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Criteria for Publishing in Reputable International Journals: An Analytical Hierarchy Process Decision Model

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ABSTRACT

Publication of articles in reputable international journals by a researcher is very important to improve the academic career of researchers or lecturers at universities. Unfortunately, university lecturers encounter the challenge of determining appropriate publication platforms for their research findings after accomplishing their research projects and reports. So the aim of this researh is developing a decision model using the Analytic Hierarchy Process (AHP) to assist researchers in selecting appropriate journals for publication. By analyzing criteria from 20 articles across major publishers, the model identifies the most critical factors influencing journal selection, including novelty, scientific rigor, and manuscript quality. The findings suggest that novelty is the highest priority, followed by scientific merit. This model provides researchers with a systematic approach to prioritize journal selection, enhancing the visibility and impact of their work.

Keywords: Academic Reputation; Analytic Hierarchy Process; Journal Selection; Multi-Criteria Decision Making; Research Publication

INTRODUCTION

The issue of higher education quality has become a major concern in the academic world. One indicator of the quality of higher education is the publication of articles in internationally reputable journals. Therefore, determining the criteria for publishing articles in internationally reputable journals is important to ensure the quality and relevance of published research[1].

From the perspective of higher education, the concept of "quality" is a standard used to evaluate and compare the quality of education between institutions. In the context of publishing articles in internationally reputable journals, quality can be measured through factors such as research originality, valid methodology, strong data analysis, and research contributions to the development of science [2], [3], [4].

The studies highlight the use of AHP for ranking journals but do not provide a holistic model that integrates a broad range of factors, such as journal reputation, open access options, audience reach, and publication timelines, which are essential for effective

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decision-making [5]. Existing studies primarily focus on general journal selection criteria but fail to address specific challenges faced by teaching staff in higher education, such as aligning research publication with curriculum development and institutional goals. [6]

While AHP involves expert judgment for weight determination, previous research lacks an objective validation mechanism to ensure consistency and reliability in these weight assignments. Previous studies discuss journal impact but often overlook how journal selection influences the author's academic reputation and recognition within the scientific community. There is little consideration of how evolving standards, such as open access policies and digital indexing, affect the journal selection process. [7]

This research provides a complete AHP-based decision-making framework that encompasses a wide range of variables such as journal reputation, novelty, audience impact, publishing timeframes, and open access choices, geared to the demands of teaching staff in higher education.

By focusing on lecturers as the target population, this study addresses their specific issues in aligning publication selections with instructional objectives and increasing institutional quality. Using expert consensus methods and statistical tests to confirm the consistency of weight assignments results in more trustworthy and objective findings. This study investigates the direct relationship between journal selection and an author's academic reputation, adding a new dimension to the decision-making process. The study takes into account current publishing trends, including as open access standards and digital indexing, to make the approach more flexible to modern academic needs.

METHOD

Data Collection

The data collection method in this research was first sourced from books, the internet, and previously a study of articles and journals; secondly, create a checklist of criteria and sub-criteria from 20 (twenty) articles, namely 4 articles from Elsevier, 4 articles from Springer Nature, 4 articles from Taylor & Francis, 4 articles from Wiley-Blackwell, and 4 articles from Sage. Article selection was carried out randomly.

Criteria Development

This study utilizes the Analytic Hierarchy Process (AHP), a widely-used decision-making tool, to rank criteria for journal selection. Criteria were identified from 20 articles sourced from leading publishers like Elsevier and Springer. Article selection was carried out randomly [8], [9], [10], [11], [12]. A checklist of relevant factors, such as manuscript alignment, content quality, and novelty, was developed. By establishing transparent criteria based on these key factors, researchers can ensure that their work meets the standards expected by reputable international journals, enhancing the credibility and impact of their publications [13].

The criteria and subcriteria in this research can be seen in Table 1.

Table 1. Criteria and sub-criteria for publication of articles in journals of international reputation

Criteria	sub-criteria
	1. In accordance with the scope of the research
Manuscript	2. In accordance with "manuscript guidelines"
	3. Quality of Problem Formulation
	4. Relevant literature review
Content	1. The title and content of the article are related
	2. Appropriate research abstraction
Interesting	1. Stimulate audience interest
	2. Good writing quality
Scientific	1. Complete research analysis
	2. Scientific research methods/design
	3. Relevant results and discussion
	4. Limitation of the problem and space for further research
	5. Consistent and accurate references and citations
Novelty	1. Authenticity (original)
	2. Recency (novelty)

AHP Implementation

In the implementation of AHP, researchers initially performed pairwise comparisons of the criteria utilizing the Saaty scale, followed by the application of AHP-OS software to determine the relative weights of each criterion [14], [15]. The checklist is designed based on the criteria and sub-criteria contained in Table 1. The technique used in scoring this questionnaire uses the Saaty scale technique which has answers on a scale of 1 to 9. [16].The questionnaire consists of 15 subcriteria with details in Table 1.

Secondly, the priority weight of each criterion is determined by inputting the value from the comparison matrix or can be calculated using mathematical equations. This approach ensures that the study is conducted with a high level of scientific rigor and increases its credibility within the scientific community. The results of distributing questionnaires were analyzed using the AHP Online System - AHP-OS designed by Klaus D. Goepel. In this template the researcher includes a checklist of criteria and sub-criteria for each article to obtain a paired matrix of the 20 articles studied.

Thirdly, prioritizing the criteria based on their impact on the overall value and reliability of the research.

Pairwise comparison values are required for each accessible criterion to establish the priority of criteria. The pairwise comparison value can be modified to a pre-established judgment in order to obtain a priority weight value for the criteria and alternatives. The priority weight of each criterion is determined by inputting the value from the comparison matrix or can be calculated using mathematical equations.

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Next, developing a systematic approach to assessing and scoring articles against the established criteria to ensure consistency and fairness in the publication process

$$CI = \frac{\lambda_{max} - n}{n} \quad (1)$$

where CI is Consistency index, λ_{max} is the optimum of eigen vector from matrix, and n is number of parameters / matrix order. Next, in order to calculate the consistency ratio, it is necessary to obtain the random index established by Saaty for the second type:

Table 2. Random Index Consistency

N	1,2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.48	1.56	1.7	1.59

It can be inputted using equation (2) below:

$$CR = \frac{CI}{RI} \quad (2)$$

where CR is consistency ratio, CI is consistency index, and RI is random index consistency as presented in Table 2.

Finally, implementing feedback mechanisms to continuously improve and refine the criteria for article publication in international journals This includes actively seeking input from authors, reviewers, and editors on ways to enhance the criteria and make them more comprehensive. By incorporating feedback into the evaluation process, journals can ensure that their publication standards remain relevant and up-to-date in the rapidly evolving academic landscape. Ultimately, the goal is to establish a transparent and rigorous system that promotes high-quality research and fosters a culture of continuous improvement within the scholarly community.

The steps for implementing AHP above can be seen in the flowchart in Figure 1 below.

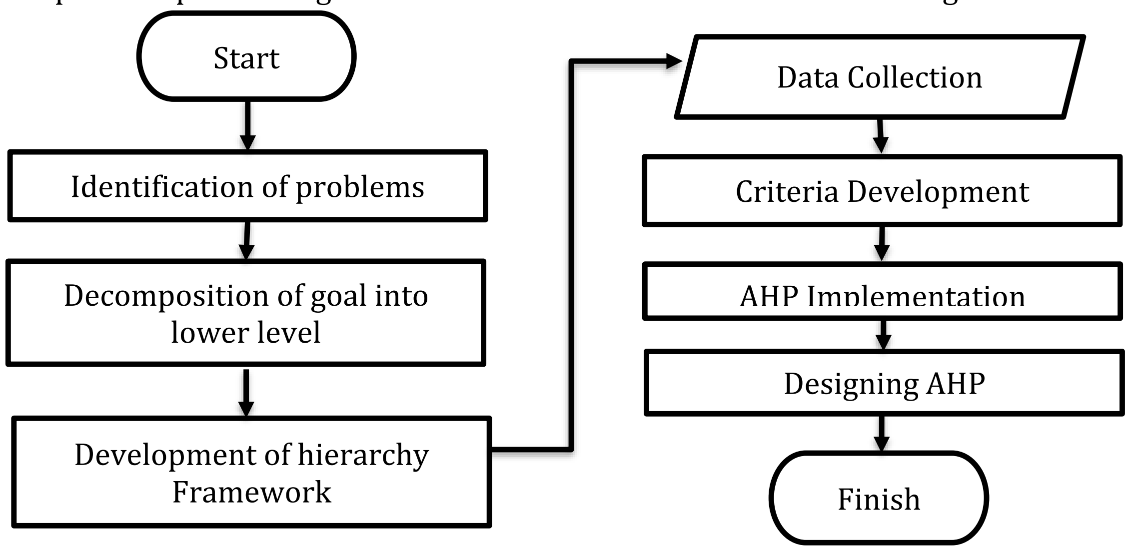

Figure 1 The steps for implementing AHP

Designing AHP

Analytic Hierarchy Process Model Assumptions

The study employs the criteria established in the Analytical Hierarchy Process (AHP) paradigm, as presented in Table 3a and 3b below:

Table 3a. Model Assumption for criteria

Criteria	Symbol
Manuscript	A
Content	B
Interesting	C
Scientific	D
Novelty	E

Table 3b. Pair-wise Comparison Matrix between Criteria

Information	Value
EI: Equally Important	1
MI: Moderate importance	3
SI: Strong importance	5
VI: Very strong importance	7
AI: Absolutely importance	9

Note: (2,4,6,8 values in-between).

In this study, authors implemented a hierarchical approach to facilitate the determination of the weight assigned to each criterion. Data analysis using AHP Online System - AHP-OS. Mathematically the method is based on the solution of an Eigenvalue problem. The results of the pair-wise comparisons are arranged in a matrix. The first (dominant) normalized right Eigen vector of the matrix gives the ratio scale (weighting), the Eigenvalue determines the consistency ratio. As a pairwise comparison matrix between criteria has been created, the subsequent step involves calculating by substituting this matrix into a preset model. This site employs many Analytic Hierarchy Process (AHP) approaches, such as standard linear AHP scale, square root scale, geometric scale, and others.

RESULTS AND DISCUSSION

Results

The research findings have yielded the calculation for determining the factors that influence the acceptance of an article in a highly regarded worldwide journal using the Analytic Hierarchy Process (AHP) model.

Tables 4a, 4b, and 4c represent pairwise comparison matrices using different scaling methods: standard linear scale (4a), square root scale (4b), and geometric scale (4c). These tables are used to calculate priority weights for the criteria: Manuscript Quality, Content, Interestingness, Scientific Merit, and Novelty.

Table 4a. Pairwise comparison matrix for standard linear AHP scale

Criteria	Manuscript	Content	Interesting	Scientific	Novelty
Manuscript	1	3.00	2.00	0.50	0.20
Content	0.33	1	1.00	0.50	0.20
Interesting	0.50	1.00	1	0.33	0.20
Scientific	2.00	2.00	3.00	1	0.33
Novelty	5.00	5.00	5.00	3.00	1

This table uses a direct linear comparison. For example, Novelty compared to Manuscript Quality is assigned a value of 5, indicating that Novelty is 5 times more important. The weights derived are: Novelty (49.7%), Scientific Merit (20.0%), Manuscript Quality (14.5%), Content (8.0%), and Interestingness (7.8%). Consistency Ratio (CR) = 3.4%, indicating a consistent matrix. This table can be computed mathematically as follows :

Initial Pairwise Comparison Matrix in Table 4a:

$$Matrix = \begin{bmatrix} 1 & 3.00 & 2.00 & 0.50 & 0.20 \\ 0.33 & 1 & 1.00 & 0.50 & 0.20 \\ 0.50 & 1.00 & 1 & 0.33 & 0.20 \\ 2.00 & 2.00 & 3.00 & 1 & 0.33 \\ 5.00 & 5.00 & 5.00 & 3.00 & 1 \end{bmatrix}$$

Compute the sum of each column in the pairwise comparison matrix:
Column Sums = $\left[8.83, 12.00, 12.00, 5.33, 1.93\right]$.

Normalize the matrix by dividing each element by its respective column sum. For example:

Normalized Element $\left(1,1\right) = \frac{1}{8.83} = 0.1133$

The resulting normalized matrix is:

$$\begin{bmatrix} 0.1133 & 0.2500 & 0.1667 & 0.0938 & 0.1036 \\ 0.0374 & 0.0833 & 0.0833 & 0.0938 & 0.1036 \\ 0.0566 & 0.0833 & 0.0833 & 0.0619 & 0.1036 \\ 0.2266 & 0.1667 & 0.2500 & 0.1875 & 0.1715 \\ 0.5661 & 0.4167 & 0.4167 & 0.5626 & 0.5180 \end{bmatrix}$$

Calculate row averages to derive priority weights:
Weights = $\left[0.145, 0.080, 0.078, 0.200, 0.497\right]$.

Validate consistency by calculating eigenvalue (λ_{max}), Consistency Index (CI), and Consistency Ratio (CR):

$$\lambda_{max} \approx 5.23, CI = 0.0575, CR = 0.051 \text{ (consistent).}$$

Table 4b. Pairwise comparison matrix for square root AHP scale

Criteria	Manuscript	Content	Interesting	Scientific	Novelty
Manuscript	1	1.73	1.41	0.71	0.45
Content	0.58	1	1.00	0.71	0.45
Interesting	0.71	1.00	1	0.58	0.45
Scientific	1.41	1.41	1.73	1	0.58
Novelty	2.24	2.24	2.24	1.73	1

This table moderates extreme comparisons by applying square root scaling. For example, Novelty compared to Manuscript Quality is assigned a value of 2.24, reducing the disparity seen in Table 4a. The resulting weights are: Novelty (33.9%), Scientific Merit (21.5%), Manuscript Quality (17.9%), Content (13.4%), and Interestingness (13.3%). CR = 0.8%, showing excellent consistency. The calculations for Table 4b follow the same steps as Table 4a, with the square root scale applied. For example, Novelty compared to Manuscript Quality = 2.24 (moderated scale).

Table 4c. Pairwise comparison matrix for geometric AHP scale

Criteria	Manuscript	Content	Interesting	Scientific	Novelty
Manuscript	1	4.00	2.00	0.50	0.06
Content	0.25	1	1.00	0.50	0.06
Interesting	0.50	1.00	1	0.25	0.06
Scientific	2.00	2.00	4.00	1	0.25
Novelty	16.00	16.00	16.00	4.00	1

This table emphasizes dominant criteria using geometric scaling. Novelty compared to Manuscript Quality is assigned a value of 16, highlighting Novelty's importance. The resulting weights are: Novelty (71.1%), Scientific Merit (13.2%), Manuscript Quality (8.0%), Content (3.9%), and Interestingness (3.7%). CR = 5.8%, which is within the acceptable range. The calculations for Table 4c emphasize dominant criteria using the geometric scale. The calculations for Table 4c follow the same steps as Table 4a.

The priorities using standard linear AHP scale, square root AHP scale, and geometric AHP scale are stated in Table 51, Table 5b, and Table 5c respectively.

Table 5a. Consolidated Priorities standard linear AHP scale (CR = 3,4%)

Criteria	Priority	Rank
Manuscript	14.2%	3
Content	7.8%	4
Interesting	7.6%	5
Scientific	20.1%	2
Novelty	50.2%	1

Table 5a presents a comprehensive overview of the reinforced priorities of the criteria, employing a standard linear scale. Particularly, Novelty occupies the highest priority at 50.2%, succeeded by Scientific Merit at 20.1%. Other criteria, including Manuscript Quality, Content, and Interestingness, were assigned lesser importance, each getting below 15%. The consistency ratio (CR) stands at 3.4%, indicating that these findings are valid and imply that Novelty performs a crucial role in the acceptance of articles in international journals.

Table 5b. Consolidated Priorities square root AHP scale (CR = 0,8%)

Criteria	Priority	Rank
Manuscript	17.9%	3
Content	13.4%	4
Interesting	13.3%	5
Scientific	21.5%	2
Novelty	33.9%	1

Table 5b presents the order of importance of criteria according to the AHP square root scale. Novelty continues to be the most significant criterion, accounting for 33.9%, though its weight is more evenly distributed relative to the prior table. Scientific Merit is assigned a weight of 21.5%, ranking second, while Manuscript Quality, Content, and Interestingness each receive weights below 18%. The results, with a CR of 0.8%, demonstrate strong consistency, affirming the reliability of the square root scale in yielding more proportional results.

Table 5c. Consolidated Priorities geometric AHP scale (CR = 5,8%)

Criteria	Priority	Rank
Manuscript	8.0%	3
Content	3.9%	4
Interesting	3.7%	5
Scientific	13.2%	2
Novelty	71.1%	1

Table 5c provides the order of priority results derived from the AHP geometric scale, indicating that Novelty holds a significant weight of 71.1%, while Scientific Merit follows with a weight of 13.2%. The remaining criteria, specifically Manuscript Quality, Content, and Interestingness, carry significantly lower weights, each falling below 10%. The results, reflecting a CR of 5.8%, remain within acceptable consistency limits. However, it is noteworthy that the geometric scale assigns significantly greater weights to the criteria deemed most critical.

Alternative Ranking as a Priority Determinant for Articles Accepted by Journals

The levels in the hierarchy cannot be ascertained through conjecture or reliant on the researcher's approximations. The hierarchy levels must be derived from preexisting data in order to provide a consistent final outcome. The determination of the weight for each alternative pairwise comparison should be derived from the hierarchy outlined in the weighting for each criterion. Once the hierarchy level has been taken into account, the subsequent step involves transforming each weighting result into a matrix. A pair comparison matrix of 20 articles based on the manuscript criteria is presented below.

Comparison Matrix between Manuscript Criteria

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	2.00	3.00	2.00	3.00	2.00	3.00	3.00	2.00	3.00	2.00	3.00	2.00	3.00	2.00	2.00	3.00	3.00	2.00	3.00
2	0.50	1	3.00	3.00	2.00	2.00	3.00	1.00	3.00	3.00	2.00	2.00	2.00	3.00	2.00	3.00	2.00	3.00	2.00	3.00
3	0.33	0.33	1	3.00	2.00	1.00	3.00	2.00	2.00	1.00	1.00	2.00	1.00	3.00	2.00	1.00	1.00	1.00	2.00	3.00
4	0.50	0.33	0.33	1	3.00	2.00	1.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	2.00	3.00	3.00	3.00	1.00	3.00
5	0.33	0.50	0.50	0.33	1	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00	3.00	2.00	1.00	1.00	1.00	1.00	1.00
6	0.50	0.50	1.00	0.50	1.00	1	1.00	1.00	1.00	3.00	3.00	2.00	1.00	3.00	3.00	3.00	1.00	1.00	1.00	2.00
7	0.33	0.33	0.33	1.00	1.00	1.00	1	1.00	1.00	3.00	1.00	1.00	3.00	2.00	3.00	1.00	1.00	3.00	1.00	1.00
8	0.33	1.00	0.50	1.00	1.00	1.00	1.00	1	1.00	2.00	1.00	3.00	3.00	1.00	2.00	1.00	1.00	1.00	1.00	3.00
9	0.50	0.33	0.50	0.50	1.00	1.00	1.00	1.00	1	1.00	2.00	3.00	1.00	1.00	1.00	1.00	1.00	3.00	1.00	3.00
10	0.33	0.33	1.00	0.50	0.50	0.33	0.33	0.50	1.00	1	1.00	1.00	0.33	1.00	3.00	2.00	1.00	1.00	1.00	1.00
11	0.50	0.50	1.00	1.00	1.00	0.33	1.00	1.00	0.50	1.00	1	1.00	1.00	2.00	1.00	1.00	2.00	1.00	1.00	3.00
12	0.33	0.50	0.50	1.00	1.00	0.50	1.00	0.33	0.33	1.00	1.00	1	1.00	3.00	1.00	2.00	1.00	1.00	1.00	1.00
13	0.50	0.50	1.00	0.50	1.00	1.00	0.33	0.33	1.00	3.00	1.00	1.00	1	3.00	1.00	2.00	3.00	1.00	3.00	0.50
14	0.33	0.33	0.33	1.00	0.33	0.33	0.50	1.00	1.00	1.00	0.50	0.33	0.33	1	1.00	1.00	1.00	3.00	3.00	1.00
15	0.50	0.50	0.50	0.50	0.50	0.33	0.33	0.50	1.00	0.33	1.00	1.00	1.00	1.00	1	2.00	1.00	3.00	2.00	0.50
16	0.50	0.33	1.00	0.33	1.00	0.33	1.00	1.00	1.00	0.50	1.00	0.50	0.50	1.00	0.50	1	3.00	1.00	2.00	1.00
17	0.33	0.50	1.00	0.33	1.00	1.00	1.00	1.00	1.00	1.00	0.50	1.00	0.33	1.00	1.00	0.33	1	1.00	1.00	0.33
18	0.33	0.33	1.00	0.33	1.00	1.00	0.33	1.00	0.33	1.00	1.00	1.00	1.00	0.33	0.33	1.00	1.00	1	2.00	3.00
18	0.50	0.50	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.50	0.50	1.00	0.50	1	1.00
20	0.33	0.33	0.33	0.33	1.00	0.50	1.00	0.33	0.33	1.00	0.33	1.00	2.00	1.00	2.00	1.00	3.00	0.33	1.00	1

Figure 2. Table Comparison Matrix between Manuscript Criteria

To acquire the weight of the criteria, the same computation is carried out as in table 4a, and the results are as follows.

Priority Weights:
Manuscript Quality : 0.145
Content : 0.080

Interestingness : 0.078
Scientific Merit : 0.200
Novelty : 0.497

The eigenvalue (λ_{max}), Consistency Index (CI), and Consistency Ratio (CR) are calculated:

$$\lambda_{max} \approx 5.23$$
$$CI = (\lambda_{max-n})/(n-1) = 0.0575$$
$$CR = CI/RI = 0.051 (RI = 1.12\ for\ n = 5)$$

Since $CR < 0.1$, the matrix is consistent.

The computation results indicate that the most significant criterion in determining the acceptance of articles in reputable international journals is novelty. The maximum comparison score was 5 for Manuscript Quality, Content, and Interestingness, and 3 for Scientific Merit. Scientific Merit is in second place, with a comparative value of 3 for Interestingness and 2 for Manuscript Quality and Content. In contrast, Manuscript Quality, Content, and Interestingness have lower values, each below 1, when compared to Novelty and Scientific Merit, suggesting that they are more supportive.

For the other sub criterias can be seen in bpmsg.com. This website also provides a bar chart that displays the visualization of priority. For example, in Figure 3, it can be seen the visualization result of the first method.

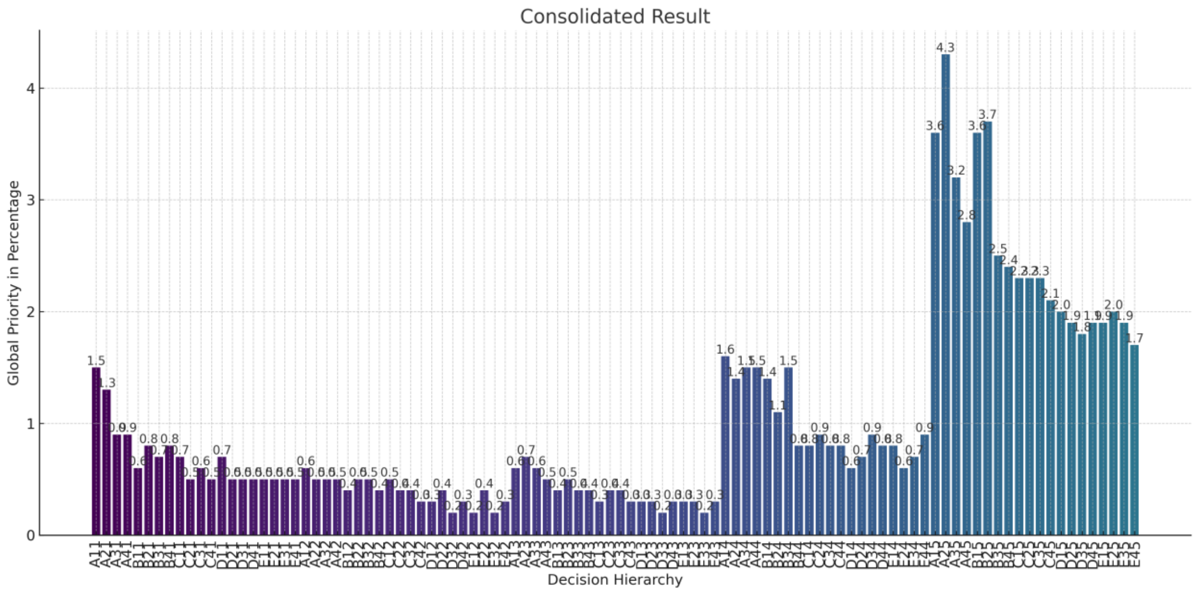

Figure 3. Effects of selecting different switching under dynamic condition

The following image is a bar diagram that illustrates the outcomes of sub-criteria prioritization using the Analytic Hierarchy Process (AHP) method. The sub-criteria with the highest priority weight (e.g., 4.3%) are considered the most significant in decision-making, while those with shorter bars have less influence. The primary sub-criteria to concentrate on are identified in this diagram, which has an irregular distribution, with only a handful of sub-criteria dominating the consolidated results. This facilitates the formulation of more focused and effective decisions.

Discussion

Based on the results of this research, several criteria were used for design, namely Manuscript, Content, Interesting, Scientific and Latest criteria. The analysis reveals that the most important criterion for journal acceptance is novelty, followed by scientific rigor and manuscript quality. These findings suggest that journal editors prioritize original and well-researched manuscripts that align with their journal's focus. The AHP model offers a clear ranking of criteria, enabling researchers to better navigate the journal selection process. However, the study's reliance on a limited set of journals and criteria may impact the generalizability of the findings. Future research could expand the model by considering more diverse journal types and incorporating expert feedback.

CONCLUSIONS

This study demonstrates the use of the Analytic Hierarchy Process (AHP) to rank criteria for selecting reputable journals for research publication. In this research, the criteria for accepting article manuscripts in reputable international journals using the Analytical Hierarchy Process model is that the first priority is the "recentness" criterion with a weight of 0.502. The second priority is the "Scientific" criterion with a weight of 0.201. Furthermore, the third and fourth priorities are "manuscript" and "content" respectively with weights of 0.142 and 0.078. Meanwhile, the final priority is "interesting" with a weight of 0.076. The findings emphasize the importance of novelty and scientific rigor in the journal selection process. This research prompts university professors to prioritize novelty and scientific rigor to enhance the acceptance of their publications in prestigious journals.

In this paper, only the Standard AHP linear scale, square root scale, and geometric scale methods are presented. There remain multiple techniques that can be employed. Future research could explore the application of this model to other disciplines or refine it by incorporating expert insights to improve its accuracy and relevance.

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