AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
National

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject: Management

EVALUATION OF INDIAN PHARMACEUTICAL INDUSTRY THROUGH ANALYTIC NETWORK PROCESS TECHNIQUE

SUBHAS ROY
Research Scholar
MG19BPHDMG004
MANAGEMENT
DR. PARAS JAIN
Supervisor:
SARDAR PATEL UNIVERSITY, BALAGHAT

Abstract:

Analytic network process (ANP) methodologies are used in the research design to analyze how resources are allocated using a case-study methodology in specific pharmaceutical businesses. This explains the procedures for performing ANP analysis and the pair-wise scale used to collect data. An impact network of clusters and the nodes within the clusters makes up the fundamental structure for ANP, but for AHP it is a hierarchy. However, due to the interplay and dependence of higher-level factors like objectives on lower-level elements, some choice issues cannot be organized hierarchically. In the network, criteria and alternatives influence each other's relevance. Feedback enables us to plan for the future and decide what has to be done to bring about the desired future. In this article, evaluation of Indian pharmaceutical industry through analytic network process technique has been discussed.

Keywords: Indian, Pharmaceutical, Industry, Analytic, Network, Process

INTRODUCTION:

A strategic decision problem, resource allocation, calls for respondents to come from top positions to participate in the process. Judgmental sampling was employed to make sure the proper respondents were chosen. According to Cavana, Delahaye, and Sekeran (2001),

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject : Management

judgmental sampling guarantees that the appropriate participants or respondents are chosen who are qualified to offer the necessary data.

To ensure the accuracy of the data gathered, the sample frame for this case study was limited to respondents who held senior positions or worked in quality departments at the chosen organizations. Using Saaty's 9-point priority scale, the information was gathered from three respondents from each organization.

Using Thomas Saaty's Super Decisions program, which is freely accessible on the website of the Creative Decisions Foundation (Creative Decisions Foundation, 2018, Beta version), the ANP model was developed and the data obtained were examined. The individual replies are combined, and the composite score for each company is determined using the geometric mean. According to Cheng, Li, and Yu (2005), the composite score represents the opinions of all the individuals who are a part of the same organization. Excel 2010 was used to determine the geometric mean

THE ANP MODEL:

Before any data is collected, a conceptual model for the decision problem must be created. Since it serves as the foundation for all later efforts to address the decision problem, a conceptual model is the most important element of the qualitative component of ANP. The decision problem itself makes up the model's first level.

The network's nodes stand in for the various parts of the system, and the arcs between them represent interactions. Arcs indicate reliance, while loops indicate internal dependencies among cluster members.

The ANP model, developed to explore the interactions between the three different types of resources and the ten quality management strategies and their capacity to improve quality, is shown in the accompanying figure. The relationships between various node groups are shown by the arrows.

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject: Management

The ability to enhance quality (AEQ) goal cluster is so named. The three kinds of resources that affect each other's contributions to the implementation of various quality methods are HR, OR, and TR. An arrow entering and exiting the same cluster is used to symbolize this phenomenon, which is known as inner dependence. These resources aid in the execution of numerous tactics referred to as outer dependence.

The main goal of employing ANP was to rank different resources and tactics and assign weights to them in relation to one another. The influence of two resources on the contribution of the third resource to the improvement of quality was calculated by ranking and weighting the three resources in relation to one another. The contribution of three different types of resources to their implementation, as well as each strategy's capacity to improve quality, were weighed and graded in relation to the ten quality strategies.

Analytical Network Process Technique:

Thomas L. Saaty, a mathematician, created the analytical network process technique to address poorly organized, complex decision problems.

Because it permits both dependency within a set of elements (inner dependence) and dependence between separate sets of elements (outer dependence), the analytical network process (ANP) technique is a generic case of the analytical hierarchy process (AHP) technique. The ANP method is a broad theory of relative measures, claims Saaty (1999). From separate scales, composite ratio scales are derived using them. According to a control criterion, the individual scales indicate relative measures of the influence of various factors. Through its super-matrix, the analytic network process captures the result of dependencies and feedback inside and across clusters of elements.

A super-matrix is made up of matrices of column priorities. ANP, in contrast to AHP, offers a basic framework to handle decisions without assuming the independence of elements within a level or the independence of higher elements from lower ones. On the other hand, ANP does not need to explain the levels of hierarchy because it employs influence as its primary notion to build a network of elements.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
National

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject: Management

Two processes are combined to form the ANP. A control hierarchy or network of criteria or sub-criteria that regulates interactions makes up the first section. The network of influences between the elements and clusters makes up the second component. A different super-matrix of limiting impact is calculated for each control criterion, and the network changes depending on the criterion. All of these super-matrices are ultimately weighted according to the importance of their control criteria, and results are computed by adding all of the control criteria. Since ANP is non-linear, any decision problem can be represented without regard to what occurs before or after another element in the hierarchy. The ANP prioritizes both elements and groups, or clusters, as is frequently required in real-world situations.

Incorporating dependent issues into the analysis is made easier with the help of the ANP. ANP models a problem with a systems-with-feedback approach and considers the interactions between decision levels and other qualities, whereas AHP uses unidirectional hierarchical relationships among decision levels.

A psychological theory of measurement called the analytic network process (ANP) is based on a generalization of dependence and feedback from the analytic hierarchy process (AHP). It is predicated on the idea that evaluation of subjective feelings and understanding is not all that dissimilar from evaluation of the physical world, where experience and understanding are gained. Judgments and structures that represent an understanding of the flow of influences are necessary for the complex decision-making process.

In ANP, the feedback structure resembles a network with cycles connecting its components to elements and loops connecting a component to itself, in contrast to AHP, where the feedback structure has a top-to-bottom kind of hierarchy. These components are no longer referred to as levels. The sources and drains in a network Source nodes, intermediate nodes, and sink nodes can all be found in a whole network. The source node never serves as the destination of important or influential pathways; instead, it serves as their origin. The intermediate nodes lie on cycles, fall on paths to sink nodes, or fall on paths from source nodes. Only source and sink nodes are present in certain networks, while only source and cycle nodes, cycle and sink nodes, or simply cycle nodes, are present in other networks. Any of the networks mentioned above

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject: Management

can be used to solve a decision problem, but the trick is figuring out how to prioritize the network's components, particularly the choice alternatives, and perhaps more importantly, how to defend the validity of the solution. Due to the limitless nature of cycling in ANP compared to AHP, the operations required to derive priorities become more difficult because feedback involves cycles.

Applications of ANP Technique:

Zero-order goal programming (ZOGP) and the ANP technique were combined by Lee & Kim (2000) to express the interdependencies between the criteria and potential projects for information systems. The research demonstrates that the interdependence property that results from group opinion can be taken into account in the decision-making process when ANP and COGP are combined (Lee & Kim, 2000). Karsak, Sozer, and Alptekin (2003) combined the Analytic Network Process and Zero Order Goal Programming (ZOGP) decision-making methodologies to take into account customer needs and product technical constraints while implementing quality function deployment in product design. The ANP technique enables taking into account the built-in dependencies in the deployment process of the quality function.

For improved planning or evaluation decisions in the QFD Process, Lee, Wu, and Tzeng (2008) developed a decision-making technique based on quality function deployment (QFD) and the Analytic Network Technique. A case study approach to placement decisions for a shopping mall employing ANP as a decision-making technique is also demonstrated in the literature. ANP is a more potent tool to solve choice issues in cases where inter-relationships have a significant influence on decision-making models, according to a comparison of ANP and AHP strategies using the example of choosing where to locate a shopping mall.

AHP has received high ratings across a number of metrics in research comparing the effectiveness of various multi-criteria decision-making procedures, including conjoint analysis, nominal group technique (NGT), Delphi, and AHP. The level of problem abstraction represented, the number of criteria that can be taken into account when formulating problems, the level of detailed analysis, the capacity to elicit elementary judgments, structural flexibility through inconsistency and compatibility measures that allow for improvement and aligning

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject : Management

perceptions, the capacity to facilitate the opinion of other group members, and the generalizability of mathematical foundations

Analytical network processing (ANP) has also been used in a variety of decision-making situations, such as resource allocation for strategic quality management strategies in the food industry and to capture the interaction between firm resources and quality strategies, supplier selection, assessing intellectual capital, and logistics service provider selection.

RESEARCH METHODOLOGY:

Sample Selection and Analysis:

A strategic decision problem called resource allocation calls for replies to come from the senior management team (senior or middle-level managers) in the ranks of general manager and above who take part in the process of making strategic decisions. In order to assure the trustworthiness of the data gathered and that the appropriate respondent is chosen who is in a position to supply the necessary information, judgmental sampling was utilized.

Using a standardized questionnaire created and used by Alidrisi H. M., respondents employed in senior positions or in the quality departments of the chosen firms are solicited to participate in the study. Three respondents from each organization provided information via a questionnaire that employed the Saaty (1999) 9-point pairwise comparison scale.
Using Thomas Saaty's Super Decisions program, which is freely accessible on the Creative Decisions Foundation website (Creative Decisions Foundation, 2018, Beta version), the ANP model was developed and the data gathered was examined.

Pair-wise Comparison:

In ANP, relative importance values on a scale of 1–9 are calculated using ratio scale measurements based on pair-wise comparisons. In this case, a score of 1 denotes parity between two items, and a score of 9 denotes the great importance of one element relative to the other. By keeping the link between aji = 1/aij and aii = 1, where aij stands for the importance of the ith element in comparison to the jth element, the consistency of judgments in the pair-wise

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject: Management

comparison matrix is improved. In the first step of ANP, a network is built while taking into account all of the interactions between the components. Draw an arrow from group or cluster X to group or cluster Y to indicate the dependence, for instance, if elements of group Y are dependent on elements of group or cluster X. Pair-wise comparisons are used to assess each association. The priority of the items is determined in the second stage.

The biggest issue with ANP/AHP is measuring intangibles since we must fit our entire universe of experiences into a system of priorities in order to fully comprehend it and how it operates in general. To create trade-offs between numerous objectives and criteria, qualitative judgments are frequently expressed mathematically. Instead of using a random number based on a person's recollection, reciprocal pair-wise comparisons that have been meticulously constructed in a scientific manner are employed. The smaller element is utilized as the unit in the paired comparisons, and the "larger element" is measured as the multiple of the "smaller element" as a unit with regard to the shared attribute or comparison criterion.

So, rather than being arbitrary, judgments are more scientific. The ability of humans to compare extremely small and very large objects is restricted. Pairwise comparisons of components or alternatives that are very close or far apart are used to get around this restriction. The need to divide them into several groups and connect them through a common factor increases as the gap widens. All of the paired comparisons are combined to provide a scale of relative values for priorities. To avoid the inescapable discrepancies between judgments and since priorities must be invariant, the priorities are calculated in the form of the principal eigenvector of paired comparisons.

A scale that is absolute is identity-transformed invariant. It implies that the meaning of its numbers cannot be changed to another set of numbers that have the same meaning. The priorities obtained from such numbers are likewise part of the absolute scale of relative numbers whose sum is one.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
National

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject: Management

Steps of ANP:

The relationships between the various components, both inside and across the levels of the decision network, must be established in order to create an ANP model. The network linkages, or connections between clusters of elements, take place at the factor level under the presumption that different factors interact with one another.

The analytical network process is used in the current study to evaluate the allocation of three types of resources, namely organizational, technological, and human resources, and to determine which type of resources are thought to be necessary for implementing ten quality strategies in two pharmaceutical companies chosen as case studies.

RESULTS AND DISCUSSION:

The identified strategies for three resources are ranked and given weight in this study using the ANP. Additionally, resources are ranked and given weight in relation to a set of ten quality strategies. Despite the fact that each strategy has unique resource requirements, ANP creates an overall ranking of resources by giving the demands of all strategies equal weight. Additionally, it evaluated each strategy's capacity to raise quality while ranking all the mutual support received from all the resources.

Each resource contributes to implementing the ten quality management strategies, and it is presumable that three resources have an influence on one another's contributions to quality strategies. Each component of the hierarchy is regarded as independent in the case of ANP. ANP enables feedback loops to take into account resource interdependence in order to perform quality management. The three resources are ranked and weighed in relation to one another to address the interdependence among them. For instance, a 9-point scale is used to weigh and rank how organizational and technical resources affect the contribution of human resources to the implementation of strategic quality management plans. The identical process was carried out again for both organizational and technological resources.

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject : Management

Results demonstrate that organizational resources have a considerably greater impact on human resources than do technology resources. In Company A (CO.A) and Company B (Co.B), respectively, the impact of OR on HR is 57% and 69%. In Co.A and Co.B, respectively, technological resources have an impact on the contribution of human resources of 43% and 31%. However, in the case of Company A, human resources have a 40% influence and an 86% influence on the organizational resource contribution.

The findings show that in the instance of company A, technological resources are thought to have a greater impact on OR than human resources; however, this is not the case for company B, and vice versa for the impact of HR and OR on the contribution of TR. Since this is a case-based study and every company has a different method for allocating its resources, it can be assumed that Company B values human resources more than Company A. Company A, on the other hand, places more emphasis on technology resources.

The combined impact of the three resources on the adoption of quality strategies is shown. The findings show that while technical resources are just as important as human resources, the importance of soft components (HR and OR) is greater than that of technology resources. The importance of human resources is higher in firm B than it is for the other two resources.

To determine the relative importance of different resources in the execution of each quality plan, the resources were compared and ranked against one another. The ranking is a sign of the resources required for each approach to be implemented successfully. To determine the importance of each resource in the successful execution of all ten quality strategies, the ten strategies were rated and weighed in relation to each other independently for each of the three resources. Last but not least, regardless of the available resources, the capacity of quality initiatives to improve quality was assessed by weighing and rating them relative to one another.

Values for Company A and Company B's respective relative contributions of three resources to the successful execution of 10 quality methods are shown. The soft factors (combined human and organizational resources) have a relatively bigger implementation contribution in both firms.

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject : Management

Quality tactics in contrast to difficult components (technical resources). In implementing quality strategies like strategic quality planning (71%), total continuous learning (69%), quality culture (62%), employee management (78%), and resource management (77%), organizational resources are seen as crucial for implementing leadership and management, supplier management, customer focus, and quality information and management. The executives of Co. B. have given higher weight to human resources than to other organizational resources.

When it comes to strategic quality planning, human resources are deemed crucial in the instance of Company A (55%). Human resources are essential for implementing leadership and management (31%), total continuous learning (35%), a quality culture (33%), and employee management (38%), but organizational resources are assigned more weight in putting these strategies into action, with respective weights of 49%, 40%, 51%, and 50%. The executives of Co. A rate organizational factors as being somewhat important for resource management (61%) and supplier management (57%).

According to the ANP outcome shown that companies A and B received the three types of resources' actual support in executing ten quality methods. Although the rankings for the two organizations are different, it is clear that human resources are comparatively more important in adopting various quality strategies in both companies.

The outcomes demonstrate each quality strategy's capacity to raise output quality.

The information illustrates how three different types of resources were used in the execution of ten quality initiatives as well as how each strategy failed to increase quality. The findings of the three categories of resources' contributions to the implementation of quality strategies and the contributions of each strategy to improving quality are combined using ANP. Organizational resources, particularly quality culture (22.2%), are seen as crucial for executing quality strategies in firm A.

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject: Management

When adopting a design and process management strategy, technological resources are given more weight (18.4%). When it comes to establishing excellent leadership and management in business B, the roles of HR and OR are seen as being more crucial (22.4% and 26.1%, respectively), in addition to the more significant roles of HR in employee management (15.3%) and resource management (17.5%).

In the case of company B, and to some extent in company A as well, the role of technological resources is more significant than organizational and human resources in implementing quality information and analysis strategies, supplier management, customer management, and resource management. All 10 strategies are not handled similarly since the three resources do not support each strategy equally, according to the data indicating the potential of each strategy to improve quality. It shows that not all strategies have the same capacity to improve quality.

The findings concluded that the following factors have a stronger capacity to improve quality: quality culture (QC), quality information and analysis (QIA), design and process management (DPM), strategic quality planning (SQP), employee management (EM), and leadership and management (LM). The findings suggest that human resources are more crucial in putting these quality methods into practice.

CONCLUSION:

The outcomes of the ANP analysis show that all three resources have an impact on how well other resources contribute to the implementation of strategic quality management. There are soft and hard components to the strategic quality management elements. According to the study's findings, soft factors play a bigger role in the successful application of quality strategies than do hard ones. Additional comparisons showed that some of the solutions have excessive and others inadequate resources. For the best use of resources, the chosen pharmaceutical companies may review their judgments about resource allocation. Finally, it can be deduced from a comparison of organizational resources and soft elements, i.e., human resources and soft elements, that human resources are comparatively more important for the achievement of strategic quality management in the Indian pharmaceutical sector.

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject : Management

REFERENCES:

Alidrisi, H. (2014). An ANP-based multi criteria decision making model for supplier selection. *International Conference on Industrial Engineering and Engineering Management (IEEM)* (pp. 1-4). Sunway, Malaysia: IEEE .

Alidrisi, H., & Mohamed, S. (2009). Resource Allocation for Strategic Quality Manangment: An Analytic Network Process (ANP) Model. *Fifth International Conference on Construction in the 21st Century (CITC-V) "Collaboration and Integration in Engineering, Management and Technology.* Istanbul, Turkey.

Cheng, E. W., Li, H., & Yu, L. (2005). The analytic network process (ANP) approach to location selection: a shopping mall illustration. Construction Innovation , 5 (2), 83– 97.

Lee, Y.-T., Wu, W.-W., & Tzeng, G.-H. (2008). An effective decision-making method using a combined QFD and ANP approach. WSEAS Transactions on Business and Economics , 12 (5), 541-551.

Nedjati, A., & Izbirak, G. (2013). Evaluating the Intellectual Capital by ANP Method in a Dairy Company. Evaluation of Learning for Performance Improvement International Conference. 107, pp. 136 – 144. Malaysia: Procedia - Social and Behavioral Sciences.

Author's Declaration

I as an author of the above research paper/article, hereby, declare that the content of this paper is prepared by me and if any person having copyright issue or patentor anything otherwise related to the content, I shall always be legally responsible for any issue. For the reason of invisibility ofmy research paperon the website/amendments/updates, I have resubmitted my paper for publication on the same date. If any data or information given by me is not correct, I shall always be legally responsible. With my whole responsibility legally and formally I have intimated the publisher (Publisher) that my paper has been checked by my guide (if any) or expert to make it sure that paper is technically right and there is no unaccepted plagiarism and hentriacontane is genuinely mine. If any issue arises related to Plagiarism /Guide Name /Educational Qualification/Designation/Address of my university/college/institution/Structure or Formatting/ Resubmission / Submission /Copyright / Patent/Submission for any higher degree or Job/Primary Data/Secondary Data Issues.

ISSN: 2321-3914
Volume 3 Issue 1
July 2023
Impact Factor: 11.9
Subject: Management

I will be solely/entirely responsible for any legal issues. I have been informed that the most of the data from the website is invisible or shuffled or vanished from the data base due to some technical fault or hacking and therefore the process of resubmission is there for the scholars/students who finds trouble in getting their paper on the website. At the time of resubmission of my paper I take all the legal and formal responsibilities, If Ihide or do not submit the copy of my original documents (Aadhar/Driving License/Any Identity Proof and Photo) in spite of demand from the publisher then my paper may be rejected or removed from the website anytime and may not be consider for verification. I accept the fact that as the content of this paper and the resubmission legal responsibilities and reasons are only mine then the Publisher (Airo International Journal/Airo National Research Journal) is never responsible. I also declare that if publisher finds any complication or error or anything hidden or implemented otherwise, my paper maybe removed from the website or the watermark of remark/actuality maybe mentioned on my paper. Even if anything is found illegal publisher may also take legal action against me

SUBHAS ROY
DR. PARAS JAIN

******