

The Application of Analytical Hierarchy Process (AHP) in Evaluating Employee Selection Criteria: Insights from Northern Malaysia

Nur Anis Zulaikha Sharif Azam^{1*}, Norshahrizan Nordin^{1,2,3}, Suhaiza Hanim Mohamad Zailani⁴, Fadhlur Rahim Azmi⁵, Mohd Saiful Izwaan Saadon⁶, Wan Zuki Azman Wan Muhamad⁷, Suraiya Ibrahim¹, Nur Syuhadah Kamaruddin¹, Wan Norsyafawati W. Muhamad Radzi¹, Mahmoud El-Banna⁸, and Abdurrahman Faris Indriya Himawan⁹

¹Faculty of Business & Communication, Universiti Malaysia Perlis

²Healthcare Management – Special Interest Group (HEM – SIG)

³Management of Technology – Special Interest Group (MoTE – SIG)

⁴Universiti Malaya (UM), Malaysia

⁵Universiti Teknologi Mara (UiTM) Cawangan Melaka, Malaysia

⁶Universiti Malaysia Terengganu (UMT), Terengganu, Malaysia

⁷Institute of Engineering Mathematics, Universiti Malaysia Perlis

⁸German Jordanian University (GJU), Amman, Jordan

⁹Telkom University (Tel-U), Bandung, Indonesia

ABSTRACT

Employee selection in Higher Education Institutions (HEIs) is increasingly challenged by financial constraints and skills gaps. This study addresses these challenges by employing the Analytical Hierarchy Process (AHP) to develop a systematic framework for optimizing academic staff recruitment. Through a survey conducted among experienced lecturers at public universities in Malaysia's Northern Region, the research identifies and ranks critical selection criteria: Innovative Work Behaviour AHP (IWBA) emerges as the most significant, followed by Ethical Climate AHP (ECA) and Cultural Diversity AHP (CDA). The findings underscore the importance of fostering creativity and ethical environments in academic recruitment to meet institutional goals of excellence and innovation. By integrating the Analytical Hierarchy Process (AHP) methodology, this research provides Higher Education Institutions (HEIs) administrators with a robust, quantitative decision-making framework to refine personnel selection processes. This strategic approach ensures alignment between recruitment practices and organizational objectives, offering actionable insights to enhance staff performance, retention, and overall institutional success.

Keywords: Higher Education Institutions (HEIs), Analytical Hierarchy Process (AHP), Employee Selection Models, and Decision-Making Frameworks

1.0 INTRODUCTION

Human Resource Management (HRM) is the cornerstone of organizational success, as no function can operate effectively without a well-managed workforce. Skilled and knowledgeable employees are pivotal in achieving business objectives, highlighting the increasing emphasis on the human element as organizational wealth. The performance of an organization's workforce significantly impacts its ability to attain long-term goals. Consequently, designing and implementing a robust framework for managing the human element is crucial to enhancing performance and promoting a healthy work-life balance.

A goal-oriented recruitment and selection process is fundamental to such a system. As noted by Phillipa et al. (2023), this process involves identifying and hiring qualified candidates to fill key positions. The Employee Selection AHP (ESA) methodology, as discussed by Munaty et al. (2022), prioritizes candidates with integrity, strong ethical values, and sound behavior. It aims to foster a sense of belonging, loyalty, and motivation, ensuring employees exert maximum

effort in fulfilling their roles. The success of an organization depends on securing individuals who demonstrate unwavering devotion, innovation, and honesty to protect its interests.

Higher Education Institutions (HEIs) face complex recruitment challenges, particularly those stemming from financial constraints (Pedró, 2023). Budget limitations hinder institutions' ability to recruit full-time staff or offer competitive salaries, exacerbating staffing shortages, increasing workloads, and intensifying competition in certain fields. The retirement of experienced academics and a lack of research opportunities further compound these issues. Globally, HEIs grapple with infrastructural and resource limitations, which directly affect teaching quality, research productivity, and staff retention. In Malaysia, a persistent skills gap between graduates and workplace demands poses additional challenges (Tilo, 2023). Bridging this gap is vital to fostering better alignment between educational outcomes and labor market requirements, ensuring the recruitment of talented academic staff contributes to institutional and academic excellence.

Past studies have examined employee selection factors; however, there is a noticeable gap in research on selection processes specifically in HEIs. As Tilo (2023) emphasizes, understanding and addressing these gaps require a deeper exploration of factors influencing recruitment through a multicriteria decision-making approach. This study employs the Analytical Hierarchy Process (AHP) as a practical framework to evaluate and rank criteria systematically.

This research explores how AHP serves as a quantitative and systematic tool for improving employee selection in HEIs and enhancing organizational performance. The study underscores the necessity of well-designed recruitment frameworks, as poorly executed processes can damage candidates' perceptions of the organization, leading to adverse effects on future professional relationships.

Although numerous previous studies have examined employee selection factors, most have focused on corporate or general organizational contexts, with limited attention given to the unique environment of Higher Education Institutions (HEIs). Furthermore, these studies often overlook integrating critical attributes such as Innovative Work Behaviour Attributes (IWBA), Ethical Climate Attributes (ECA), and Cultural Diversity Attributes (CDA), which are increasingly vital for fostering academic excellence and institutional resilience. This study addresses these gaps by developing a comprehensive academic staff selection framework using the Analytical Hierarchy Process (AHP), systematically incorporating IWBA, ECA, and CDA. By doing so, it offers a novel, evidence-based approach to strategic and ethical recruitment in HEIs, ultimately contributing to improved organizational performance and long-term institutional success.

2.0 LITERATURE REVIEW

2.1 Employee Selection AHP (ESA)

The Employee Selection AHP (ESA) framework has emerged as a vital tool for systematic and effective hiring practices, ensuring alignment between organizational needs and candidate qualifications. According to Phillipa et al. (2023), ESA provides a structured approach to identifying the best-suited candidates for specific roles from a pool of applicants. It not only facilitates the selection of individuals who meet job requirements but also underscores the strategic importance of recruitment in achieving business goals. A well-designed ESA process can significantly reduce costs, improve organizational perceptions, and optimize workforce productivity.

Effective selection mechanisms are integral to enhancing both organizational performance and employee satisfaction. As Aliyu (2021) asserts, robust hiring practices increase the likelihood of

retaining motivated and capable employees, thereby contributing to long-term success. Beyond meeting immediate job demands, the ESA process can enhance market perceptions of the organization, attract top-tier talent, and align workforce capabilities with productivity and financial objectives.

Gupta and Praveen (2023) highlight the role of ESA in sustaining organizational performance by identifying candidates who exhibit integrity, ethical principles, and a commitment to excellence. These attributes are pivotal in fostering innovation, loyalty, and motivation within the workforce. Similarly, Munaty et al. (2022) emphasize the importance of selecting candidates who not only excel in technical competencies but also embody values critical to organizational growth, such as dedication, honesty, and creativity. Such candidates contribute to achieving strategic goals while safeguarding the organization's interests.

Collectively, the literature emphasizes the transformative potential of ESA in optimizing recruitment processes, ensuring alignment with institutional objectives, and fostering a workforce that drives innovation, productivity, and organizational excellence

2.2 Cultural Diversity (CDA)

Cultural Diversity AHP (CDA) has been broadly defined as recognizing, understanding, valuing, and engaging with differences among individuals across dimensions such as age, ethnicity, gender, physical and mental ability, socioeconomic status, and spiritual practices (Tjimuku & Atiku, 2024). These diverse traits, as emphasized by Orsini and Watanabe (2023), set individuals apart and encompass categories including gender, race, ethnicity, culture, and education. Managing such diversity effectively is particularly critical for multinational organizations, where expatriates must grasp why local staff collaborate and support them (Sabiou et al., 2019).

Cultural Diversity AHP (CDA) extends beyond recognizing differences; it serves as an essential framework for fostering inclusivity and promoting sociocultural distinctions within organizational structures. Othman and Fouda (2022) highlighted the relationship between Cultural Diversity AHP (CDA) and multiculturalism, which involves respecting diverse groups while encouraging their active contributions within an inclusive cultural environment. Effective multiculturalism policies not only strengthen organizational cohesion but also align with broader goals of diversity management.

Research underscores the tangible benefits of managing Cultural Diversity AHP (CDA) within organizations. Taamneh et al. (2022) demonstrated that addressing cultural diversity enhances organizational financial performance, improves profitability, and establishes competitive advantages. Similarly, findings by Inegbedion et al. (2020) show that organizations benefit from resolving conflicts and addressing concerns of exclusion, as these actions lead to more efficient diversity management practices. A robust Cultural Diversity AHP (CDA) strategy considers employee sentiments regarding exclusion and conflict, creating a workplace that embraces diversity while advancing organizational productivity and harmony. In conclusion, Cultural Diversity AHP (CDA) emerges as a pivotal component for organizations seeking sustainable growth and inclusivity. Its strategic implementation offers not only competitive advantages but also a pathway to fostering innovation, cohesion, and enhanced performance.

2.3 Ethical Climate AHP (ECA)

Ethical Climate AHP (ECA) is traditionally defined as "a collection of shared perceptions of codified and informal policies and procedures that shape expectations for ethical behaviour within an organization" (Barattucci et al., 2021). Itzkovich et al. (2020) refine this definition by emphasizing that Ethical Climate AHP (ECA) reflects employees' perceptions of typical

organizational practices and procedures with ethical dimensions. At its core, Ethical Climate AHP (ECA) integrates employees' opinions regarding the ethical standards embedded in workplace policies and procedures, serving as a critical metric for assessing organizational moral integrity.

The importance of Ethical Climate AHP (ECA) in enhancing organizational performance (OP) and refining personnel selection processes has been well-documented. Sabiu et al. (2019) highlight the critical role of Ethical Climate AHP (ECA) in fostering ethical principles among employees and creating work environments that prioritize moral conduct, effective leadership, trust, loyalty, and value creation. These ethical foundations are crucial for driving organizational growth, innovation, and sustainability. Ethical Climate AHP (ECA) mandates adherence to ethical standards, thereby embedding a culture of integrity within organizational processes. Employees' ethical conduct plays an indispensable role in advancing organizational effectiveness and long-term success.

Despite the wealth of research addressing the antecedents and outcomes of ethical climate, notable gaps remain. Specifically, the complex interplay between ethical leadership, moral attentiveness, and employees' ethical behaviour warrants deeper empirical investigation. Recent studies call for a more nuanced understanding of how moral attentiveness mediates the relationship between ethical leadership and employee ethical conduct, providing a pathway for organizations to enhance their ethical frameworks. In conclusion, the Ethical Climate AHP (ECA) is not only a benchmark for organizational ethics but also a pivotal driver of performance and employee engagement. By advancing research on its interrelated components, organizations can better align their ethical practices with strategic objectives, fostering environments that prioritize integrity, innovation, and sustained growth.

2.4 Innovative Work Behaviour AHP (IWBA)

Innovative Work Behaviour AHP (IWBA) has become a cornerstone of organizational success, highlighting the critical role of employees in generating and implementing novel ideas that sustain and enhance institutional achievement (Venketsamy & Lew, 2024). Innovative Work Behaviour AHP (IWBA) encapsulates the ability of personnel to actively contribute to the innovation process, ensuring organizations adapt to dynamic market demands and remain competitive.

The promotion and cultivation of creativity within organizations have been extensively emphasized in management research. According to Noraisah et al. (2021), fostering innovative behaviours is not only essential for organizational growth but also holds broader implications for societal advancement. In increasingly competitive environments, institutions must leverage Innovative Work Behaviour AHP (IWBA) to differentiate their products and services from their competitors. Employees' ability to introduce and operationalize unique concepts is paramount in driving innovation, optimizing productivity, and achieving long-term organizational goals.

Further, Innovative Work Behaviour AHP (IWBA) supports the alignment of workforce capabilities with strategic objectives. Encouraging employees to engage in creative problem-solving and innovative thinking empowers organizations to capitalize on emerging opportunities and tackle challenges effectively. Organizations that prioritize the development of IWBA among their employees gain a significant edge in innovation, ensuring sustainability and relevance in a fast-evolving global landscape. In conclusion, Innovative Work Behaviour AHP (IWBA) serves as a vital mechanism for maintaining organizational competitiveness and achieving sustainable performance. By fostering a culture of innovation, institutions can equip their workforce to address future challenges while driving continuous growth and differentiation.

3.0 ANALYTICAL HIERARCHY PROCESS (AHP)

The Analytical Hierarchy Process (AHP), pioneered by Thomas Saaty, is a widely recognized method for handling complex decision-making scenarios involving multiple interconnected criteria (Nugroho et al., 2023). As part of the Multi-Criteria Decision-Making (MCDM) framework, AHP is renowned for its adaptability in resolving problems ranging from straightforward to highly intricate (Akmaludin et al., 2022). A distinguishing feature of AHP is its ability to effectively address both quantitative and qualitative factors, as well as scenarios that blend these dimensions, making it an invaluable tool for decision-makers.

Analytical Hierarchy Process (AHP) has demonstrated exceptional utility in managing scenarios involving a significant number of criteria, maintaining clarity and precision even in complex situations. Lia Hananto et al. (2021) applied the Analytical Hierarchy Process (AHP) methodology to assess employee performance for Hon Chuan Company, leveraging predefined criteria to reward top-performing individuals. Similarly, Nugroho et al. (2023) employed Analytical Hierarchy Process (AHP) in a decision-making framework to select the most suitable candidate for a Project Manager position in a technology firm. Their research evaluated ten candidates and highlighted Analytical Hierarchy Process (AHP) effectiveness in balancing multiple criteria, enabling decision-makers to identify the optimal choice.

The versatility and robustness of Analytical Hierarchy Process (AHP) make it a vital tool for organizations seeking a systematic and data-driven approach to decision-making. By prioritizing and ranking criteria, Analytical Hierarchy Process (AHP) provides clarity and facilitates strategic decisions that align with organizational goals. Its ability to integrate diverse factors ensures its applicability across a range of industries and research domains, making it indispensable for contemporary decision-making frameworks.

4.0 METHODOLOGY

This research employs a rigorous quantitative methodology grounded in the positivist paradigm to ensure objectivity and scientific precision in investigating personnel selection frameworks for Higher Education Institutions (HEIs). A descriptive research design was adopted to systematically explore, analyze, and develop an evidence-based model for optimizing academic staff recruitment. The methodological approach integrates extensive reviews of relevant literature to construct a robust theoretical foundation. Primary data collection was conducted through physical surveys to ensure authenticity, accuracy, and respondent engagement. Researchers undertook on-site visits to seven prominent public universities in Northern Malaysia—Universiti Malaysia Perlis (UniMAP), Universiti Teknologi MARA (UiTM Perlis), Universiti Utara Malaysia (UUM), Universiti Teknologi MARA (UiTM Kedah), Universiti Teknologi MARA (UiTM Pulau Pinang), Universiti Sains Malaysia (USM), and Universiti Teknologi MARA (UiTM Perak). This strategic selection of institutions captures the regional diversity of academic staff in Perlis, Kedah, Pulau Pinang, and Perak, ensuring the study's findings reflect the distinct educational dynamics in Malaysia's Northern Region.

The direct distribution and collection of questionnaires allowed researchers to establish personal interactions with respondents, fostering trust and enhancing the reliability of the data. This meticulous data-gathering approach enables the study to identify critical factors influencing personnel selection while maintaining high methodological integrity. By anchoring the research in a scientific and systematic framework, this study contributes actionable insights into improving recruitment processes in HEIs.

4.1 Analytical Hierarchy Process (AHP) Questionnaire Design

This study employed a rigorous quantitative methodology, anchored in the positivist paradigm, to systematically examine personnel selection frameworks in Higher Education Institutions (HEIs). A pre-test was conducted with six experts' opinions who have experience in operational research and recruitment processes to construct and refine the Analytical Hierarchy Process (AHP) questionnaire. But only three expert opinions give feedback to the AHP questionnaires. Expert consensus on objectives, methodology, and questionnaire structure led to the finalization of selection criteria and components.

A convenience sampling technique was applied to select 20 respondents, comprising professors, associate professors, and senior lecturers, due to their extensive experience in higher education and their direct exposure to the various phases of transformation and reform within the academic landscape. A deep understanding of institutional dynamics enables them to provide critical, reflective, and informed insights into the criteria for academic staff selection that align with current and future institutional needs. Therefore, their input is essential to ensure that the proposed selection framework is practical, contextually relevant, and grounded in the realities of the academic profession. All distributed questionnaires were collected and deemed usable for subsequent analysis. Excel was utilized to apply the AHP method, calculating the relative weights, consistency ratios, and priorities of selection criteria across multiple levels. This analytical approach enabled the identification and ranking of critical factors influencing employee selection in HEIs.

The results offered actionable insights into refining recruitment strategies, ensuring alignment with institutional goals, while highlighting key areas for organizational improvement. By systematically ranking selection criteria, this study contributes a robust framework for personnel selection in HEIs, enhancing decision-making processes and overall institutional performance.

4.2 Implementation AHP

The Analytical Hierarchy Process (AHP) begins by constructing a hierarchical structure to evaluate the problem. This hierarchy starts from the ultimate goal at the top, followed by decision criteria and sub-criteria at subsequent layers. Each level is independent, and no more than seven decision factors are recommended per hierarchy, ensuring clarity and adherence to Saaty's (1980) guidelines. Decision factors are systematically divided into groups and sub-groups, building the hierarchy layer by layer.

Next, an evaluation scale is established to measure the relative importance of factors. Pairwise comparisons are made using a 9-point scale, with 1 representing "least influence" and 9 indicating "greatest influence." Intermediate values reflect varying levels of importance. The Random Index (RI) provides reference values for consistency in comparisons, ensuring the logical ranking of factors.

Pairwise comparisons are conducted by creating a matrix in which identical factors are assigned a weight of 1, and reciprocal values are used for inverse comparisons. For instance, if factor A is deemed three times more important than factor B, the comparison between B and A is automatically assigned a value of 1/3. Mathematical calculations, including the geometric mean of row vectors, are used to determine weights and eigenvalues, ensuring accurate prioritization of criteria.

Consistency analysis follows to validate the results. The Consistency Index (CI) and Consistency Ratio (CR) are calculated using specific formulas, with $CI \leq 0.1$ and $CR < 0.1$ indicating acceptable consistency. Inconsistent judgments ($CR > 0.1$) require revision. Once consistency is confirmed,

the relative weights of the criteria and sub-criteria are calculated to determine their importance. The results are synthesized by aggregating the weights to derive an overall score for each alternative. Sensitivity analysis is performed to assess how changes in criteria weights impact rankings, ensuring robustness and identifying key criteria that influence decision outcomes. The final rankings provide a comprehensive evaluation of the alternatives, supporting informed decision-making.

5.0 RESULT

Based on the AHP analysis, the study was conducted with a clear target population and distributed questionnaires to targeted respondents. Twenty questionnaires were distributed, and twenty were validly collected. After collecting the questionnaires, the study was analyzed through the analytical hierarchy process (AHP). The Excel software was utilized to find each factor's comparative matrix and weight at each level. The ultimate goal was to determine the relative importance of each weighting factor by matrix of each level, which was less than 0.10 (CR=0.10). The key decision-making criteria to improve management performance in higher education institutions (HEIs) were identified.

Table 1 Pairwise Comparison Matrix

	CDA	ECA	IWBA
CDA	1	0.60	0.17
ECA	1.666667	1	0.43
IWBA	5.975608	2.351398	1
Total	8.642274	3.951398	1.592626

In Table 1, the Analytic Hierarchy Process (AHP) was used to assess the relative importance of three criteria in the employee selection process: Cultural Diversity AHP (CDA), Ethical Climate AHP (ECA), and Innovative Work Behaviour AHP (IWBA). The results of the pairwise comparison in Table 2 show that Innovative Work Behaviour AHP (IWBA) is more important than Cultural Diversity AHP (CDA) and Ethical Climate AHP (ECA), with comparison values of 5.9756 and 2.3514, respectively. On the other hand, Cultural Diversity AHP (CDA) is considered slightly more important than Ethical Climate AHP (ECA), with a value of 1.6667.

Table 2 Normalize Matrix

	CDA	ECA	IWBA	Total	Priority	Wt. Sum Vector	Consistency
CDA	0.11571	0.151845	0.105076	0.37263143	0.12421047	0.37359201	3.007733443
ECA	0.19285	0.253075	0.26703	0.71295553	0.23765184	0.71605586	3.013045661
IWBA	0.69143	0.59508	0.627894	1.91441302	0.63813767	1.93918472	3.038818739
	9			4	5	4	

Next, this comparison matrix was normalized in Table 2, and the results reveal the priority weights for each criterion. Based on the normalization, Innovative Work Behaviour AHP (IWBA) has the highest priority weight with a value of 0.6382, followed by Ethical Climate AHP (ECA) with a value of 0.2376, and Cultural Diversity AHP (CDA) with a value of 0.1242. This indicates that Innovative Work Behaviour AHP (IWBA) is the most significant criterion in the employee selection process in the organization being studied.

Table 3 Consistency Ratio

Items	Score
λ_{max}	3.019866
CI	0.006622
RI	0.58
CR	0.01

The Consistency Ratio (CR), shown in Table 4, was calculated to ensure the reliability of the pairwise comparisons. The maximum eigenvalue (λ_{max}) is 3.0199, and the Consistency Index (CI) is 0.0066. With a Random Index (RI) value of 0.58 (for a matrix of size three factors), the Consistency Ratio (CR) is 0.01, which is below the threshold of 0.1. This indicates that the pairwise comparisons are consistent and reliable.

Table 4 Ranking of Criteria (Factor)

Criteria (Factor)	Score	Ranking
Cultural Diversity AHP (CDA)	0.124210479	3
Ethical Climate AHP (ECA)	0.237651846	2
Innovative Work Behaviour AHP (IWBA)	0.638137675	1

Table 4 presents the final ranking of the criteria based on their priority scores. Innovative Work Behaviour AHP (IWBA) ranked highest with a score of 0.6381, followed by Ethical Climate AHP (ECA) with 0.2377, and Cultural Diversity AHP (CDA) with 0.1242. This ranking suggests that IWB is the most important factor in the employee selection process, emphasizing its significance compared to the other criteria

6.0 LIMITATION AND FUTURE RESEARCH

While this study offers a robust framework for academic staff selection using the Analytical Hierarchy Process (AHP), several limitations warrant consideration. First, the sample size was limited to 20 respondents from selected public universities in Northern Malaysia, which may constrain the generalizability of the findings to other regions or institutional contexts. Additionally, the study focused exclusively on three criteria: Innovative Work Behaviour (IWBA), Ethical Climate (ECA), and Cultural Diversity (CDA), potentially overlooking other relevant factors such as digital literacy, interdisciplinary collaboration, or sustainability orientation. The reliance on expert judgment in pairwise comparisons, while methodologically sound, may introduce subjective bias. Future research could expand the scope by incorporating a larger, more diverse respondent pool across regions and institutional types, including private and international universities. Moreover, integrating emerging criteria such as digital competency, environmental ethics, and AI-readiness could enrich the selection framework, aligning it more closely with the evolving demands of higher education in the digital age. Longitudinal studies could also be conducted to assess the long-term impact of these selection criteria on institutional performance, innovation outcomes, and staff retention.

7.0 DISCUSSION AND CONCLUSION

This study utilized the Analytical Hierarchy Process (AHP) to systematically assess and prioritize employee selection criteria in public universities, focusing on Cultural Diversity AHP (CDA), Ethical Climate AHP (ECA), and Innovative Work Behaviour AHP (IWBA). The findings underscore the pivotal role of Innovative Work Behaviour AHP (IWBA) as the most influential criterion, reflecting the growing emphasis on adaptability, creativity, and innovation in academia. This result aligns with the existing literature, which highlights that fostering innovation among staff is vital for maintaining institutional competitiveness and excellence, particularly in environments shaped by rapid technological and educational advancements.

Ethical Climate AHP (ECA) emerged as the second most significant criterion, emphasizing the importance of ethical and moral integrity in academic institutions. A strong ethical climate fosters collaboration, trust, and loyalty among employees, forming the foundation for sustainable organizational growth and success. Such principles are indispensable for ensuring a positive institutional culture and building long-term credibility in the higher education sector.

Cultural Diversity AHP (CDA), although ranked third, remains a critical consideration in employee selection. Diversity enriches the academic environment by introducing varied perspectives and experiences, fostering inclusivity, and driving innovation. It highlights the need for institutions to embrace multiculturalism to create dynamic learning and working environments that prepare students and faculty to thrive in a globalized world.

In conclusion, this study demonstrates that applying the AHP framework provides a structured, data-driven approach to improving employee selection processes in public universities. By prioritizing Innovative Work Behaviour AHP (IWBA), Ethical Climate AHP (ECA), and Cultural Diversity AHP (CDA), institutions can align their recruitment strategies with strategic objectives,

ensuring the selection of candidates who contribute to organizational performance, innovation, and long-term sustainability. The insights from this research provide actionable recommendations for higher education institutions to refine their hiring practices and enhance institutional effectiveness in an increasingly competitive academic landscape.

This study directly contributes to the conference theme by offering a data-driven, digitally adaptable framework for enhancing human capital strategies in Higher Education Institutions (HEIs). By leveraging the Analytical Hierarchy Process (AHP), the research introduces a systematic, replicable model that supports evidence-based decision-making in academic recruitment, an essential pillar for building sustainable and future-ready institutions. The prioritization of Innovative Work Behaviour (IWBA) as the most critical selection criterion reflects the growing need for academic staff who can drive digital transformation, foster interdisciplinary innovation, and adapt to rapidly evolving educational technologies. Furthermore, the inclusion of Ethical Climate (ECA) and Cultural Diversity (CDA) underscores the importance of cultivating inclusive, values-driven academic environments that are resilient and socially sustainable. As HEIs navigate the complexities of digital disruption, this study provides actionable insights that align recruitment practices with broader societal goals—namely, fostering innovation, equity, and sustainability in education. In doing so, it supports the creation of connected futures where academic institutions serve as catalysts for digital innovation and societal progress.

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