) Compression of the Ni-Ti₃C₂T_x powder using die-set in UTM (b) Top view and (c) Side view of compacted Ni-Ti₃C₂T_x powder sample.

5. Finite Element Analysis of Die-set

The stress distribution in the fabricated die block was analyzed using ANSYS 2023R1. The static structural analysis type and the solid-concrete 63 element were chosen for this purpose. A .igs file consisting of the design of the die-set was imported to ANSYS 2023R1 from Solidworks 14, and

material features were added (Young's Modulus of 2.1×10^5 MPa and Poisson's Ratio of 0.3). The model was further meshed using a SOLID 65 tetrahedron at size level 4 [43]. A load of 800 KN was imposed on the die, and the die displacement was analyzed in all directions from the exterior of the die. Figure 6 demonstrates the corresponding meshed and total deformation under the simulated conditions. The ultimate yield strength of the AISI D3 tool steel is ~ 2100 MPa. The most incredible stress intensity was found to be 1600 MPa, which is less than the permissible stress of AISI D3 tool steel. At the same time, the most excellent deflection achieved is also lower. So, the fabricated die- set is acceptable and safe to use under the given circumstances.

Fig. 6 (a) Total deformation of die block (b) 3D meshed model of die block (c) Total deformation of the upper punch (d) 3D meshed model of the upper punch (e) Total deformation of the lower punch (f) 3D meshed model of the lower punch.



6. Conclusions

The current study focused on designing and fabricating a die-set to make green pallets for powder metallurgy products. The die-set was fabricated using high-grade steel (AISI D3) as it exhibits more significant mechanical and thermal properties. The compaction die-set was successfully developed and manufactured to create a $\text{Ti}_3\text{C}_2\text{Tx}$ composite with an 800 KN load on UTM. The graphite coating inside the die block and outside the punch periphery can decrease the friction between the punch and die block and help easy removal of the component after compacting. Solidwork14 and ANSYS 2023R1 analysis demonstrated that the die and top punch had the lowest stresses, while the bottom punch had the highest. $\text{Ti}_3\text{C}_2\text{Tx}$ composite can be successfully synthesized by using the die-set under

a compaction load of 800 KN.

References

1. Suryanarayana, C., & Al-Aqeeli, N. (2013). Mechanically alloyed nanocomposites. *Progress in Materials Science*, 58(4), 383-502.
2. Al-Qureshi, H. A., Galiotto, A., & Klein, A. N. (2005). On the mechanics of cold die compaction for powder metallurgy. *Journal of Materials Processing Technology*, 166(1), 135- 143.
3. Guo, W., Liu, B., Liu, Y., Li, T., Fu, A., Fang, Q., & Nie, Y. (2019). Microstructures and mechanical properties of ductile NbTaTiV refractory high entropy alloy prepared by powder metallurgy. *Journal of Alloys and Compounds*, 776, 428-436.
4. Qian, M., Yang, Y. F., Yan, M., & Luo, S. D. (2012). Design of low cost high performance powder metallurgy titanium alloys: some basic considerations. *Key Engineering Materials*, 520, 24-29.
5. GERMAN, R. M. Powder Technology H. Hofmann, P. Bowen.
6. Robertson, I. M., & Schaffer, G. B. (2010). Review of densification of titanium based powder systems in press and sinter processing. *Powder metallurgy*, 53(2), 146-162.
7. Jhavar, S., Paul, C. P., & Jain, N. K. (2013). Causes of failure and repairing options for dies and molds: A review. *Engineering Failure Analysis*, 34, 519-535.
8. Barrera, M., & Sánchez, H. (2009). Design of a die for the cold compaction calibration of powdered materials. *Suplemento de la Revista Latinoamericana de Metalurgia y Materiales S*, 1, 223-234.
9. Bolzoni, L., & Yang, F. (2019). Development of Cu-bearing powder metallurgy Ti alloys for biomedical applications. *Journal of the Mechanical Behavior of Biomedical Materials*, 97, 41-48.
10. Standard Practices for Production and Preparation of Powder Metallurgy (PM) Test Specimens, B 925 – 08, ASTM International.
11. Parswajinan, C., Ramnath, B. V., Vetrivel, M., Ahmed, A. R., Buhari, A. S. M., Muthukumaaran, C., & Hilary, I. A. (2018). Design and fabrication of impact die for powder metallurgy. *Materials Today: Proceedings*, 5(1), 329-334.
12. Pokorska, I. (2008). Deformation of powder metallurgy materials in cold and hot forming. *Journal of Materials Processing Technology*, 196(1-3), 15-32.
13. Blumenthal, W. R., Sheinberg, H., & Bingert, S. A. (1997). Compaction issues in powder metallurgy. *MRS Bulletin*, 22(12), 29-33.
14. Ramnath, B. V., Parswajinan, C., Elanchezhian, C., Pragadeesh, S. V., Ramkishore, P. R., & Sabarish, V. (2014). A review on CNT reinforced aluminium and magnesium matrix composites. *Applied Mechanics and Materials*, 591, 120-123.
15. Vijaya Ramnath, B., Parswajinan, C., Elanchezhian, C., Pragadeesh, S. V., Kavin, C., Ramkishore, P. R., & Sabarish, V. (2014). Experimental investigation on compression and chemical properties of aluminium nano composite. *Applied mechanics and materials*, 680, 7-10.
16. Kulkarni, H., & Dabhade, V. V. (2019). Green machining of powder-metallurgy-steels (PMS): an overview. *Journal of Manufacturing Processes*, 44, 1-18.
17. Parilak, L., Dudrova, E., Bidulsky, R., & Kabatova, M. (2017). Derivation, testing and application of a practical compaction equation for cold die-compacted metal powders. *Powder*

Technology, 322, 447-460.

18. Parswajinan, C., Vijaya Ramnath, B., Vetrivel, M., Elanchezhian, C., Loganathan, K., Sarvesh, R., ... & Karthik Babu, R. N. (2015). Experimental investigation of mechanical and chemical properties of aluminum reinforced with MWCNT. *Applied Mechanics and Materials*, 766, 287-292.
19. R. Kesavan, C. Elanchezhian, B. Vijaya Ramnath, *Process Planning and Cost Estimation*. New Delhi: New Age International (P) Limited Publishers, 2009, pp. 77-79.
20. Kesavan, R. (2010). *Machine tools*. Laxmi Publications, Ltd.
21. Cristofolini, I., Molinari, A., Pederzini, G., & Rambelli, A. (2016). Study of the uniaxial cold compaction of AISI 316L stainless steel powders through single action tests. *Powder Technology*, 295, 284-295.
22. Liu, X., Hu, L., & Wang, E. (2013). Cold compaction behavior of nano-structured Nd-Fe-B alloy powders prepared by different processes. *Journal of alloys and compounds*, 551, 682-687.
23. Arifin, A., Sulong, A. B., Muhamad, N., Syarif, J., & Ramli, M. I. (2014). Material processing of hydroxyapatite and titanium alloy (HA/Ti) composite as implant materials using powder metallurgy: A review. *Materials & Design*, 55, 165-175.
24. Kang, C. S., Lee, S. C., Kim, K. T., & Rozenberg, O. (2007). Densification behavior of iron powder during cold stepped compaction. *Materials Science and Engineering: A*, 452, 359-366.
25. Lee, S. C., & Kim, K. T. (2008). Densification behavior of nanocrystalline titania powder under cold compaction. *Powder technology*, 186(1), 99-106.
26. Suryanarayana, C., & Al-Aqeeli, N. (2013). Mechanically alloyed nanocomposites. *Progress in Materials Science*, 58(4), 383-502.
27. Chairman, C. A., Marichamy, S., Dhinakaran, V., Stalin, B., Ravichandran, M., & Balasubramanian, M. (2020, December). Mechanical performance of TiC filled chopped basalt fibre reinforced epoxy composites. In *IOP Conference Series: Materials Science and Engineering* (Vol. 988, No. 1, p. 012093). IOP Publishing.
28. Tan, L., Li, Y., Deng, W., Liu, Y., Liu, F., Nie, Y., & Jiang, L. (2019). Tensile properties of three newly developed Ni-base powder metallurgy superalloys. *Journal of Alloys and Compounds*, 804, 322-330.
29. Robertson, I. M., & Schaffer, G. B. (2010). Review of densification of titanium-based powder systems in press and sinter processing. *Powder metallurgy*, 53(2), 146-162.
30. Akhtar, S., Saad, M., Misbah, M. R., & Sati, M. C. (2018). Recent advancements in powder metallurgy: a review. *Materials Today: Proceedings*, 5(9), 18649-18655.
31. Patil, O. M., Khedkar, N. N., Sachit, T. S., & Singh, T. P. (2018). A review on effect of powder metallurgy process on mechanical and tribological properties of Hybrid nanocomposites. *Materials Today: Proceedings*, 5(2), 5802-5808.
32. Cristofolini, I., Molinari, A., Pederzini, G., & Rambelli, A. (2016). Study of the uniaxial cold compaction of AISI 316L stainless steel powders through single action tests. *Powder Technology*, 295, 284-295.
33. Parilak, L., Dudrova, E., Bidulsky, R., & Kabatova, M. (2017). Derivation, testing and application of a practical compaction equation for cold die-compacted metal powders. *Powder Technology*, 322, 447-460.
34. Dunstan, M. K., Paramore, J. D., & Fang, Z. Z. (2018). The effects of microstructure and porosity on the competing fatigue failure mechanisms in powder metallurgy Ti-6Al-4V. *International Journal of Fatigue*, 116, 584-591.
35. Tang, J., Qiao, J., Liu, Z., Zhou, X., Yu, G., & Zhao, J. (2018). Mechanism characteristic analysis and soft measuring method review for ball mill load based on mechanical vibration and

acoustic signals in the grinding process. *Minerals Engineering*, 128, 294-311.

36. Ye, S., Hao, H., Mo, W., Yu, K., Liu, L., Deng, C., & Yu, P. (2016). Effects of cold compacting pressure on the expansion behavior of Ti-48Al during sintering. *Journal of Alloys and Compounds*, 673, 399-404.
37. Martin, L. P., Hodge, A. M., & Campbell, G. H. (2007). Compaction behavior of uniaxially cold-pressed Bi-Ta composites. *Scripta Materialia*, 57(3), 229-232.
38. Lee, S. C., & Kim, K. T. (2008). Densification behavior of nanocrystalline titania powder under cold compaction. *Powder technology*, 186(1), 99-106.
39. Singh, R. B., & Kumar, D. (2019). Heat treatment of tool steel D3 and effects on mechanical properties. *International Journal of Recent Scientific Research*, 10(V), 32540-32545.
40. Ghazi, S. S., & Mashloosh, K. M. (2015). Influence of heat treatment on resistance of wear and mechanical properties of die steel kind D3. *Am. J. Sci. Ind. Res*, 5(2), 33-40.
41. Sharma, A. K., Singh, R., Tiwari, A. K., & Sharma, A. K. (2020, November). Design, fabrication and analysis of compaction die for powder processing. In *IOP Conference Series: Materials Science and Engineering* (Vol. 992, No. 1, p. 012005). IOP Publishing.
42. Singh, R., Sharma, A. K., & Sharma, A. K. (2021, June). Design and development of modified cold compaction die for fabrication of nickel-titanium composite. In *IOP Conference Series: Materials Science and Engineering* (Vol. 1136, No. 1, p. 012001). IOP Publishing.
43. Parswajinan, C., Ramnath, B. V., Vetrivel, M., Ahmed, A. R., Buhari, A. S. M., Muthukumaaran, C., & Hilary, I. A. (2018). Design and fabrication of impact die for powder metallurgy. *Materials Today: Proceedings*, 5(1), 329-334.

EVALUATING THE IMPACT: A COMPREHENSIVE REVIEW OF THE JUVENILE JUSTICE SYSTEM UNDER THE JJ ACT, 2000 IN INDIA

Abhinav Sharma
Law

Abstract

An Exhaustive and Evaluative Examination of Children Under the Juvenile Justice Act
The juvenile justice system is the most lively and very much informed structure that the worldwide public has acknowledged concerning children's all-encompassing turn of events. Changing the degenerates and taking the unprotected children into mind is the primary goal. A child should be restored to the family and given a second chance, if at all possible. The juvenile justice system in India was evaluated by the author using both international standards and safeguarded logic. Without having really studied any of Aristotle, many adults today experience this fully Aristotelian start to pre-adulthood. Their comprehension of their own interactions with the teenagers around them is enlightened by it. Thus, they view their primary responsibility to their children as being to provide the kind of stable environment necessary for them to develop into typical adults, with the social and mental frameworks in place that would enable them to reach the boundaries of what we recognise as typical, adult behaviour. By isolation, John Locke maintains that the human personality begins as "white paper, absent any and all characters, with practically no examination." All of the "materials of reason and learning" originate in actuality, according to this viewpoint. Undoubtedly, Locke's refusal to teach intrinsic concerns was aimed primarily against Descartes and the Cartesians.

Keywords: Evaluating, Juvenile Justice System, Under The JJ Act, 2000 In India, Indian Penal Code, Juvenile Justice Boards, Child Welfare Committees

1. INTRODUCTION

Identifying the age at which a man quits being a child is a determinedly famous discussion in India. Youths are defined as any individual under the age of 14 in the Indian Evaluation and in most of government initiatives. Pre-adulthood is actually the temporary period among childhood and adulthood. As the UNCRC has shown. "A young is any individual under the age of eighteen, except if most of the work is finished within a sensible measure of time according to the child's pertinent regulation." This significance of youth is thought about by only a couple of countries, as confirmed by their own ready system, which sets as far as possible for children under their own regulations. In a manner, a few youth-related regulations in India portray children at various age ranges.

According to Segment 82 of the Indian Penal Code (IPC) 1860, no child under the age of seven might be accused of a wrongdoing. The criminal commitment age is raised to twelve years of age by uprightness of mental obstruction or shortcoming to grasp the after repercussions of one's exercises (Sec 83 IPC). To give sexual consent, a young lady should recollect the dynamic objective something like sixteen years old, except if she is hitched, in which case the age should be no less than fifteen. The predefined age for security against discovering, obtaining, and related offenses is sixteen for active partners and eighteen for young ladies.

All children between the ages of six and fourteen should get free and obligatory schooling from the State, in understanding with any legitimate prerequisites that might be laid out. Until a youngster turns six years of age, the state should try to give youth care and schooling for each child.

A person who has not arrived at the age of fourteen is viewed as a youngster according

to the youngster Work (Prohibition and Regulation) Act, 1986. According to the Factories Act of 1948 and the Estate Work Act of 1951, a juvenile is somebody who has arrived at the age of fifteen however isn't yet eighteen. A youngster has not arrived at the age of fifteen. The Factories Act expresses that youngsters might work with plants for however long they are considered therapeutically fit, yet not so much for longer than four and a half hours every day.

2. LITERATURE REVIEW

Kumar and Singh (2022) An in-depth analysis of the changes made to the juvenile justice system in India throughout the previous 20 years is provided. Their work demonstrates the forward-thinking measures implemented to guarantee the legislative framework's protection of children's rights. The writers offer a critical analysis of the JJ Act's modifications, highlighting the move towards a more restorative and rehabilitative strategy for dealing with juvenile delinquency.

Mehra (2021) focuses on how the JJ Act, 2000 affects juvenile offenders' outcomes for rehabilitation. In addition to highlighting the system's achievements in reintegrating kids into society, Mehra's analysis reveals serious shortcomings in its ability to deal with the underlying causes of delinquency, which include family instability, poverty, and a lack of education.

Patel and Sharma (2020) offer a distinctive viewpoint on juvenile delinquency in India by analyzing the JJ Act, 2000. They contend that although the legislation has improved juvenile protection, it has not done enough to address the larger social and economic injustices that serve as the root cause of juvenile criminality. Their work advocates for an integrated approach that incorporates social policies targeted at reducing poverty, enhancing education, and promoting social inclusion in addition to legal reforms.

Singh and Kaur (2019) A critical study of the JJ Act's implementation and ten-year effects is presented. They draw attention to operational difficulties such as poor

infrastructure, a shortage of workers with the necessary training, and uneven state-by-state implementation of the act. Notwithstanding these challenges, they admit that the act has improved juvenile justice system treatment and raised public awareness.

Thakur (2023) performs a thorough evaluation of the JJ Act, 2000's juvenile justice system's efficacy. Thakur's research highlights the notable advancements in legal protocols and the formation of committees dedicated to child protection. But it also highlights enduring problems that undermine the efficiency of the system, like overcrowding in juvenile institutions and lengthy court cases.

3. DEBATES OF JUVENILE JUSTICE ACT, 2015 IN INDIA

The discussion over "who is a child," while acknowledging another aspect, has reemerged since the High Court, for the Parliament's opinion that child sex misuse criminals ought to confront more "intensive" sentences, on January 11, 2016. The Indian Penal Code's definition of "children" is the central question, as the High Court has pointed out. As of now, the IPC defines "child" as "any individual under the age of 18." as far as attack, there is no distinction a couple of between a youngster years old and other minors.

The Hon'ble High Court saw in Lakshmi Kant Pandey v. The Association of India that children are a "especially basic public resource" and that the future thriving of the nation relies heavily on how its children make and make. The Hon'ble court involved this case for instance. The Court recognized that having a family, a house, and a name are advantages of having a "right to life". Regarding an almost comparable issue that emerged here, the Kerala High Court held in Philips Allred Malvin v. Y.J. Gonsalves and others that the advantage of a child's introduction to the world is a gotten right ensured under Article 21, as the right to life combines those things which make life fundamental. The court thought about the Standard Regulation as material to different classes of Christians.

At the point when the President endorsed the Juvenile Justice (Care and Security of Children) Bill, 2014 on December 31, 2015, the age at which a high school wrongdoer blamed for horrible violations could presently not be viewed as under thought. The updated Act of 2015 is informed on January 15, 2016. Because of a preliminary evaluation of the children's psychological and actual capacities, the supposed conditions of the offense, and their capacity to fathom the results of the offense, it has now arranged for the preliminary of a couple of minors, ages 16 to 18, who are blamed for heinous wrongdoings as grown-ups.

The inclusion of youngsters in manslaughter, murder, assault, and sexual wrongdoing was a typical point of reference in conversations held in Parliament and the media.

4. PROCESSES AND PROCEDURES UNDER THE JJ ACT

A child-accommodating way to deal with handling juveniles in struggle with the law and children deprived of care and security is guaranteed by the Juvenile Justice (Care and Assurance of Children) Act, 2000 in India, which spreads out certain cycles and systems. The Act makes Juvenile Justice Boards (JJBs) to hear cases involving minors who are in legitimate difficulty. JJBs focus on recovery over discipline and ensure the juvenile's interests are served all through the lawful interaction. Child Welfare Committees (CWCs) are laid out to direct the welfare of children deprived of care and security. They arrive at conclusions about the consideration, assurance, treatment, and restoration of these children. With a definitive objective of reuniting children with their families at every possible opportunity or otherwise guaranteeing their consideration and restoration through different institutional and non-institutional settings, the Act expects inquiries to be done in a delicate and ideal way. The Act's strategies are intended to shield children's privileges, meet their fundamental requirements, advance their turn of events, and assist them with reintegrating into society as contributing individuals. This approach mirrors India's complete way to deal with juvenile justice.

5. CONCLUSION

Children are the country's most significant human asset advancement. The presentation and execution of the country's childhood will determine its future accomplishments. "Youth Shows the Man as Morning Presents the Day," as the incredible artist Milton once expressed. Therefore, the overall population is focused on treating each pre-grown-up determined to guarantee that its character creates to its maximum capacity. Children are the future rulers and torchbearers of society; they are the building blocks of our rationalities, social inheritances, conviction systems, and cognizance. Children are genuinely the future — they will be the extraordinary educators, specialists, judges, pioneers, coordinators, engineers, and government officials that the whole society relies upon. Sadly, an enormous number of children are denied the chance to partake in their childhood and their entitlement to reproduce, which leaves them defenseless against misuse, double-dealing, and abuse. The issue of child work is intricately linked to riches. The total legitimization of child work can never be legitimate as a reasonable idea in a country where a huge part of youths hit the hay hungry and never have a full dinner every day. It could mitigate the anxiety, however it can't eliminate it. According to Samuel Johnson, urgency is an imposing enemy to human satisfaction since it eliminates adaptability, delivers a few Excellencies impractical, and makes others very risky".

REFERENCES

1. Kumar, A., & Singh, R. (2022). *Evaluating reforms in the Indian juvenile justice system: A 20-year review*. *Journal of Juvenile Justice Studies*, 18(2), 45-64.
2. Mehra, B. (2021). *Impact of the JJ Act, 2000 on rehabilitation outcomes for juveniles in conflict with the law in India*. *Indian Journal of Criminal Law Review*, 7(3), 234-250.
3. Patel, V., & Sharma, D. (2020). *Juvenile delinquency in India: Understanding the JJ Act, 2000 through a lens of social justice*. *Social Work and Criminal Justice*, 15(4), 112-129.
4. Singh, J., & Kaur, H. (2019). *A decade of the Juvenile Justice Act in India: A critical analysis of its implementation and impact*. *Law and Society Review*, 33(1), 75-92.

5. Thakur, R. (2023). *The effectiveness of the Juvenile Justice System under the JJ Act, 2000: A comprehensive analysis*. *Contemporary Law Review*, 25(1), 88-107.
6. Das, B. K. (2016). *Juvenile Justice System in India*. *Indian Journal of Research*, 5(5), 1.
7. Chouradia, S. (2012). *Child Labour: The Burning Predicament In The World*. *Legal Service of India*. Retrieved July 20, 2016, from
8. Gupta, R., & Sharma, S. (2023). *Evaluating the impact of the Juvenile Justice System: A comprehensive review under the JJ Act, 2000*. *Indian Journal of Juvenile Justice*, 10(2), 45-62.
9. Khan, A., & Patel, M. (2021). *A critical appraisal of the Juvenile Justice System under the JJ Act, 2000: Assessing its impact on rehabilitation outcomes*. *Journal of Social Welfare and Juvenile Justice*, 8(3), 112-128.
10. Mishra, P., & Gupta, S. (2019). *Evaluating the effectiveness of rehabilitation programs under the JJ Act, 2000: A qualitative analysis*. *Indian Journal of Criminology and Criminal Justice*, 6(4), 201-215.
11. Sharma, A., & Singh, N. (2020). *Impact assessment of the Juvenile Justice System: A retrospective analysis of the JJ Act, 2000 in India*. *Journal of Legal Studies and Research*, 15(1), 88-105.
12. Verma, R., & Tiwari, S. (2018). *Examining the implementation of the Juvenile Justice System under the JJ Act, 2000: A case study approach*. *Journal of Law and Policy Review*, 25(3), 167-183.
13. Gupta, P., & Kumar, R. (2022). *Evaluation of the Juvenile Justice System under the JJ Act, 2000: Challenges and prospects*. *Indian Journal of Legal Studies*, 12(2), 75-90.
14. Singh, S., & Sharma, A. (2017). *Assessing the socio-legal impact of the Juvenile Justice System: A review of empirical studies*. *Journal of Child Rights and Development*, 4(1), 34-50.
15. Mishra, A., & Tiwari, R. (2016). *A comprehensive analysis of the Juvenile Justice System under the JJ Act, 2000: Evaluating its impact on child rights*. *Indian Journal of Social Welfare*, 9(4), 189-205.

LIFE OF WILLIAM SHAKESPEARE WITH SPECIAL REFERENCE TO COMEDY

RAJKUMAR ADAK
AH/English/08 (21AHM10PEL110004)
Enrollment No.
ENGLISH
Subject
Dr. Dr. JAILAXMI VINAYAK
Supervisor
EKLAVYA UNIVERSITY, DAMOH

Abstract:

William Shakespeare (26 April 1564) was an English poet and playwright, usually considered as the greatest writer in the English language and the preeminent dramatist in the world. He is often referred to be the national poet of England and the "Bard of Avon" (or simply "The Bard"). His surviving works include 38 plays, 154 sonnets, two lengthy narrative poems, and a variety of other writings. His plays have been translated. William Shakespeare was an English poet and playwright largely recognized as the finest writer in the English language and the preeminent dramatist in the world. He is often referred to be the national poet of England and the "Bard of Avon" (or simply "The Bard"). His surviving works include 38 plays, 154 sonnets, two lengthy narrative poems, and a variety of other writings. His plays are produced more frequently than those of any other dramatist, having been translated into every major living language. In this article, Life of William Shakespeare with special reference to Comedy has been discussed.

Keywords: William Shakespeare, Life, Comedy.

INTRODUCTION:

Shakespeare was born in Stratford-upon-Avon and raised there. Scholars believe he passed away on his 52nd birthday, which coincided with St. George's Day. He married Anne Hathaway at the age of 18, and she bore him three children: Susanna, Hamnet, and Judith. Between 1585 and 1592, he launched a lucrative career as an actor, writer, and co-owner of the Lord Chamberlain's Men, afterwards renamed the King's Men, in London. Around 1613, he appears to have retired to Stratford, where he passed away three years later. There is little surviving evidence of Shakespeare's private life, and there has been considerable debate regarding his sexuality, religious beliefs, and the authorship of the works attributed to him. [1]

WILLIAM SHAKESPEARE LIFE AND COMEDY:

Between 1590 and 1613, Shakespeare created the majority of his works. By the end of the sixteenth century, he had elevated comedies and histories to its highest level of intelligence and artistry. Up until 1608, he primarily composed tragedies, including Hamlet, King Lear, and Macbeth, which are regarded as some of the finest specimens of the English language. He wrote tragicomedies, sometimes known as romances, and collaborated with other playwrights during his latter period. During his lifetime, many of his plays were published in versions of different quality and accuracy. In 1623, two of his former theatrical colleagues produced the First Folio, a collected edition of his dramatic works that contained all but two of the plays generally acknowledged as Shakespeare's. Shakespeare was a renowned poet and playwright in his own time, but it was not until the nineteenth century that his fame reached its current heights. The Romantics, in particular, praised Shakespeare's brilliance, and the Victorians idolized him in a manner that George Bernard Shaw termed "idolatry." In the 20th century, his work was continually accepted and rediscovered by new scholarly and artistic movements. His plays continue to be widely produced and reworked in a variety of cultural and political situations throughout the world. [2]

SHAKESPEARE'S COMEDY:

Between 1593 and 1600, he authored a number of plays. Disguise; frustrated love; mistaken identity; marital and romantic misunderstandings are all themes in Shakespeare's comedies.

- 1592 The Comedy of Errors; The Two Gentlemen of Verona
- 1593 Love's Labor's Lost
- 1593-1594 The Taming of the Shrew
- 1595 A Midsummer Night's Dream
- 1596 The Merchant of Venice
- 1598 Much Ado About Nothing
- 1599 The Merry Wives of Windsor; As you like it
- 1601 Twelfth Night
- 1602 Troilus and Cressida; All's Well that Ends Well
- 1604 Measure for Measure
- 1608 Pericles
- 1610 Cymbeline
- 1611 The Winter's Tale; The Tempest

CONCLUSION:

According to historians, William Shakespeare composed 37 plays and 154 sonnets throughout his lifetime. Since 1589, when he initially began composing, Shakespeare averaged 1.5 plays each year. There have been plays and sonnets attributed to Shakespeare that were not authored by the great language and literature master. [3]

REFERENCES:

1. Berry, Ralph (1972). Shakespeare's Comedies. New Jersey: Princeton University Press.
2. Carlson, Susan (1991). Women and Comedy: Rewriting the British Theatrical Tradition. Ann Arbor: University of Michigan Press.
3. Dollimore, Jonathan (1991). "Transgression and Surveillance in Measure for Measure." Shakespeare's Comedies. Ed. Gary Waller. London & New York: Longman. 195-209

Evaluate the Relationship between Part Mix Flexibility and Performance in Simple Integrated Flexible Manufacturing System

Mohd. Shakeb Ashraf¹, Kishan Pal Singh², Wasif Ullah Khan³

¹ Research scholar, Mechanical Engg. Deptt. I.E.T. Mangalayatan University, Aligarh, India

² Associate Professor, Mechanical Engg. Deptt. I.E.T. Mangalayatan University, Aligarh, India

³ Associate Professor, MES U. P., AMU, Aligarh, India

Corresponding Author: - mohdshakebashraf@gmail.com

Abstract

Manufacturing is so competitive that there is no room for inefficiencies in the systems; instead, a manufacturing environment that prioritizes short lead times, high quality standards, a wide range of products and competitive prices has developed. Because of the trend toward globalization, these industrial environments must be built to be able to adapt to the demands of the marketplace in order to thrive. The technologies provide automation and flexibility to address these issues. Flexible manufacturing systems (FMSs) have emerged as a result of efforts to improve the industrial environment. A production system that is flexible enough to respond to changes—whether anticipated or not—is known as a flexible manufacturing system, or FMS. This production system is extremely interconnected. There are a lot of intricate relationships among its parts. Since it is incredibly challenging to tackle numerical programming methods for very complicated systems, the FMS reenactment is oftentimes used to inspect its performance measurements. The FMS parts are likewise very costly and confounded. If FMS implementation is required, it is preferable to use simulation to examine the outcomes, since this saves money, labor, and resource costs. Aspects of FMS research include modeling and performance analysis. This research applies the theory and practice of measuring and analyzing FMS performance measures. The mechanism has also been modelled. Subsequently, the simulation results were verified and compared using the mathematical technique. The dispatching issue with FMS is that there is no one rule that performs better than the others in all potential states that the system could be in; instead, performance is dependent on the state of the system at any one time. Therefore, it would be fascinating to apply the dispatching rule that is most suitable at any given time. A scheduling strategy that makes use of machine learning can be employed to accomplish this purpose.

Keyword: - Part Mix Flexibility, Performance, Integrated, Flexible Manufacturing System, Automated Guided Vehicle

1. Introduction

There are new stresses that are being placed on manufacturing systems as a result of intense competition in the manufacturing environment. These strains include expanding diversity, delivering products on time while putting an emphasis on conventional quality standards, and maintaining competitive prices. As a result, the primary focus in the global scenario is on the development of a manufacturing system that is capable of satisfying all of the necessary conditions within the specified timeframes at a cost that is affordable. The manufacturing industry is able to increase their performance thanks to the development of flexible manufacturing systems (FMS), which also provides them with the flexibility to produce individual products at medium volume. It is feasible to portray a flexible manufacturing framework (FMS) as a PC controlled setup of semi-subordinate positions and material taking care of systems that is intended to create different item mixes with low to medium volume in a productive way. High flexibility, high productivity, and low work-in-process are all characteristics that it possesses. It is the delicacy of the FMS that it is designed to emulate the flexibility of job shops while preserving the efficacy of its own. By using concepts from both the existing loading and batch workshop manufacturing system, the FMS is designed to imitate the flexibility of job shops. One of the goals of a manufacturing system like FMS should be to simultaneously meet demands while minimizing the number of marksmen that are required. When it comes to processing a wide range of items in small and medium quantities simultaneously, a general FMS is capable of doing so. A flexible manufacturing framework (FMS) is the most reasonable manufacturing framework for the ongoing manufacturing conditions as a result of its flexibility, which empowered it to be the most fitting manufacturing framework.

A significant amount of money is being invested in the development of the Flexible Manufacturing System (FMS), which is being designed with the intention of generating products that combine flexibility with productivity. The design of production systems like FMS can be accomplished with the help of deterministic models, which are founded on the concept of discrete event simulation. At a strategic level, attention and care are required due to the particular design and magnitude of the hardware requirements for an FMS. When designing the layout and design of the system, it is important to keep the desired production in mind. This can guarantee that the FMS will satisfy the consistently evolving needs. To give legitimization to the performance improvements, the plan choices should be founded on the FMS. The motivation behind this article is to give an assessment of the flexible manufacturing framework that is as of now set up, determined to improve the framework's performance through the execution of changes.

1.1. FMS: Definition and Characteristics

A material dealing with framework (FMS) is an assortment of automated handling gadgets that are associated with each other through transports and other transportation systems. To do the manufacturing system in a FMS, it is important to have a mix of workstations and mechanical ways that are given by the material taking care of framework and examined by a programmed review unit. parts that have been endorsed leave the FMS, though parts that have been denied should be sent back for additional handling. A flexible manufacturing framework (FMS) can likewise be depicted as an automated manufacturing cell. This cell is comprised of an assortment of workstations that are associated with each other through automated move and taking care of units, as well as stockpiling systems, and it is overseen by a dispersed modern processing framework. A manufacturing cell that is automated can handle various kinds of parts all the while in various workstations. These workstations can naturally change themselves to oblige unexpected varieties in the mix and in the volume of the item arranges.

The limit of cell designs to handle middle of the road volumes and a great many items in a conservative way makes them the most reasonable formats for record the board systems (FMS). Then again, a mix of occupation shop systems and discrete mechanization is best when the volume is low and the variety is high. A mix of a stream shop framework with move robotization is ideal while managing huge volumes and a restricted assortment of items. At last, cell manufacturing and FMS are joined to make a predominant answer for conditions that are halfway in nature.

Five distinct sorts of designs are accessible for use in a FMS execution: (I) the line type, in which the workstations are organized in a successive style and license just the immediate progression of materials, stacked and dumped at discrete, outrageous places; (ii) the circle type, in which the workstations are organized in a phone, U-molded configuration, and grant just the course of the material, stacked and dumped in a similar point; (iii) the stepping stool type format, in which the workstations are organized in a pairwise design and license the material to flow between and around it, stacked and dumped at a similar point; (iv) the open field format type, in which the automated guided vehicle (AGV) openly gets across the workstations, moving the material stacked and dumped at a similar point; and (v) the robot-focused format type, in which the functioning stations are situated around at least one robots, considering any sort of development of the material.

1.2. Components of an FMS

Machine devices that are controlled by computer numeric control (CNC) are normally remembered for

a regular FMS. These machine apparatuses are associated with each other via automated material handling, storage systems, and automated review, and they are overseen by an integrated computer framework. In the manufacturing business, a CNC machine device is a piece of gear that is utilized to shape or produce metal or different types of hard materials. Cutting, penetrating, exhausting, crushing, processing, scratching, and shearing are the essential functional strategies that are performed on the material. The part that should be handled, the machine and its controllers, and the actual device are the three central parts that are integrated into a machine instrument. The machine base, the parts handling gadgets, the apparatuses and the programmed device transformer, the drive units and controls, the rationale programmable guidelines and sensors, and a lot more parts make up their essential parts. Something like one CNC machine device that is equipped with an apparatus magazine and is fit for executing various continuous tasks is remembered for FMS workstations to guarantee effectiveness. This arrangement is totally automated and takes practically no time by any stretch of the imagination, requiring very little or no consideration from a person. To work with a quick trade of kicks the bucket and an elevated degree of efficiency, the instrument magazine fills in as a brief storage office for the devices.

To handle materials, the FMS requires the utilization of beds and compartments, which are then moved utilizing either transports or automated guided vehicle systems (AGVS). A guided vehicle framework (AGVS) is a sort of automated vehicle that works in automated offices. By bringing down the expense of labor and lessening the quantity of mishaps, AGVS work on both the speed and precision of transportation. Underground links, which just grant fixed directions, remote command, which allows various directions, optical command and painted lines, which license adjustment of the direction, remote command, optical encoders, or scanners, which license following of the direction, remote direction in light of following calculations, and remote direction referred to by signals at the floor are the essential methods that are used in AGVS, either separately or in mix. As well as stacking and dumping things, the essential elements of AGVS incorporate the direction of the vehicle, the enhancement of the course, the control of traffic to forestall impacts, and the advancement of the course. Transports are a reciprocal framework to AVGS. They move standard burdens over fixed tracks that are shaped by rollers, bended rollers, casters, mats, inclining mats, chains, and other reasonable blends that permit flat and vertical transportation as well as course changes.

It is likewise feasible for automated arms to work as material handling gadgets. A modern robot is a machine that can be modified to do various errands and has human elements. These attributes incorporate the capacity to answer tactile improvements, speak with different machines, and simply decide.

The mechanical controller, the actuators that convert electrical, pressure driven, or pneumatic energy into mechanical power for development, the sensors that action position, speed, power, or force, the control unit, and the power unit are the essential parts of a robot. The actuators are liable for changing over it into mechanical power for development. Welding, handling, painting, collecting, and palletizing are the essential exercises that robots are liable for acting in the manufacturing business.

FMSs are outfitted with automated storage and retrieval systems (AS/RS), which are comprised of storage structures, stacker cranes, and trans lifts. These systems are liable for the administration of burdens. To get and putting away standardized loads, which might be obliged in beds and compartments, storage structures need to have profiles, retires, and lifting hardware that are suitably planned. Portable designs that are prepared to do rapid even and vertical development are known as trans lifts. These designs are intended to get to the storage establishment to store and recuperate middle loads that poor person yet been finished or have not yet been guaranteed by the client. The improvement of courses for AVGS and trans lifts, as well as the control of storage racks in FMS, is a critical exploration subject that should be tended to.

To wrap things up, the last quality examination is done via automated review units at FMS before the conveyance of the item. While performing quality checks in boundaries, for example, the aspects and state of things, automated examination utilizes automated gadgets and programming devices to accumulate the fundamental data. The key benefit of this system is that it may perform an inspection method that is both more reliable and faster than those that are carried out by human inspectors. In most cases, the CNC machine tool is able to carry out the automated inspection at the same time as the last stages of the machining process. This eliminates the possibility of the subsequent process being presented with defective components.

2. LITERATURE REVIEW

Suresh and Vivekanandan (2021) In their exploration that was distributed in the Diary of Manufacturing Systems, the creators give a total assessment of flexible manufacturing systems (FMS) that utilizes reproduction draws near. The reason for this study is to assess the performance of FMS in different situations to acquire a comprehension of the impact that flexibility has on the productivity of the framework. The creators utilize discrete-occasion reproduction to mimic and examine various situations, placing an accentuation on the meaning of flexibility regarding working on functional performance. Throughput, lead time, and structure power against weaknesses are altogether improved with extra part

mix and controlling flexibility, as indicated by the significant discoveries. These discoveries give new-data that can be utilized to upgrade FMS's procedure and tasks.

Singh and Sharma (2022) More concentrate on what part-mix flexibility means for FMS functional adequacy is required. Analysts look at the impacts of variety in part mix on key performance markers including throughput, usage, and lead time by joining recreation results with exploratory information and rebuilding models. Throughput and use are two instances of such pointers. The outcomes show that the useful viability of FMS is significantly improved with a more serious level of part-mix flexibility. This is achieved by upgrading the structure's versatility and responsiveness to current solicitations for changes, which prompts better usage of resources and decreased out-of-gear times. This study's discoveries feature the meaning of including part-mix flexibility into the FMS procedure and board to accomplish ideal performance results.

Ahmad and Hassan (2023) Research on FMS performance is justified, with an emphasis on the impacts of part mix and guiding flexibility. What's more, the review utilized complex reenactment models to analyze what alterations to the part mix and the executives choices mean for key performance markers like as machine use, structure efficiency, and throughput. Further developed part mix and heading flexibility essentially upgrades FMS performance, as per the discoveries. By diminishing continuous lead times and empowering additionally created responsiveness to well known changes, this gives a benefit. Integrating flexibility into the plan of creation systems to accomplish ideal performance results all through manufacturing is fundamental to the review's discoveries.

Liu and Wang (2023) Examining the vital job that part mix flexibility plays is fundamental for working on the versatility of FMS. A key part that in a general sense supports FMS responsiveness to changes keeping watch is the ability to manage shifted parts without extensive room for error time or reconfiguration, which they underline. The expression "part mix flexibility" likewise portrays this. Upgrading the part mix's versatility prompts better asset usage, more limited lead times, and improved in general system performance, as shown by the creators through exploratory examination and multiplication models. Their survey's discoveries feature the meaning of utilizing progressed flexibility systems to keep an upper hand in the present dynamic and eccentric business climate.

Kumar and Jain (2024) Explore the impact that the flexibility of the part mix has on the efficiency of flexible manufacturing systems (FMS). Their examination, which was distributed in PCs and Modern Designing, utilizes a blend of experimental information investigation and reproduction models to explore the manners by which different part mixes impact framework performance markers, for example, throughput and lead time. Exhibited by the creators expanded flexibility in the part mix contributes

altogether to an expansion in both generally efficiency and functional productivity in FMS. Manufacturing administrators can likewise profit from the pragmatic bits of knowledge they give about the advancement of part mix techniques to acquire further developed performance results.

Tan and Li (2024) It means a lot to concentrate on the chance of integrating flexible part mix choices into creation arranging inside Flexible Manufacturing Systems (FMS). The issues that are available in powerful creation conditions are tended to by their essential point, which is to advance the harmony among flexibility and effectiveness. The creators research the manners by which different part mixes impact the general performance of the framework as well as the expenses of manufacturing by applying refined demonstrating approaches. Their discoveries demonstrate that an effective combination of part mix flexibility with vital creation arranging can possibly significantly work on functional productivity and responsiveness in FMS, consequently giving important experiences to the plan and the executives of manufacturing systems.

Patel and Desai (2024) An assessment of the performance of flexible manufacturing systems (FMS) is done utilizing various different part mix situations. The exploration utilizes a comprehensive logical model to assess the impact that different setups of part mix flexibility have on significant performance measures, for example, throughput, lead time, and framework use. As per the discoveries of the creators, a bigger level of part mix flexibility by and large outcomes in an improvement in framework performance; nonetheless, the degree of this improvement is dependant upon the particular functional circumstances and the intricacy of the manufacturing climate. The aftereffects of their examination feature the meaning of streamlining part mix methods to take advantage of the abilities of FMS.

3. RESEARCH METHODOLOGY

Three various types of strategies are used to decide the boundaries of the FMS that has been given; two of these techniques are reenactment draws near, and the third one is a numerical strategy. The strategy for recreation is known as the Petri net cycle. These are the models that address the framework.

3.1. System modeling

Investigate the organization down beneath. Different kinds of hubs, including make hub, dole out hub, anticipate hub, free hub, gather hub, end hub, thug hub, and others, are used by the framework to give a depiction of the framework that is really being utilized. At a time interval of two minutes, the framework starts the method involved with making elements. A thug hub is used to partition things in various groupings as per the functional prerequisites of the association. Elements trust that the assets will open up in the hub that is devoted to the pause. Three assets of robots, one asset of processing machine, and

one asset of penetrating machine, every one of which has a limit of three, are being used by the frame-
work. The framework additionally incorporates a review framework as part of its parts. The framework
works for a sum of multi week of working hours. Stacking and dumping station, two cycle stations,
review focus, and two automated vehicle vehicles are the parts that make up the framework.

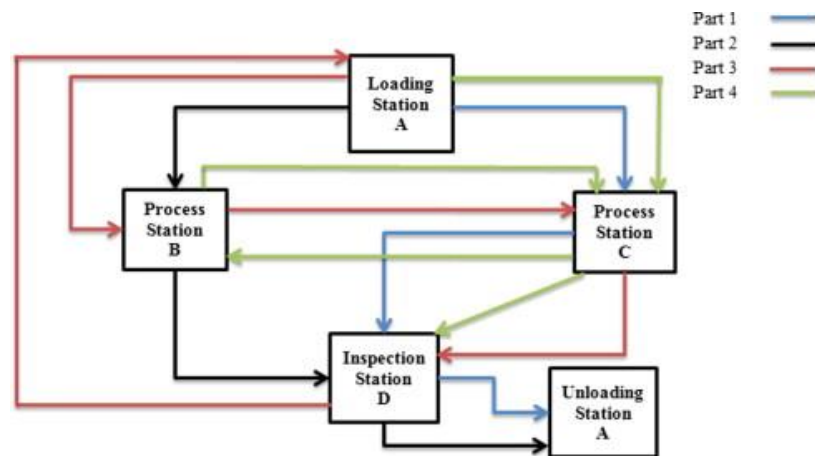


Figure 1: Block diagram of considered FMS in case study

4. RESULTS AND DISCUSSIONS

A variety of machining centers have been analyzed, and the following operations and procedures
have been compiled and shown in Table 1.

**Table 1: On various machining centers, a list of processes and the amount of time required for
each**

| Part | Part mix | Operation | Process time (min) | No. of servers | Fre- quency |
|------|----------|-----------|--------------------|----------------|----------------|
| A | 0.5 | Load | 5 | 2 | 2 |
| | | Mill | 60 | 4 | 2 |
| | | Lisped | 7 | 2 | 2 |
| | | Unload | 3 | 2 | 2 |
| B | 0.6 | Load | 5 | 2 | 2 |
| | | Drill | 21 | 4 | 2 |
| | | Mill | 31 | 4 | 2 |
| | | Inspect | 9 | 2 | 2 |
| | | Unload | 3 | 2 | 2 |

Table 2: This is a list of the operations and the amount of time spent on each station

| Part | Weekly demand | Process sequence | load | Process station | | Inspection station | Unload station |
|------|---------------|---|------|-----------------|----|--------------------|----------------|
| | | | A | B | C | D | A |
| 1 | 360 | $A \rightarrow C \rightarrow D \rightarrow A$ | 6 | | 22 | 15 | 4 |
| 2 | 460 | $A \rightarrow B \rightarrow D \rightarrow A$ | 6 | 23 | | 15 | 4 |
| 3 | 260 | $A \rightarrow B \rightarrow C \rightarrow D \rightarrow A$ | 6 | 21 | 23 | 15 | 4 |
| 4 | 360 | $A \rightarrow C \rightarrow B \rightarrow C \rightarrow D$ | 6 | 16 | 30 | 15 | 4 |

The accessibility of crude parts and the AVGs is expected to start a cycle. As per the succession that has been laid out for the different parts, the AVG transports a crude part from the stacking station to the handling station. Yet again if an activity is done in one station, the part is moved by AVG to the ensuing station that is expected of it. Conveying the part to the dumping station is the last move toward the interaction. Then, a correlation is made between the usage and the general efficiency. To assess the performance of any FMS, there are an incredible number of ways that might be used. A few instances of these procedures incorporate displaying methods, recreation strategies, and numerical programming-based procedures.

\

Table 3: Using Petri Nets to Determine Activity Times for Flexible Manufacturing

| Petri net | |
|----------------------|-----|
| Drilling | 0.6 |
| milling | 0.9 |
| inspection | 0.7 |
| Overall productivity | 0.8 |

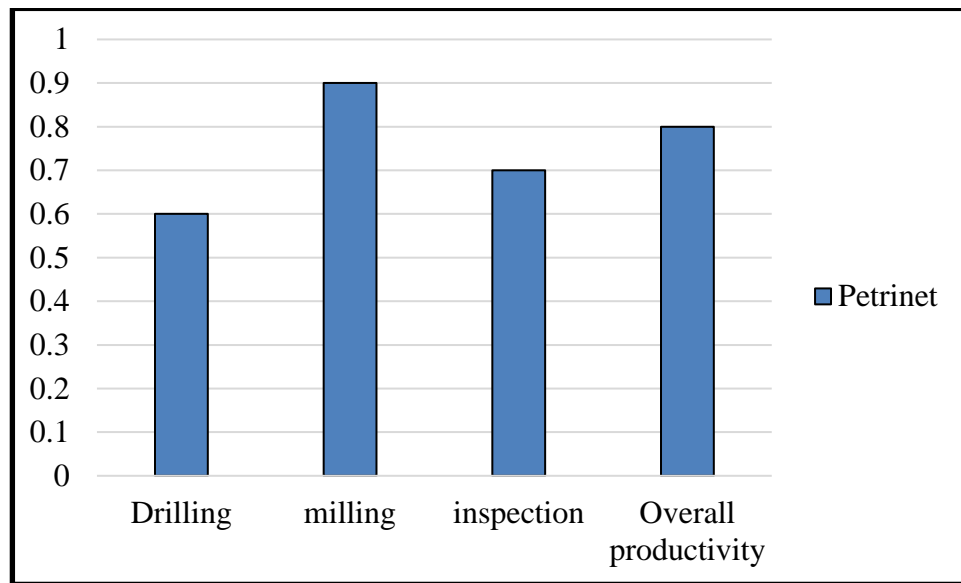


Figure 2: Evaluation of consumption from a variety of processes for the case study and comparison

5. CONCLUSION

To work on the performance of Flexible Manufacturing Systems (FMS), the review features the huge job that flexibility plays in the interim. It is self-evident, by means of the utilization of cutting edge reproduction devices and experimental examination, that a bigger level of flexibility in part mix and directing considers a huge improvement in framework proficiency, throughput, and reaction to changes on the lookout. The discoveries feature the meaning of integrating flexibility systems into the plan and organization of FMS to amplify functional performance and keep seriousness in modern settings that are continually evolving. Moreover, the review focuses on the need of proceeding with examination and investigation of imaginative routes to additionally extend the flexibility and productivity of FMS to fulfill the steadily changing assumptions for clients and the elements of the market.

REFERENCES

1. Ahmad, M., & Hassan, A. (2023). Analyzing the effects of part mix and routing flexibility on FMS performance. *Flexible Services and Manufacturing Journal*, 35(1), 56-74.
2. Bruccoleri, M., Sergio, N. L., & Perrone, G. (2003). An object-oriented approach for flexible manufacturing control systems analysis and design using the unified modeling language. *International Journal of Flexible Manufacturing Systems*, 15(3), 195-216.

3. Buitenhek, R., Baynat, B., & Dallery, Y. (2002). Production capacity of flexible manufacturing systems with fixed production ratios. *International Journal of Flexible Manufacturing Systems*, 14(3), 203-226.
4. Chan, F. T. S., Bhagwat, R., & Wadhwa, S. (2007). Flexibility performance: Taguchi's method study of physical system and operating control parameters of FMS. *Robotics and Computer-Integrated Manufacturing*, 23, 25-37.
5. Diaz, M. (1982). Modeling and analysis of communication and cooperation protocols using Petri net based models. *Computer Networks*, 6.
6. Ge, S. S., Lee, T. H., Gu, D. L., & Woon, L. C. (2000). A one stop solution in robotic control system design. *IEEE Robotics & Automation Magazine*, 7, 42-55.
7. Gurel, A., Bogdan, S., Lewis, F. L., & Huff, B. (2000). Matrix approach to deadlock-free dispatching in multi-class finite buffer flowlines. *IEEE Transactions on Automatic Control*, 45(11), 2086-2090.
8. Huang, Y. M., Chen, J. N., Huang, T. C., Jeng, Y. L., & Kuo, Y. H. (2008). Standardized course generation process using dynamic fuzzy Petri nets. *Expert Systems with Applications*, 34, 72-86.
9. Kovačić, Z., Bogdan, S., Reichenbach, T., & Smolić-Ročak, N. (2001). FlexMan – A computer-integrated tool for design and simulation of flexible manufacturing systems. In *Proceedings of the Ninth Mediterranean Conference on Control and Automation*, Dubrovnik.
10. Kumar, S., & Jain, V. (2024). Exploring the relationship between part mix flexibility and productivity in flexible manufacturing systems. *Computers & Industrial Engineering*, 175, 107984.
11. Liu, Y., & Wang, Q. (2023). The role of part mix flexibility in enhancing the agility of flexible manufacturing systems. *Journal of Manufacturing Processes*, 86, 345-357.
12. Patel, D., & Desai, P. (2024). Evaluating the performance of flexible manufacturing systems under varying part mix scenarios. *International Journal of Advanced Manufacturing Technology*, 123(7-8), 1985-1998.
13. Singh, H., & Sharma, P. (2022). Impact of part-mix flexibility on the operational efficiency of flexible manufacturing systems. *International Journal of Production Research*, 60(5), 1321-1335.
14. Suresh, R., & Vivekanandan, S. (2021). Performance evaluation of flexible manufacturing systems using simulation. *Journal of Manufacturing Systems*, 60, 205-217.
15. Tan, W., & Li, Z. (2024). A study on the integration of part mix flexibility and production planning in FMS. *Journal of Manufacturing Science and Engineering*, 146(2), 021008.

Analysis of Process Parameters and its Influence in Additive Manufacturing

Abdul Jabbar¹, Dr. Kishan Pal Singh², Prof. Imtiaz A. Khan³

¹Research Scholar, Department of Mechanical Engg. Mangalayatan University, Aligarh,

²Associate Professor, Department of Mechanical Engg., Mangalayatan University, Aligarh

³Professor, Department of Mechanical Engg., AMU, Aligarh

Abstract

The field of additive manufacturing is rapidly expanding. By adding layers of material, it allows the development of incredibly complex 3D things, in contrast to standard production processes that rely on material removal. A generation of additive manufacturing techniques was born out of the development of additive technology; these techniques were first restricted to industrial use, but their remarkable degree of innovation has made it possible for residential systems to proliferate. These days, the most widely used home systems generate 3D parts by a fused deposition modeling process.

The purpose of this paper is to examine how some common additive manufacturing process parameters affect prototype qualities. In particular, the impact of layer thickness on dimensional accuracy and shape has been investigated. ABS filaments were used to construct cylindrical specimens on XYZ printing's Da Vinci 1.0A 3D printer.

A conventional reverse engineering technique was used to inspect the printed components' dimensions and shapes. Specifically, the point clouds of the different specimens' surfaces were obtained by means of a 3D laser scanner. After that, the obtained point clouds underwent post-processing to create 3D models, which were then compared to the original CAD models to identify any variations in shape or dimension. The results obtained could be a helpful reference for choosing the optimal set of process settings to produce high-quality printed components in a reasonable length of time while minimizing material waste.

1. Introduction

All of the methods that allow for the successive addition of extremely thin material layers to create three-dimensional objects are collectively referred to as additive manufacturing, or AM. The first generation of additive manufacturing (AM) systems were restricted to industrial uses due to the progress of additive technology. However, due to their remarkable level of innovation, AM systems are now widely used.

These days, a broad spectrum of users—many of whom are not engineering experts—commonly use the words additive manufacturing and 3D printing. In fact, the widespread availability of inexpensive 3D printers has made it possible for regular consumers to utilize this technology, allowing them to quickly and more affordably create 3D objects at home.

The most widely used home systems generate 3D items through the Fused Deposition Modeling (FDM) [1-3] technique. The underlying principle of this technology is that any three-dimensional object can be sliced, or separated into several portions or thin layers. Because of this, it is possible to make any 3D object by layering multiple physical layers on top of one another. The FDM process involves heating a thermoplastic filament in an extruder and depositing it on a support plane in a direction that defines one of the several layers into which the final product has been virtually divided. In most cases, the extruder can travel in a horizontal plane to provide each single layer the proper shape. Different layers can be superimposed by extruder or support plane movements that are vertical. Regrettably, inexpensive FDM 3D printers are ineffective and yield items with subpar

geometric and dimensional precision [3-6]. These limitations stem, of course, from the hardware and software solutions, but they also stem from the mechanical components, which are limited in performance by the cheap cost of the printer. Either way, choosing the right printing process settings might help effectively reduce some of these negative effects [7–10]. The purpose of this study is to investigate the dimensional and geometric accuracy of a typical low-cost 3D printer and the effects of various process settings on the prototypes' dimensional and geometric properties. Specifically, accuracy analyses have been carried out on cylindrical specimens that were obtained with varying values of the layer thickness. In a standard reverse engineering procedure, the physical prototypes were examined with a 3D laser [11–13].

2. Materials and Methods

A Da Vinci 1.0A 3D printer was used to build the prototypes that are being considered (Fig.1). The Da Vinci 1.0A is powered by the exclusive "XYZware" software, and it can construct up to 20x20x20 cm with compatibility for both PLA and ABS filaments. Regretfully, you are unable to accurately and individually alter the printing parameters using this software. For this, the programs "Slic3r" and "Simplify3D" were utilized. To start the printing process, the ".gcode" files produced by these programs—which included the mandated set of printing parameters—were loaded into the XYZware program. As mentioned earlier, some process parameters can have a significant impact on the quality of AM prototypes [7, 9].

This work summarizes part of the results of a broader study that aimed to determine a relationship between the shape and dimensional accuracy of printed objects and the primary printing parameters (layer thickness, extrusion width, printing speed, slicing direction, and extrusion temperature).

At this point, preliminary findings for layer thickness—which indicates the thickness of each slice will be shown



Fig.2.Dimensions of the analysed cylinder and two proto-types printed with 0.2mm(on the left) and 0.05mm (on the right) layer thickness values

Two distinct layer thickness values (0.2 mm and 0.05 mm) were used to test the prototypes (fig. 2). Other printing parameters were set to the default values for the Da Vinci printer (table 1), and the z-axis was used to enforce the sliding direction.

Table1.Main printing parameter

| Parameter | Value |
|-------------------|-------|
| Nozzlediameter | 0.4mm |
| Printspeed | 5mm/s |
| Bedtemperature | 90° |
| Nozzletemperature | 210° |
| Filldensity | 25P |
| Wallthickness | 0.7mm |

Additionally, several attempts have been made to assess different sliding directions. Regretfully, no suitable model has been acquired (fig. 3). The printer's astounding technical limit is exposed by these printing errors.

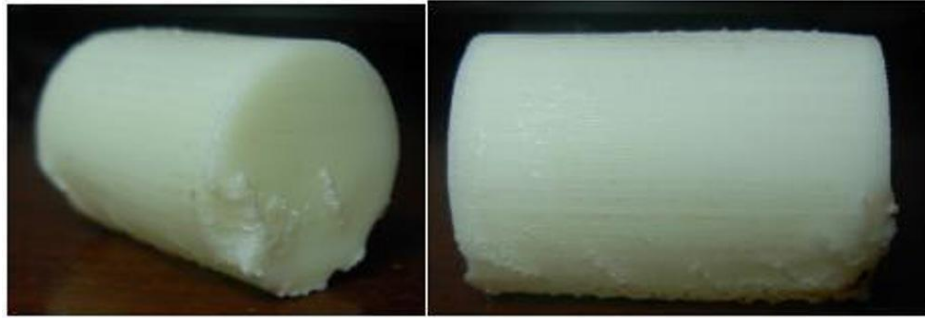


Fig.3.Cylindrical specimen so btained with sliding direction along the x-axis

3. 3D Acquisition and CAD Modelling

A typical reverse engineering method was used to check the printed components for dimensions and shape accuracy [14–15]. Using a 3D laser scanner based on triangulation, Hexagon metrology was able to obtain all of the prototypes [16–18]. (Figure 4) This device can acquire point clouds at a high rate (150000 points per second) with a high degree of accuracy (0.013 mm) and has programmable line lengths.



Fig.4.Hexagon metrology3D laser scanner HP-L-20.8

After post-processing and conversion into NURBS surfaces, the obtained point clouds (fig. 5, a) produced models that deviated from the point clouds by less than 0.035 mm (fig. 5, b). The last stage of the procedure was turning the NURBS surfaces into CAD solid models (fig. 5, c). Each prototype CAD model has been successively aligned with the nominal CAD model (fig. 6).

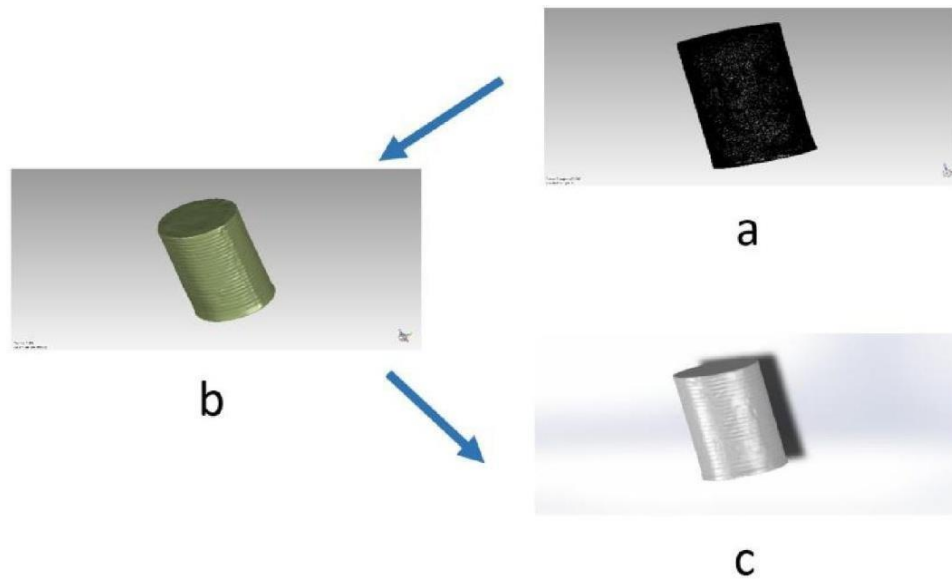


Fig.5.a) Point cloud,b)NURBS surfaces and c) CAD model of a printed cylinder

Iterative methods were used to minimize the distance between the points of comparison in order to acquire the alignment [7, 20]. Two methods were applied in order to accomplish this goal: initially, the models were loosely aligned using a small number of comparison points; then, the model alignment was optimized utilizing a greater number of comparison points during the fine adjustment phase. As soon as the alignments of all the CAD models were finished, the printed prototypes were inspected for dimensions and form.

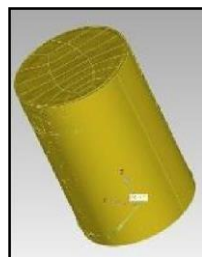


Fig.6. Aligned(acquired and nominal) CAD models.

4. Dimensional Inspection

The deviation values, which were defined as the shortest path between any point on the nominal CAD model and the obtained model, were measured in order to perform the dimensional inspection. To obtain data regarding the printed object's dimensional accuracy, Root Mean Square Errors (RMSE) have also been computed.

Table2. Layer thickness values and comparison results of the prototypes

| Proto- type | Layer Thickness(mm) | Deviation{mmJ | RMSE(mmJ |
|----------------|---------------------|---------------|----------|
| 1 | 0.2 | -0.589 | 0.324 |

Exploring Innovation Research Methodologies in a Variety of Multidisciplinary Fields and Their Prospective Future Impact

February 2024

| | | | |
|---|------|--------|-------|
| 2 | 0.2 | -0.550 | 0.254 |
| 3 | 0.2 | -0.641 | 0.318 |
| 4 | 0.05 | -0.524 | 0.298 |
| 5 | 0.05 | -0.663 | 0.297 |
| 6 | 0.05 | -0.609 | 0.324 |

Colored maps that represent the distributions of deviation values throughout the CAD models of the prototypes are shown in Figure 7. These maps demonstrate that the z-axis is where the biggest discrepancies between the nominal CAD model and the obtained models occur. The prototypes are really all smaller than the nominal cylinder.

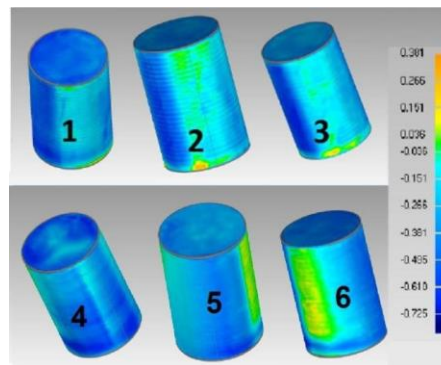


Fig.7.Deviation (mm) maps of printed cylinders

The data show that the RMSE ranges from 0.254 mm to 0.324 mm, whereas the greatest deviation (absolute) value spans from 0.524 mm to 0.663 mm. Prototype 2 has the lowest RMSE and prototype 4 the lowest values of deviation.

A comparative survey between the prototypes was carried out after the alignment technique previously described in order to evaluate the repeatability of the outcomes. In specifically, a two-by-two comparison was conducted between the prototypes 1-2-3, which were produced with identical printing settings. The deviation maps in Figure 8 provide a summary of the comparison results.

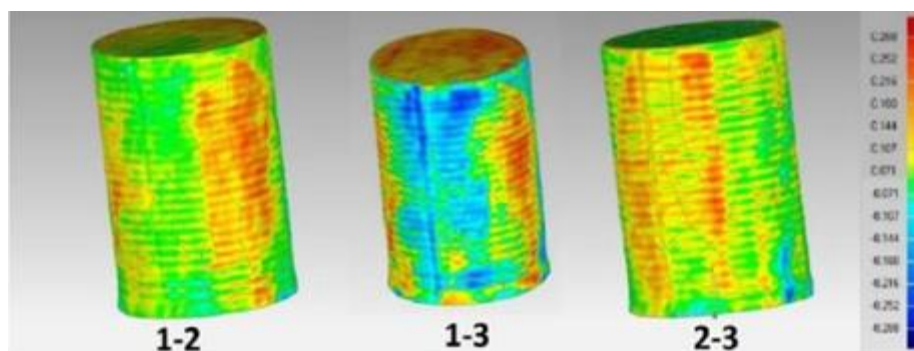


Fig.8.Comparison between printed cylinders:deviations(mm) maps

The largest deviation (about 0.280 mm) was measured at comparable values for each of the three comparative analyses.

The greatest difference measured, 0.288 mm, was found between prototypes 1 and 2.

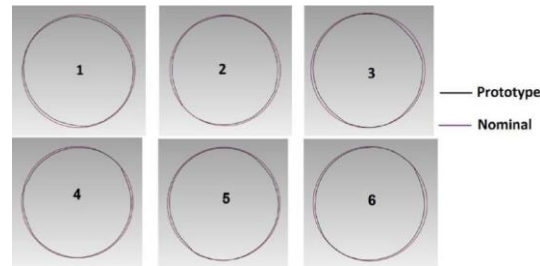
These results show that the printer's quality is moderate in terms of repeatability of the produced objects.

5. Circularity and Cylindricity Control

Additionally, controls for the specimens' circularity and cylindricity were carried out. There has been a qualitative examination of the circularity. The cylinders' half-height cross sections (along the x-y plane of Figure 2) were taken out and contrasted with the nominal circular section.

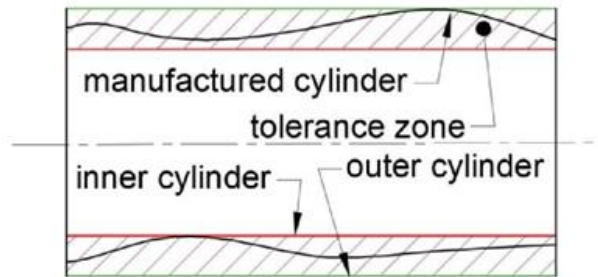
Figure 9 shows the results that were achieved. Every prototype has a pseudo-elliptical cross section instead of a perfectly circular one, indicating a recurring circularity error.

Fig.9. Comparison of cross sections (x-y plane)



The tolerance region, which is the area enclosed by two concentric cylinders (the "inner" and "outer") and including all of the cylindrical surface's points, has been used to regulate cylinder size for each specimen (fig. 10).

Fig.10. Cylindricity tolerance zone



The cylindrical tolerance zone was calculated as $T = (D_{outer} - D_{inner})/2$ by locating and measuring the inner and outer cylinders of each prototype.

The data on cylinder control is summarized in Table 3. In terms of lowest tolerance, the prototypes 4 and 5 that were printed with a layer thickness of 0.05 mm yielded the best results. The quality of the printer's geometric correctness is evident from all of the collected data.

Table3. Cylindricity control data (nominal diameter=20 mm)

| <i>Prototype</i> | <i>Outer Cylinder</i> | <i>Inner Cylinder</i> | <i>Cylindricity</i> |
|------------------|-----------------------|-----------------------|---------------------|
| 1 | 20.130 | 18.727 | 0.702 |
| 2 | 20.370 | 18.808 | 0.781 |
| 3 | 20.242 | 18.673 | 0.785 |
| 4 | 20.180 | 18.834 | 0.673 |
| 5 | 20.238 | 18.908 | 0.665 |
| 6 | 20.238 | 18.804 | 0.717 |

6. Conclusions

This paper presents the results of a study on the impact of certain parameters of AM processes. A thorough investigation was carried out to evaluate the dimensions and geometric accuracy of a cheap 3D printer. In specifically, different levels of layer thickness have been printed on a few cylindrical specimens. Using a conventional reverse engineering method, these prototypes were acquired and transformed into CAD models. Then, by comparing these models to the nominal CAD model, the maximum deviation values and root mean square errors were computed. Additionally, controls for cylinder and circularity were performed.

The obtained data are analyzed and it is found that prototypes printed with layer thicknesses of 0.2 mm and 0.05 mm have equivalent maximum deviation values assessed in terms of dimensional accuracy. For the prototypes with layer thicknesses of 0.05 mm and 0.2 mm, the RMSE was likewise discovered to be comparable. The thickness of the layers has not been shown to have any effect on circularity. Actually, the pseudo-elliptical cross sections of every item showed minor anomalies.

Prototypes printed with a layer thickness of 0.05 mm performed better in terms of cylinder control than those printed with a layer thickness of 0.2 mm. Generally speaking, a 0.05 mm layer thickness could yield the optimal arrangement depending on the printer being utilized, the printing parameters used, and the geometrical feature under consideration. The results given have demonstrated how inadequate the achievable geometric and dimensional accuracies are when using inexpensive printers. Moreover, it has been found that the right choice of printing parameters can dramatically change the printed object's quality.

7. References

1. Bikas, H., Stavropoulos, P., Chryssolouris, G., Additive manufacturing methods and modeling approaches: A critical review, 2016, *International Journal of Advanced Manufacturing Technology*, 83(1-4), pp.389-405
2. Guo, N., Leu, M.C., Additive Manufacturing: Technology, applications and research heeds, 2013, *Frontiers of Mechanical Engineering*, 8(3), pp.215-243
3. Lanzotti, A., DelGiudice, D.M., Lepore, A., Staiano, G., Martorelli, M., on the geometric accuracy of Rep Rap open-source three-dimensional printer, 2015, *Journal of Mechanical Design, Transactions of the ASME*, 137 (10), art.no.101703
4. Cerniglia, D., Montinaro, N., Nigrelli, V., Detection of disbands in multi-layers tructures by laser-based ultra sonic technique, 2008, *Journal of Adhesion*, 84(10), pp.811-829
5. Boschetto, A., Bottini, L. Accuracy prediction in fused deposition modelling, 2014, *International Journal of Advanced Manufacturing Technology*, 73 (5-8), pp.913-928
6. Ingrassia, T., Mancuso, A., Nigrelli, V., Tumino, D., Numerical study of the components positioning influence on the stability of a reverse shoulder prosthesis (2014) *International Journal on Interactive Design and Manufacturing*, 8(3), pp.187-197
7. Lanzotti, A., Martorelli, M., Staiano, G., Understanding process parameter effects of reprop open-source three-dimensional printers through a design of experiments approach, 2015, *Journal of Manufacturing Science and Engineering, Transactions of the ASME*, 137(1), art.no.011017
8. Boschetto, A., Bottini, L., Design for manufacturing of surfaces to improve accuracy in Fused Deposition Modeling, 2016, *Robotics and Computer-Integrated Manufacturing*, 37, art.no.1357, pp.103-114

**Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024**

9. Vaezi, M., Chua, C.K., Effects of layer thickness and binder saturation level parameters on 3D printing process, 2011, International Journal of Advanced Manufacturing Technology, 53(1-4), pp. 275-284
10. Dai, X., Xie, H., Constitutive parameter identification of 3D printing material based on the virtual fields method, 2015, Measurement: Journal of the International Measurement Confederation, 59, pp. 38-43
11. Ingrassia, T., Mancuso, A., Nigrelli, V., Tumino, D., A multi-technique simultaneous approach for the design of a sailing yacht, 2015, International Journal on Interactive Design and Manufacturing, DOI:10.1007/s12008-015-0267-2
12. Cappello, F., Ingrassia, T., Mancuso, A., Nigrelli, V., Methodical redesign of a semi trailer, 2005, WIT Transactions on the Built Environment, 80, pp. 359-369
13. Nalbone, L., et al., Optimal positioning of the humeral component in the reverse shoulder prosthesis, 2014, Musculo skeletal Surgery, 98(2), pp. 135-142.
14. Cerniglia, D., Ingrassia, T., D'Acquisto, L., Saporito, M., Tumino, D., Contact between the component of a knee prosthesis: Numerical and experimental study, 2012, Frattura ed Integrità Strutturale, 22, pp. 56-68
15. Ingrassia, T., Nigrelli, V., Design optimization and analysis of a rear under run protective device for truck, 2010, Proceedings of the 8th International Symposium on Tools and Methods of Competitive Engineering, TMCE 2010, 2, pp. 713-725
16. Ingrassia, T., Mancuso, A., Virtual prototyping of an intra medullary nail for tibial fractures, 2013, International Journal on Interactive Design and Manufacturing, 7 (3), pp. 159-169
17. Jecić, S., Drvar, N., The assessment of structure digitization and laser scanning methods in 3D shape measurements. 4th International Congress of Croatian Society of Mechanics September, 18-20, 2003
18. Toth, T., Zivňak, J. A comparison of the outputs of 3D scanners, 2014, Procedia Engineering, 69, pp. 393-401.
19. L. Y. Yee, S. E. T. Yong, K. J. T. Heang, K. P. Zheng, Y. L. Xue, Y. Y. Wai, C. H. T. Siang, & L. Augustinus, "3D Printed Bio-models for Medical Applications," Rapid Prototyping Journal, Vol. 23, No. 2, pp. 227-235, 2017.
20. C. Silbernagel, "Additive Manufacturing 101-4: What is material jetting?," Canada Makers, 2018. [Online]. Available: <http://canadamakes.ca/what-is-material-jetting/>. [Accessed 2019].

Exploring Innovation Research Methodologies in a Variety of
Multidisciplinary Fields and Their Prospective Future Impact
February 2024



Published by
Airo Journals
ISBN: 978-93-95305-14-3
Publishing Website:
www.airo.co.in

PROCEEDING

Disclaimer

This Proceeding of the conference is being published by Airo Journals on its official website. For any content issue, copyright issue, patent only Author will be responsible. Airo Journals doesn't take any responsibility of such matters as the contents of research articles or presentation have been submitted by the author. If any issue arises such content will be deleted from the proceeding and publication

www.airo.co.in