ANALYTIC HIERARCHY PROCESS AND ITS APPLICATIONS IN THE PUBLIC SECTOR: A REVIEW

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ABSTRACT

The applications of the Analytic Hierarchy Process (AHP) are reviewed in this article. AHP is a multi-criteria decision-making tool that has been employed in practically every decision-making application. This article focuses on a few of the many potential applications of AHP that may be of interest to both scholars and practitioners. The article critically evaluates some of the papers published in prestigious international journals and provides a synopsis of many of the referred works. This research looks at how the Analytic Hierarchy Process (AHP) is used in decision-making in the public sector's many functions. More particularly, scientific research on the evaluation of public works conducted in the recent decade was investigated. The articles were also grouped by the year they were written, the application they were used for, and the country they were written in. For the years 2010 to 2020, this study examines the deployment of AHP in public sector decision-making processes. AHP is proving to be useful in a variety of public-sector initiatives, but it is most commonly used in transportation, energy, health, and technology projects. The study's ultimate purpose is to contribute to future public-sector decision-making studies. This work is intended to serve as a quick reference on AHP as well as a useful summary kit for researchers and practitioners to use in their future work.

Keywords: Analytic Hierarchy Process (AHP), Decision Making, Decision Analysis, Public Sector.

INTRODUCTION

Since its inception, the Analytic Hierarchy Process (AHP) has been a tool in the hands of decision-makers and researchers alike, and it is one of the most extensively used multiple criteria decision-making procedures available. Many outstanding works have been published that are based on AHP: they include applications of AHP in various fields such as planning, selecting the best alternative, resource allocations, conflict resolution, optimization, and so on, as well as numerical extensions of AHP in various fields such as numerical analysis and optimization (Vargas, 1990; Zahedi, 1986).

AHP stands for Analytic Hierarchy Process, and it is a theory of measurement for dealing with measurable and/or intangible criteria that have found extensive application in decision theory, conflict resolution, and brain models. In order to make decisions, people's experience and expertise must be considered at least as valuable as the facts they utilize, according to this theory of decision making. Using the AHP, decision applications are carried out in two stages: hierarchical design and evaluation (Vargas, 1990). In order to construct hierarchies, you must have prior expertise and knowledge of the problem area. If two decision-makers were faced with an identical problem, they would generally construct two separate hierarchies for it. As a result, there is no such thing as a unique hierarchy. When two people construct the same hierarchy, their tastes may lead to very distinct courses of action, even if they use the same software (Ahmed &

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Ganapathy, 2021). A group of people, on the other hand, can collaborate in order to obtain consensus on both the hierarchy (design) and the judgments and the synthesis of their findings (evaluation).

The AHP, invented by Saaty (1980), has been extensively investigated and applied in almost all of the applications connected to multiple criteria decision making (MCDM) in the previous 20 years, with the exception of a few. Steuer & Na (2003) discovered that there were approximately 18 publications examining the AHP combined with finance in isolation, but Vaidya & Kumar (2006) discovered that there were 150 articles investigating the AHP combined with broad applications in isolation. As previously stated (Steuer & Na, 2003), the AHP has been implemented in a variety of fields, including education and engineering; government; industry; management; manufacturing; personal; political; and social; and sports (Vaidya & Kumar, 2006). Its broad applicability can be attributed to its simplicity, ease of use, and high degree of flexibility. When combined with other techniques, such as mathematical programming, it is possible to take into account not just qualitative and quantitative elements, but also some real-world resource constraints. A more practical and hopeful decision can be reached using this approach, which is known as the integrated AHP, as opposed to using the stand-alone AHP. As a result, more attention has recently been focused on the integrated AHPs.

The current article examines research papers with a view to gaining a better understanding of the growth of AHP applications across a variety of industries. The papers under consideration for discussion present the AHP as a developed instrument that has been widely used. The author makes an attempt to summarize a few recent applications in a few sentences. It has been taken into consideration to identify the most recent references and to explain the findings in each area, as well as to discuss works that have been published in international journals of high acclaim, among other things. It should be noted that the coverage is not thorough and that it attempts to portray only a few peeks of AHP applications.

Using a literature study and classification of international journal papers published between 2010 and 2020, the author intends to provide an overview of the uses of AHPs and their applications in the public sector. Public sector was chosen because of its widespread use, broad applicability, and overall success in decision-making processes. Three problems are investigated based on the 62 scientific studies: (i) which type of AHPs received the most attention? (ii) which type of AHPs received the least attention? (ii) In which areas did the AHPs find the most widespread application? In your opinion, is there any insufficiency in the approaches taken?

Papers are reviewed in reverse chronological order, allowing readers to gain an overview of the most recent trend in AHP applications as well as previous coverage of the subject matter. For the instant peeks, the references are listed alphabetically as well as numerically according to their position in the series. They are also summarized in a tabular format under each of the sub-headings for each of the areas.

It is firmly believed that this effort will provide a rapid insight for future work involving AHP and will assist practicing researchers and engineers in gaining a better understanding of the various aspects of AHP.

AHP AS A MULTIPLE CRITERIA DECISION-MAKING TOOL

Using a hierarchical design process, the concepts, questions to be addressed, and responses connected with those questions are used to determine the elements and levels of the hierarchy. Hierarchical design is an iterative process. For this reason, all questions should be

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answered and consistent with current knowledge, as ambiguities in the questioning process may lead the decision-maker to select the incorrect criteria or option.

The Analytic Hierarchy Process (Saaty, 1980) is a decision-making tool that considers several factors. This is a technique for pair-wise comparisons that uses the Eigenvalue method. It also includes a process for calibrating the numeric scale, which may be used to measure both quantitative and qualitative performance. AHP assists in the incorporation of a group consensus. The questionnaire for comparison of each piece and the geometric mean to arrive at a final answer is the most common component of this process. The AHP technique is summarized in Figure 1, which depicts the overall procedure.

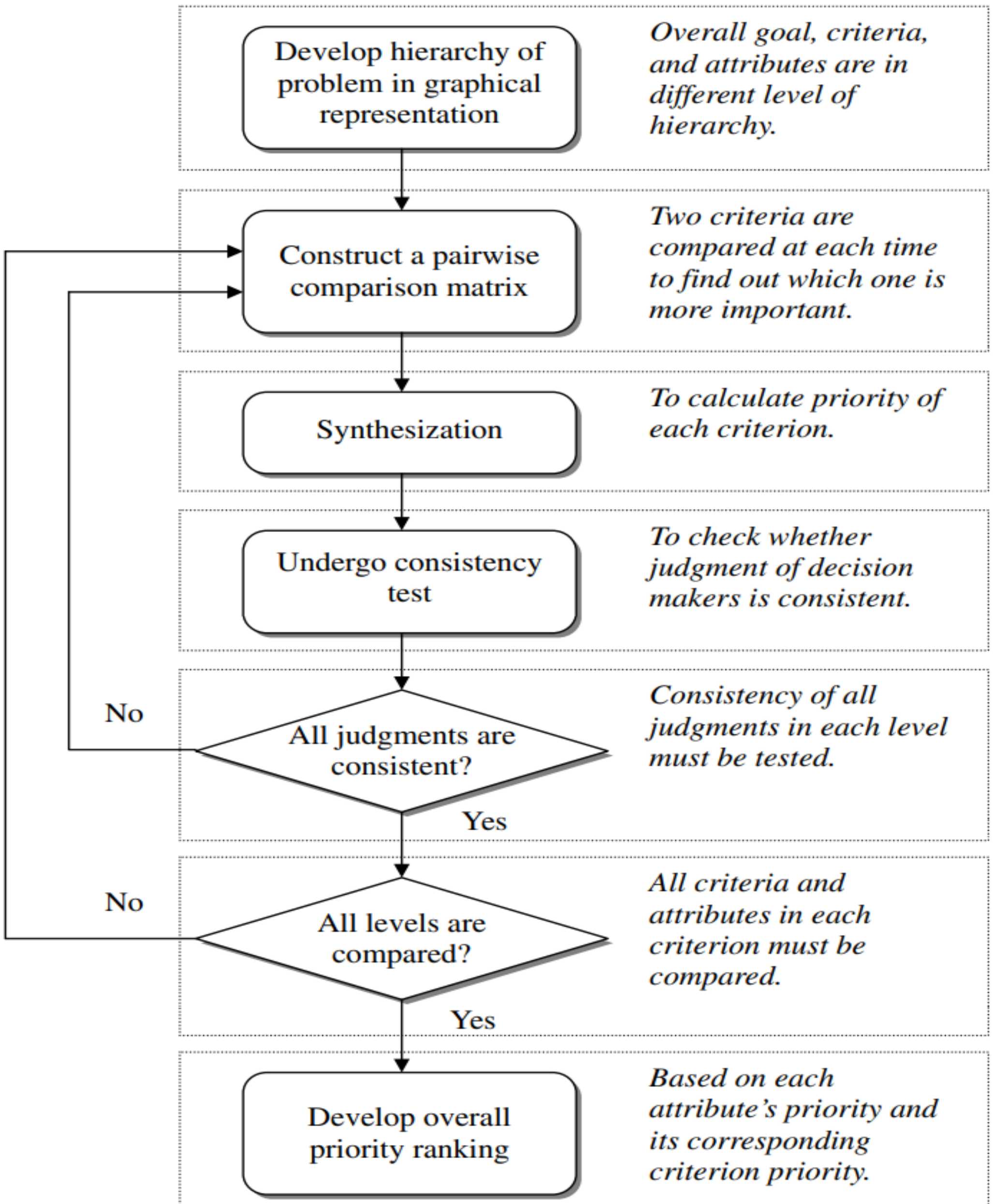

Figure 1
AN ILLUSTRATION OF THE ANALYTIC HIERARCHY PROCESS'S FLOWCHART. (HO ET AL., 2006)

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The AHP is comprised of three basic activities, which are hierarchy formation, priority analysis, and consistency verification (in that order of importance). First and foremost, decision makers must disassemble complex multiple-criteria choice issues into their constituent pieces, each of which has every possible attribute organized into numerous hierarchical levels, before proceeding. Following that, the decision-makers must compare each cluster on the same level in a pairwise fashion, using their own experience and knowledge to reach their final judgment. Example: Every two criteria in the second level are compared against the goal at each iteration, whereas every two attributes of the same criteria in the third level are compared against the goal at each iteration with respect to the associated criterion. Due to the fact that the comparisons are made using personal or subjective assessments, there may be some degree of disagreement between the results. For the purpose of ensuring that the judgments are consistent, a final operation known as consistency verification is included. This operation, which is regarded as one of the most advantageous aspects of the AHP, is used to compute a consistency ratio that is used to measure the degree of consistency among the pairwise comparisons. If it is discovered that the consistency ratio is more than the limit, the decision makers should evaluate and update the pairwise comparisons, as appropriate. Once all pairwise comparisons have been carried out at every level and have been shown to be consistent, the judgements can be synthesized in order to determine the priority ranking of each criterion and associated attributes, as shown in Figure 1.

ANALYSES OF AHP

The last decade there is tremendous scientific advances in the investigation of multi-criteria analysis methods. AHP is a decision-making method, widely used in the world scientific literature, as it finds application in many processes.

AHP is a decision-making process developed by Saaty. It aims to quantify the relevant priorities for a given set of alternatives and emphasizes the importance of the decision-maker's judgment, as well as the consistency of comparing alternatives in the decision-making process (Saaty, 1980). The purpose of this study is to contribute to future research by providing clear information on the use of AHP in the last decade in public sector decision-making processes.

The Table 1 presents the distribution of studies per year. It is noteworthy in the comparison of 2 five years 2011-2015 and 2016-2020 in the first five years are presented 23 decision-making studies with AHP, while in the second are presented 36. It is obvious that researchers over the years increasingly prefer this method, because of the many advantages. Also Ho (2008), found that there was an increase in integrated AHP methods, because of AHP's advantage, such as ease of use, great flexibility, and wide applicability.

Table 1
DISTRIBUTION OF STUDIES BY YEAR

Year	No of Articles
2010	4
2011	2
2012	6
2013	4
2014	5
2015	6
2016	10
2017	4

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2018	7
2019	7
2020	7
Total	62

A bibliographic review was carried out in scientific journals concerning project evaluation and decision-making in the various aspects of the public sector and government work. Google scholar was used to locate eligible articles published from 2010 until 2020. The following keywords and their combinations were used: AHP government/ AHP public. The Google search results were 73700 articles. In queries that yielded extensive results, the 400 first Google Scholar search results were examined for each keyword, as it was ascertained that after that point the findings lost their association with the keyword.

In the present review, the publications made in the range of the last decade, in the period 2010 to 2020 were studied 62 scientific studies, analyzed and categorized in the categories presented in the following Table 2.

Table 2
THE COMBINED APPROACH AND USE OF AHP

Sr. no.	Author(s)	Year	Country	Application	Study Area
1	Xiaowei et al	2010	China	Transportation	Optimization of Urban Public Transport Network
2	Byun	2010	Korea	Technology	Usability of e-government websites
3	Dominic et al.	2010	Asia	Technology	Evaluation of e-government websites
4	Erden & Coşkun	2010	Turkey	Siteselection	Multi-criteria site selection for fire services
5	Choi et al.	2011	Korea	Publicsafety	Decision Making Model of Measures on the Decrease of Traffic Accident
6	Wang & Sun	2011	China	Public safety	Evaluation of the emergency response capacity
7	Hsu et al.	2012	Taiwan	Culture - Tourism	Critical Success Factors of the Cultural and Creative Industries
8	Duleba et al.	2012	Japan	Transportation	Public bus transport’s supply quality
9	Zhongua & Ye	2012	China	Publics ervices	Public sector performance measurement
10	Mojaveri & Fazlollahtabar	2012	Iran	Agriculture	Prioritization of Development Agriculture Strategies
11	Alshomrani & Qamar	2012	SaudiArabia	Technology	Analysis of E-Government
12	Sultan et al	2012	Saudi Arabia	Technology	Success of e-government
13	Achillas et al.	2013	Greece	Waste management	Thermal processing of infectious hospital wastes
14	Chatterjee & Mukherjee	2013	India	Health	Potential hospital location selection
15	Duleba et al.	2013	Hungary	Transportation	Connections of factors in a public transport system
16	Lai & Vinh	2013	Vietnam	Culture - Tourism	Tourism promotional

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					effectiveness
17	Nosal & Soleckaa	2014	Poland	Transportation	Evaluation of variants of the integration of urban public transport
18	Ahmadi et al.	2014	Malaysia	Health	Evaluating the hospital information system (HIS)
19	Lee et al.	2014	North America, Indian Sub-continent, and Greater Asia	Transportation	Comparative Analysis of Port Competitiveness
20	Wang et al	2014	China	Technology	Government e-tendering
21	Ning	2014	China	Forest	Research on Forest Structure Adjustment
22	Strojny	2015	Poland	Strategic planning	Groups of Customers of Polish Local Government
23	Lin et al.	2015	China	Tourism	Modeling and Forecasting Chinese Outbound Tourism
24	Prusak et al.	2015	Poland	Publicservices	Assessment of customers of local governments
25	Aktas et al.	2015	Turkey	Health	Evaluation of service quality
26	Boujelbene & Derbel	2015	Tunisia	Transportation	Analysis of public transport operators
27	Ozbek	2015	Turkey	Economics - Finace	Performance analysis of public banks
28	Popiolek & Thais	2016	France	Energy	Innovation policies in favor of solar mobility
29	Petrini et al.	2016	Brazil	Agriculture	Family farming prosecces
30	Khalil et al	2016	Malaysia	Publicsafety	Building performance and users' risk
31	Veisi et al	2016	Iran	Agriculture	Developing an ethics-based approach to indicators of sustainable agriculture
32	Fageha & Aibinu	2016	Saudi Arabia	Economics - Finace	Identifying stakeholders' involvement in public building projects
33	Strojny & Hejman	2016	Poland	Strategic planning	Multi criteria comparative analysis of regions
34	Salavati et al.	2016	Iran	Transportation	Public Transport ation descion making
35	Requia et al	2016	Brazil	Health	Mapping alternatives for public policy decision making
36	Garbuzova-Schlifter & Madlener	2016	Russia	Energy	Energy performance contracting projects
37	Singh & Nachtnebel	2016	Nepal	Energy	Reinforcement of hydropower strategy in Nepal
38	Aryuni & DidikMadyatmadja	2017	Indonesia	Economics - Finace	Decision support system on government loan for poor societies
39	Wu et al	2017	China	Sustainability	Integrated Sustainability Assessment of Public Rental Housing Community

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40	Zhi et al	2017	China	Public safety	Disaster Prevention Evaluation and Strategy of Community Public Space
41	Ahsan & Rahman	2017	Australia	Health	Green public procurement implementation in public healthcare sector
42	Delmonico et al.	2018	Brazil	Waste management	Waste management barriers in developing country hospitals
43	Ma et al.	2018	China	Culture – Tourism	Assessment of the value of non-World Heritage Tulou
44	Pantelidis	2018	Greece	Strategic planning	Assessment system for municipalities in Greece with public accounting of austerity
45	Moslem & Duleba	2018	Turkey	Transportation	Evaluating passenger demand for public transport improvements
46	Ghimire & Kim	2018	Nepal	Energy	Analysis on barriers to renewable energy development
47	Chowdhury et al.	2018	New Zealand	Transportation	Perceptions of integrated public transport systems
48	Ghorbanzadeh et al.	2018	Turkey	Sustainability	Sustainable Urban Transport Planning
49	Allied Health Professions Federation	2019	United Kingdom	Health	Public Health care strategy
50	Hassan & Lee	2019	Pakistan	Technology	Policymakers' perspective about e-Government success
51	Al Theeb et al.	2019	Jordan	Energy	Electric vehicles for public use
52	Duleba & Moslem	2019	Turkey	Transportation	Public transport service development
53	Rimantho et al.	2019	Indonesia	Waste management	Strategy for minimizing risk of electronic waste management
54	Byun & Ha	2019	Korea	Publicsafety	Analysis of Crime Safety Evaluation Indicators
55	Cyril et al	2019	India	Transportation	Performance Optimization of Public Transport
56	Moslem et al	2020	Hungary	Transportation	Evaluating Public Transport Quality
57	Duleba	2020	Turkey	Transportation	Decision of Public transport development
58	Dan et al.	2020	China	Transportation	Quality Evaluation of Public Transport Service
59	Seker & Aydin	2020	Turkey	Transportation	Sustainable Public Transportation System Evaluation
60	Wang et al	2020	Pakistan	Energy	Renewable energy resources selection
61	Twea et al.	2020	Malawi	Health	Health policy processes and implementation
62	Acharya &	2020	Nepal	Public	Operationalizing obstacles,

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	Zafarullah			Administration	procrastinated progress

AHP APPLICATIONS

In a variety of settings, various hierarchical patterns have come to be recognized as the ones that should be employed in specific scenarios throughout time. We include time as a level (time horizons) in the hierarchy when dealing with dynamic environments, and we take environmental scenarios into consideration when dealing with uncertainty when dealing with dynamic environments In general, the level with time horizons is positioned above the level with scenarios, despite the fact that we employ a loop to connect the two levels together. Using this loop, it is possible to evaluate scenarios with respect to time horizons in order to determine which scenario is more likely to occur at each time horizon, as well as to evaluate time horizons with respect to scenarios in order to determine which time horizon is more critical for each scenario.

In general, a hierarchy is built by moving from the general (higher levels) to the specific (lower levels), or from the uncertain and uncontrollable (upper levels) to the more certain and controllable (lower levels) (bottom levels). The Forward-Backward process of planning is a time-consuming and uncertain procedure that incorporates both time and uncertainty.

Planning is the process by which needs are identified and resources are allocated with the goal of achieving the desired result. The Forward process begins in the present and progresses into the future through a hierarchical structure that often includes levels such as Time Horizons, Environmental Scenarios, Stakeholders, Stakeholder Objectives, Policies, and Projection Scenarios, among others. Through a hierarchical structure that includes levels such as Desired Scenarios, Problems-Opportunities, Stakeholders, Objectives (Optional), and Policies, the Backward process moves from the (desired) future to the current situation.

After that, the two hierarchies are compared and contrasted. The policies of the Backward process are now being compared to the policies of the Forward process in terms of their weights or priorities, as well as the types of policies in each process. If they are exactly the same or almost the same, the process is terminated immediately. In contrast, if the policies in the Backward process are not already included in the set of policies in the Forward process, then they are included in the set. Afterward, the Projection Scenarios are analyzed in light of the new policies in order to identify how these policies will have an impact on the projected future. If the Projected future is within a reasonable distance of the Desired future, the process is terminated.

The forward process is a process of evaluation, whereas the reverse process is a process of invention or invention. The policies developed during the backward phase are examined during the forward process in order to identify their impact on the expected future state of the world economy. When it comes to conflict resolution, this technique is particularly beneficial for analyzing alternative policies or actions of parties in dispute, as well as the scenarios to which these policies or acts may lead. We have provided a summary of some of the AHP's applications in industry and government in this study.

OBSERVATIONS

In this work, an attempt has been made to study and critically analyze the Analytic Hierarchy Process as a decision-making technique that has been developed over time. The article focuses on the application areas that can be found in each of the themes that were chosen. Table 2, for example, contains a list of the research papers that were considered for the selection

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subject. The papers are further divided into categories based on the area of application they are used in, such as personal, manufacturing, industry, social, education, and so on. Most of the studies fall into one of three categories: (a) engineering and selection, (b) social and selection, and (c) personal and decision-making, according to our observations. That AHP may be used as a decision-making tool in both the engineering and social sectors is demonstrated by this example.

Observations have revealed that AHP is most frequently used to themes pertaining to selection and evaluation. As far as application areas are concerned, the majority of the time, AHP has been applied in the engineering, personal, and social fields. This should assist researchers in determining whether AHP is applicable in their particular field of interest.

The following Figure 2 shows the AHP applications in sector-wise. It is obvious that the evaluation of transport projects with this method has a dominant position, followed by the application to energy projects, as well as the evaluation with AHP of health projects and technology.

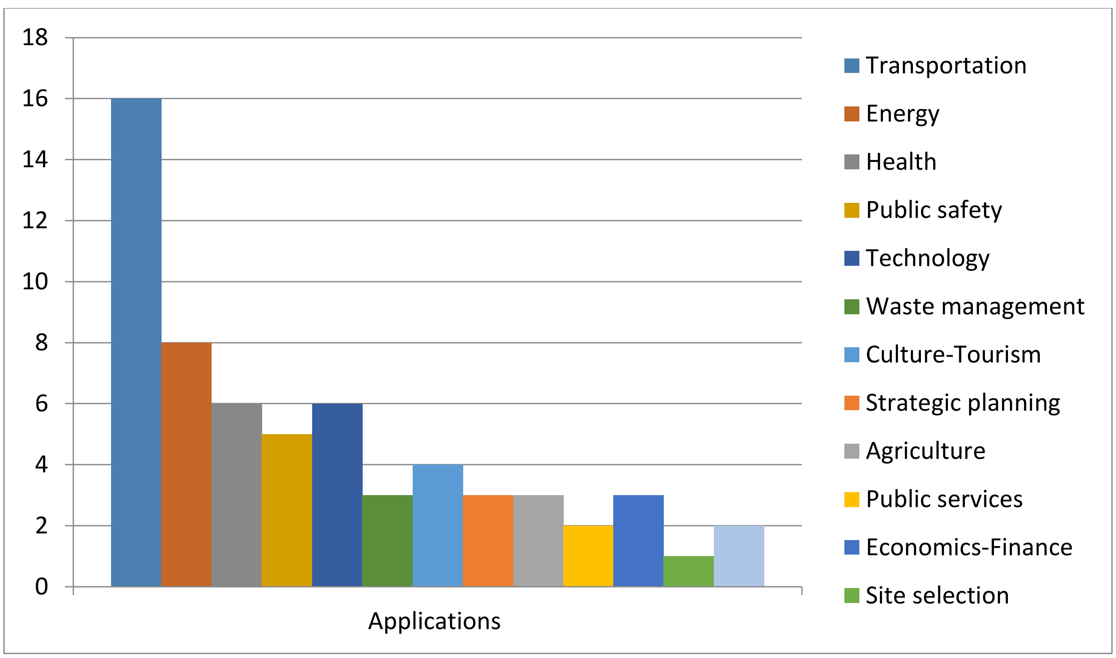

Figure 2
AHP APPLICATION IN AREA-WISE DISTRIBUTION

The author of this study reveals, during the original phase of its adoption, AHP was employed as a stand-alone tool, which allowed for greater flexibility. AHP enabled the researchers to gain valuable expertise and confidence, and as a result, they began experimenting with combining AHP with a variety of different approaches. Using modified variants of AHP such as fuzzy AHP or coupling AHP with other tools such as linear programming, artificial neural networks, fuzzy set theories, and so on, the researchers were able to get the desirable outcomes they were looking for. Despite the fact that AHP is no longer used in a standalone capacity, this does not suggest that it will be phased out completely.

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Indeed, many more researchers are (for example, Hsu et al., 2012; Khalil et al., 2016; Ahmed, 2020; Lai & Vinh, 2013) joining the ever-growing number of people who are effectively using AHP as a stand-alone tool to do research. What this means is that AHP as a tool has a built-in degree of adaptability that allows it to be effectively integrated with a wide range of methodologies. As a result, we may infer that AHP is a flexible multi-criteria decision-making tool that is easy to use.

As can be seen, the spread of AHP usage is truly global, as evidenced by the data (Vargas, 1990; Veisi et al., 2016; Wang et al., 2020; Xiaowei et al., 2010; Ahmed, 2021; Zahedi, 1986; Khan et al., 2021; Manojkumar et al., 2021; Khan et al., 2020; Aryuni and Madyatmadja, 2017; Boujelbene & Derbel, 2015). The United States, without a question, is the leader in this industry; nevertheless, we are seeing an increase in the number of AHP applications in emerging nations such as India.

Developing countries must make use of techniques such as AHP for the examination and selection of complex economic and other systems from a variety of perspectives in order to achieve sustainable development. In terms of examining the articles from a regional viewpoint, a peek at the chart provided in Figure 3 suggests that AHP applications are becoming increasingly popular in Asian countries. This could be a sign of the increasing importance that AHP will have in the future in developing countries.

Regarding the geographical distribution, most of the examined studies originated from Middle Asia (16) followed by Southeast Asia (13) and Europe (12).

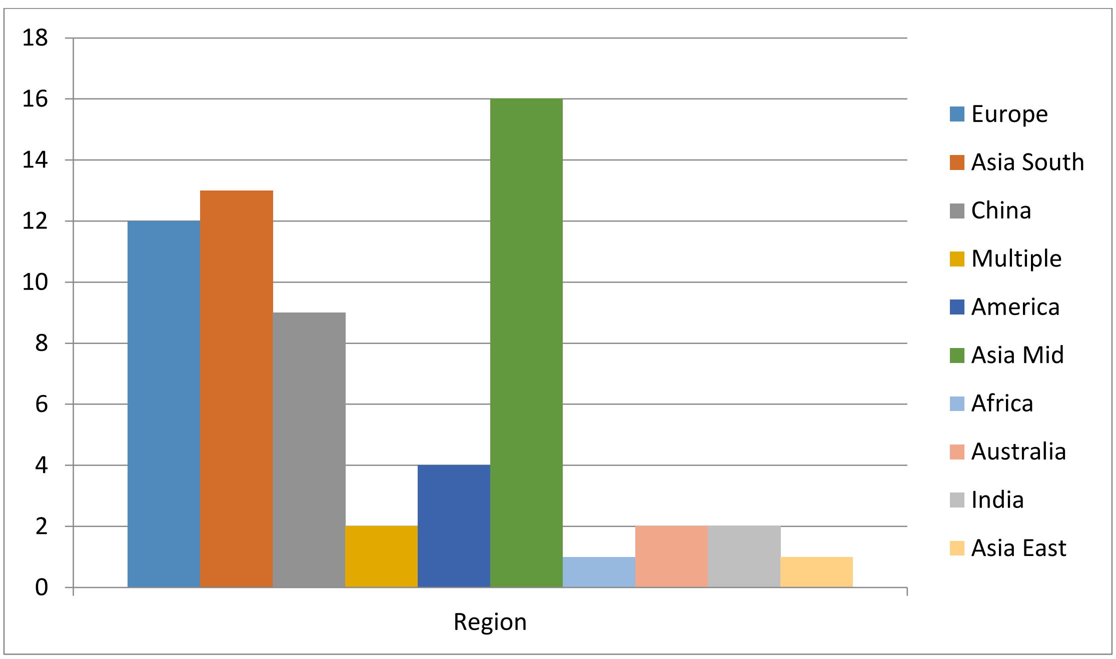

Figure 3
GEOGRAPHICAL DISTRIBUTION AHP APPLICATIONS

According to several of the evaluated publications, AHP possesses a number of noteworthy characteristics, such as strength, application, and adaptability. These are briefly described here since they relate to the issue that was previously explored in this paper.

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Applied group decision-making strategies such as Delphi methodologies were used by Lai & Vinh (2013), and the results showed that AHP was more useful than the conventional techniques. This demonstrates that AHP is a very strong tool that may be used in place of techniques such as Delphi, which are commonly utilized. AHP can be used in a variety of situations with numerous applications. Steuer & Na (2003) used AHP for the evaluation purpose, with levels going as high as seven levels in a hierarchical manner, to get their results. Prusak & colleagues (2015) used AHP to analyze as many as eighteen possibilities in a single study. This clearly demonstrates the adaptability of AHP, which enables researchers to organize the many possibilities in accordance with the requirements of the decision or decisions to be made in each case.

AHP has also been demonstrated to be beneficial in weighing the pros and drawbacks of yes/no decisions. These judgments often entail benefit–cost calculations that are comparable to those that are involved in make–buy choices. We have labeled one of the application areas as benefit–cost in order for readers to get a better understanding of this type of AHP application in general.

The usage of professional computer application software for AHP applications in complex settings may be required in some cases. Sharma et al. (2021) noted that judgments linked to multi-location problems, as well as challenges involving insufficient resources to support the selected sites, among other things, could not be implemented solely with the aid of AHP. Based on this study, we believe that the following observations, which are summarized, will help to illuminate the future trajectory of AHP applications:

1. The use of AHP is on the rise in developing countries. This bodes well for the economic development of this group of countries, which includes countries such as India, China, and others.
2. AHP will be used extensively in decision-making in the future.
3. The use of software applications will be more prevalent in order to handle the issue of complications coming from the integrated uses of AHP and other methodologies to reflect real-world scenarios.
4. A great deal of research is being conducted in countries such as the United States, where they have a head start in adopting AHP. There appears to be a strong emphasis on combining AHP with a variety of other strategies. This is done in order to take benefit of the adaptability of AHP while also making use of the supporting strategies in a concentrated manner.

IMPLICATIONS

The final goal of this research is to critically evaluate the approaches and attempt to identify any flaws in them. Following that, several recommendations are offered in light of the shortcomings. Instead of delving into each and every technique, the primary focus of this section is on those that are used in the selection of transportation routes and the selection of product designs, respectively.

As a hierarchical structure, Wang & Sun (2011) depicted the house of quality in their study. The AHP was used by the author to simply evaluate the relative relevance weightings of both client needs and design qualities, which was all that was required. As previously stated, the importance weightings of design attributes are based not only on the importance ratings of customer requirements, but also on the relationship between consumer requirements and design attributes, as well as the importance ratings of design attributes. As a result, it is claimed that the design attributes chosen may not fully reflect what the customer wants. Wang & colleagues (2014) split client requirements into two layers, which they referred to as criteria and sub-factors. The AHP was only utilized to determine the relative important weightings of the criterion, not the weightings of the sub-factors, as was the case in the previous study. The sub-factors, on the

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other hand, were used to guide the selection of design attributes. According to Wang et al. (2020), the relevance of client requirements may not be accurately reflected by the design elements that have been chosen. The AHP should be used to analyze the relative importance weightings of customer requirements at all levels of the hierarchical structure in order to refine the methodologies described above. It is then determined what design attributes are important based on the weightings and the relationship between customer requirements and design attributes. Finally, the importance weightings of design attributes are calculated.

The AHP can be utilized in the strategy to prioritize the ranking of the requirements of the stakeholders and also to measure the strength of the relationship between the requirements and the proposed functionalities of the information system. Following the consistent AHP analysis, those proposed functions with better rankings should be included in the new information system, subject to the restricted resources that are currently available to implement them (e.g., budget and human resources). At the opposite end of the spectrum from typical cost-based optimization strategies, the proposed strategy takes into account both quantitative and qualitative factors, and it also tries to maximize the advantages to both the deliverer and the clients.

CONCLUSIONS

For this study, a review of the literature on AHPs and their applications from 2010 to 2020 served as the basis for the research. In addition, it was observed that the AHPs can be successfully applied to a wide range of fields and difficulties, which was a second observation. AHPs for logistics and manufacturing are the two areas of application where AHPs have been used the most frequently in recent years, with logistics accounting for the majority of the total. Aside from that, specific recommendations were given in light of the shortcomings of particular approaches. Researchers and decision-makers will surely benefit from this information in order to effectively employ AHPs in their research and decisions. People who want to apply, modify, or extend AHP in a number of application areas in the future will benefit from our review effort, we feel. For further study, the AHP may be used in combination with other muliticriteria decision making methods, SWOT analysis and many other methods and also new integrated AHP can be created with algortithms, as we have seen in the global bibliography at the last decade.

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