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Ai based management information system to develop superior human resources in the society 5.0

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ABSTRACT

The rapid advancement of digital technology in the era of Society 5.0 has encouraged organizations to transform their human resource management practices through the integration of Artificial Intelligence (AI) into Management Information Systems (MIS). This study examines the influence of AI-based Management Information Systems on the development of high-quality human resources, with AI utilization positioned as a mediating variable. A quantitative explanatory approach was employed, using a survey method involving employees and human resource practitioners in organizations that have implemented AI-supported systems. Data were collected through a structured questionnaire measured on a five-point Likert scale to analyze the relationships among the proposed variables. The findings indicate that AI-based Management Information Systems have a positive and significant effect on the development of competitive and adaptive human resources. Furthermore, the effective utilization of AI strengthens the relationship between talent management practices—such as recruitment, training and development, performance management, and employee engagement—and improvements in employee competence, creativity, adaptability, and organizational commitment. These results highlight the strategic importance of integrating AI into human resource systems to enhance organizational competitiveness and sustainability in the Society 5.0 era. This study contributes to the development of a technology-driven human resource management framework relevant to the Indonesian organizational context.).

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1. INTRODUCTION

The acceleration of digital transformation has fundamentally reshaped organizational governance, decision-making processes, and human resource strategies across sectors. Technological advancement is no longer confined to operational efficiency; instead, it has become a strategic determinant of competitiveness and long-term sustainability (Verhoef et al., 2021). Within the conceptual framework of Society 5.0, technological innovation is directed toward human-centered development, emphasizing the harmonization between intelligent digital systems and human capabilities (Narvaez Rojas et al., 2021). Consequently, organizations are required to align technological adoption with the enhancement of workforce quality, as superior human resources represent a critical source of sustainable competitive advantage.

In this evolving environment, Human Resource Management (HRM) has experienced a paradigm shift from an administrative support function toward a strategic partner in organizational transformation (Marler & Boudreau, 2021). Contemporary HRM increasingly relies on data-driven decision-making supported by digital infrastructure, particularly Management Information Systems (MIS). Integrated MIS platforms enable systematic workforce data management, competency mapping, performance tracking, and strategic human capital planning (Bresciani et al., 2021). However, the strategic value of MIS depends largely on its analytical sophistication. Systems limited to descriptive reporting provide administrative efficiency, whereas intelligent systems equipped with predictive and prescriptive analytics can generate strategic insights that influence long-term organizational outcomes(Tambe et al., 2021).

Artificial Intelligence (AI) represents a transformative advancement in this regard. AI enhances the analytical capabilities of information systems through machine learning, predictive modeling, natural language processing, and automated pattern recognition (Dwivedi et al., 2023). In HRM contexts, AI-driven applications include recruitment analytics, talent screening algorithms, performance forecasting, personalized training recommendations, and employee retention prediction (Minbaeva, 2021). Recent studies further highlight the emergence of AI-powered HR analytics platforms that integrate big data and algorithmic decision support to optimize workforce performance and agility (M. Damnjanović et al., 2025) (Huang & Rust, 2024b). These capabilities allow organizations to transition from intuition-based decisions toward evidence-based, forward-looking human capital strategies(Selvamohana K, 2025).

Despite these advancements, the integration of AI within Management Information Systems remains uneven, particularly in emerging economies. Many organizations continue to utilize digital systems primarily for administrative automation rather than strategic intelligence generation (Alshamrani et al., 2023). Structural limitations, digital skill gaps, technological readiness constraints, and cultural resistance to algorithmic decision-making hinder the effective deployment of AI-based HR systems (Kraus et al., 2022). Furthermore, while existing research has extensively examined technology adoption determinants and system performance outcomes, limited empirical attention has been given to the mechanism through which AI utilization mediates the relationship between MIS integration and the development of superior human resources, particularly in emerging economy contexts like Indonesia(Chowdhury et al., 2024).

The concept of superior human resources within the Society 5.0 paradigm encompasses multidimensional attributes, including professional competence, digital literacy, adaptability, creativity, and competitiveness (Atay et al., 2025). These attributes are particularly essential in dynamic and technology-driven environments characterized by rapid innovation cycles. Recent AI–HR analytics studies (Huang & Rust, 2024) emphasize performance optimization but rarely investigate how AI-based MIS structurally contributes to enhancing these multidimensional workforce qualities(Xu et al., 2025). This represents a significant theoretical and empirical gap that this study aims to address: how AI utilization, as a mediator within AI-MIS integration, can systematically enhance superior human resources in a developing country context.

Unlike previous research that examines AI adoption or MIS performance in isolation, this study develops a PLS-SEM-based structural model to empirically test AI utilization as a mediating mechanism linking AI-MIS integration to superior human resource development. By explicitly modeling this mediation, the research bridges the gap between technological sophistication and multidimensional workforce quality in line with Society 5.0 principles. The study contributes theoretically by integrating strategic HRM and information systems perspectives and empirically by providing evidence from Indonesia, an emerging economy context where digital transformation and workforce development are rapidly evolving. Practically, the findings offer actionable insights for organizations seeking to leverage AI-enabled MIS to enhance workforce competence, adaptability, creativity, and strategic agility, thereby generating sustainable competitive advantage.

2. RESEARCH METHOD

This study applies a quantitative approach with an explanatory research design to examine the causal relationships among AI-based Management Information Systems (MIS), AI utilization in human resource management, and the development of superior human resources within the context of Society 5.0. An explanatory design is appropriate for testing theoretically grounded causal relationships among latent variables (Hair Jr et al, 2021). The research was conducted in organizations that have implemented or are in the process of implementing AI-supported management information systems within their HR functions, consistent with prior studies emphasizing AI-enabled HR transformation (Kassa & Worku, 2025).

The population consists of employees, HR managers, and HR practitioners who are directly involved in the use of digital HR systems. A purposive sampling technique was employed to ensure respondents possessed relevant technological experience (Etikan, 2021). The selection criteria included: (1) respondents have experience using AI-supported HR systems, (2) are actively involved in HR-related processes such as recruitment, performance management, training, or employee engagement, and (3) have a minimum of one year of work experience in the organization. This approach aligns with prior empirical studies examining digital HR systems and AI adoption (Olan et al., 2022). Data were collected through a structured questionnaire distributed electronically to facilitate broader reach and efficiency in digital research environments (Muhammad Arfah, 2025).

Several procedures were implemented to ensure measurement consistency and data quality. First, the questionnaire was developed based on validated theoretical constructs from management information systems, technology adoption, and strategic human resource management literature. Second, all items used a standardized five-point Likert scale to maintain uniformity in responses and reduce measurement error. Third, the instrument underwent a pilot test with a subset of respondents to identify ambiguous items and adjust wording for clarity. Fourth, reliability and validity checks, including item–total correlation and confirmatory factor analysis (CFA), were conducted before the main data collection to confirm construct consistency across respondents. Finally, electronic distribution and standardized instructions minimized variation in administration, further ensuring consistent interpretation of items across the sample.

The research instrument was developed based on established theoretical constructs in management information systems, technology adoption theory, and strategic human resource management (Opatha, 2020). All variables were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), which is widely applied in organizational and behavioral research (Koo & Yang, 2025).

The independent variable, AI-based Management Information Systems, was measured through indicators reflecting process efficiency, data accuracy, system integration, and decision-support capability, consistent with digital transformation and MIS capability literature (Kraus et al., 2022). The mediating variable, AI utilization in HR management, was assessed through indicators of technology adoption, frequency of use, functional relevance, and perceived ease of use, drawing upon the Technology Acceptance Model (TAM) and AI adoption studies (Venkatesh et al., 2022). The dependent variable, superior human resources, was operationalized using indicators of competence, innovation and creativity, adaptability, and competitiveness, reflecting strategic HR capability development in the digital era (Budhwar et al., 2022).

Prior to hypothesis testing, the instrument underwent validity and reliability assessment. Construct validity was evaluated through item–total correlation and confirmatory factor analysis (CFA), while reliability was assessed using Cronbach's Alpha with a minimum threshold of 0.70, as recommended in structural modeling research. Descriptive statistics were employed to describe respondent characteristics and examine variable tendencies.

Hypothesis testing was conducted using Structural Equation Modeling (SEM), which enables simultaneous assessment of measurement and structural relationships among latent constructs. The analysis included evaluation of model fit indices, convergent validity, discriminant validity, and structural path coefficients. The significance of relationships was determined at a 5 percent level ($p <$

0.05). Mediation analysis was performed to examine whether AI utilization significantly mediates the relationship between AI-based MIS and the development of superior human resources, following contemporary mediation testing procedures in SEM literature (Nitzl et al., 2022). The analytical results were interpreted systematically to provide empirical evidence regarding the strategic role of AI integration in strengthening human resource quality in the era of Society 5.0.

3. RESULTS AND DISCUSSIONS

Result

This study examined the relationships among AI-based Management Information Systems (AI-MIS), AI utilization in human resource management (HRM), and the development of high-performing human resources. Descriptive analysis indicates that the implementation of AI-MIS within the sampled organizations is generally at a moderate to high level, characterized by improvements in operational efficiency through system integration, process automation, and data accuracy. AI functionalities, including data-driven recruitment screening, performance analytics, and training recommendations, are increasingly integrated into HR activities(Naoum et al., 2026).

Validity and reliability testing confirmed that all measurement indicators meet acceptable standards, indicating that the research instrument is both valid and reliable. Structural model analysis revealed that AI-MIS has a positive and statistically significant effect on the development of high-performing human resources. This finding suggests that organizations integrating AI into their management systems tend to achieve enhanced employee competence, adaptability, and productivity (Guo et al., 2025).

Furthermore, AI utilization in HRM was found to have a significant positive impact on high-performing human resources. Employees in organizations that actively leverage AI tools in recruitment, performance evaluation, and talent development demonstrate higher innovative capacity and greater responsiveness to digital transformation. Mediation analysis further indicated that AI utilization partially mediates the relationship between AI-MIS and high-performing human resources. This result underscores that the mere availability of AI-based systems is insufficient; strategic and effective utilization of AI in HR processes plays a crucial role in translating technological capabilities into human resource excellence(Feng & Ahn, 2024).

Data analysis was conducted using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with a two-stage evaluation consisting of measurement model assessment (outer model) and structural model assessment (inner model).

1. Measurement Model Evaluation

Convergent validity was assessed through outer loadings and Average Variance Extracted (AVE). All indicators demonstrated loadings above 0.70, indicating adequate indicator reliability. AVE values for each construct exceeded the minimum threshold of 0.50.

Composite Reliability (CR) and Cronbach's Alpha values were above 0.70, confirming internal consistency reliability. Discriminant validity was evaluated using the Fornell–Larcker criterion and HTMT ratio, and all values were within acceptable limits (< 0.90).

Table 1. Measurement model results

Variable	Cronbach's Alpha	Composite Reliability	AVE
AI-Based MIS (X)	0.89	0.92	0.66
AI Utilization (M)	0.87	0.91	0.63
Superior HR (Y)	0.90	0.93	0.68

These results confirm that all constructs are valid and reliable for structural testing.

2. Discriminant Validity

Discriminant validity was assessed using the Fornell–Larcker criterion. As presented in Table 2, the square root of AVE for each construct is greater than the correlations between constructs, confirming adequate discriminant validity.

Table 2. Fornell–larcker criterion

Variable	AI-Based MIS	AI Utilization	High-Performing HR
AI-Based MIS	0.81	0.59	0.62
AI Utilization	0.59	0.79	0.57
High-Performing HR	0.62	0.57	0.82

The Fornell–Larcker criterion confirms adequate discriminant validity. The square root of AVE for each construct is higher than its correlations with other constructs. This finding indicates that each construct captures a distinct conceptual domain. AI-Based MIS represents technological infrastructure quality, AI utilization reflects behavioral and operational engagement with AI tools, and high-performing HR captures outcome-level capability development. The statistical separation among these constructs reinforces the conceptual clarity of the proposed model.

3. Coefficient of Determination (R^2)

The coefficient of determination (R^2) measures the explanatory power of the model. The results are presented in Table 3.

Table 3. R^2 values

Endogenous Variable	R^2	Category
n	0.40	Moderate
High-Performing HR	0.58	Substantial

The R^2 value for AI utilization (0.40) indicates that AI-Based MIS explains 40% of its variance, which is considered moderate in behavioral and organizational research. This suggests that system quality plays a substantial role in driving AI usage behavior. More importantly, the R^2 value for high-performing HR reaches 0.58, indicating substantial explanatory power. In practical terms, more than half of the variance in HR performance outcomes can be explained by the combined effects of AI-Based MIS and AI utilization. Such a value reflects strong predictive capability and demonstrates that digital infrastructure and technology engagement are central determinants of organizational human capital development.

4. Structural Model Evaluation

Hypothesis testing was conducted using bootstrapping procedures. All hypothesized relationships are statistically significant, as t-statistics exceed 1.96 and p-values are below 0.05.

Table 4. Path coefficients

Relationship	β	t-value	p-value	Result
AI-Based MIS → Superior HR	0.41	4.87	<0.001	Supported
AI-Based MIS → AI Utilization	0.63	8.92	<0.001	Supported
AI Utilization → Superior HR	0.36	3.95	<0.001	Supported

Bootstrapping results confirm that all hypothesized relationships are statistically significant. AI-Based MIS has a direct positive effect on high-performing HR (β = 0.41), indicating that technological infrastructure itself contributes to improved HR capability. The strongest direct relationship is found between AI-Based MIS and AI utilization (β = 0.63), demonstrating that system quality is the dominant driver of AI adoption. AI utilization also significantly influences high-performing HR (β = 0.36), confirming that active engagement with AI tools enhances employee competence, productivity, and adaptability.

5. Mediation Analysis

The indirect effect of AI-Based MIS on Superior HR through AI Utilization was tested using bootstrapping.

Table 3. Indirect effect

Indirect Path	β	t-value	p-value	Mediation
AI-Based MIS → AI Utilization → Superior HR	0.23	3.41	<0.01	Partial

The mediation analysis reveals a significant indirect effect (β = 0.23), indicating partial mediation. This means that AI-Based MIS improves HR performance not only directly but also indirectly through increased AI utilization. The partial nature of the mediation suggests that technological infrastructure independently contributes to HR development while simultaneously strengthening performance outcomes through enhanced usage behavior.

Discussion

The findings demonstrate that AI-based Management Information Systems significantly contribute to the development of superior human resources. The direct path coefficient (β = 0.41) confirms that system integration, automation, and data-driven decision support enhance workforce competence, adaptability, and productivity. This suggests that digital infrastructure forms a foundational element in organizational competitiveness.

The strongest relationship is observed between AI-Based MIS and AI Utilization (β = 0.63). This indicates that technological capability substantially determines the extent to which AI is adopted within HR processes. Organizations equipped with integrated and analytical systems are more likely to embed AI in recruitment screening, performance analytics, competency mapping, and training development.

AI Utilization also exerts a significant effect on Superior Human Resources (β = 0.36). This confirms that the strategic application of AI in HR functions contributes to improved innovation capacity, digital literacy, and workforce responsiveness. In practical terms, AI adoption reduces administrative burdens and enables HR professionals to focus on strategic talent development.

The R^2 value of 0.58 indicates substantial explanatory power, meaning that digital system integration and AI utilization jointly account for more than half of the variance in superior HR performance. This finding reinforces the argument that digital transformation must align technological systems with human capital strategy.

The mediation analysis reveals partial mediation (β = 0.23), indicating that while AI-based MIS directly influences HR quality, its impact becomes stronger when AI is actively utilized in HR practices. This suggests that technology alone does not automatically generate competitive human resources; rather, managerial commitment, digital competence, and strategic alignment determine the effectiveness of AI implementation.

These results are consistent with and extend previous studies. For instance, (Guo, X., Li, Y., & Wang, 2025) reported that AI-enabled systems improve employee competence and productivity, while (Link Feng, L., & Ahn, 2024) highlighted the mediating role of AI utilization in translating technology into HR performance outcomes. Similarly, (Ali & Kallach, 2024)found that AI functionalities enhance recruitment and training effectiveness. Other studies also support the positive effect of AI adoption and MIS integration on human resource outcomes (Minbaeva, 2021; Huang & Rust, 2024b; Selvamohana K, 2025; Bresciani et al., 2021). Compared to prior studies, this research provides stronger empirical evidence by modeling the mediating mechanism explicitly using PLS-SEM and demonstrating substantial explanatory power (R^2 = 0.58), particularly in the context of emerging economies and Society 5.0. This confirms and extends prior findings by showing that the combination of system quality and active AI utilization produces synergistic effects on high-performing human resources, rather than relying on technology adoption alone.

From a strategic perspective, these findings support the view that AI functions as an enabler rather than a substitute for human capability. Organizations that integrate robust AI-based systems while fostering active utilization practices are better positioned to develop adaptive, innovative, and competitive human resources.

Practical implications of these results include: organizations should not only invest in advanced AI-enabled MIS but also actively encourage and train HR staff to utilize AI tools effectively; strategic HR planning should incorporate AI adoption as a core component for enhancing

recruitment, training, performance management, and retention; and managers should monitor AI usage to ensure alignment with human capital development goals, thus converting technological capabilities into tangible workforce outcomes.

Overall, the empirical evidence confirms that the synergy between AI-based Management Information Systems and AI utilization significantly enhances superior human resources, particularly in the evolving landscape of digital transformation and Society 5.0.

4. CONCLUSION

This study demonstrates that AI-based Management Information Systems (AI-MIS) and strategic AI utilization in human resource management significantly enhance the development of superior human resources. AI-MIS directly improves workforce competence, adaptability, and productivity through system integration, process automation, and data-driven decision support.

AI utilization further strengthens this effect, as employees in organizations that actively apply AI tools in recruitment, performance evaluation, and training exhibit higher innovation capacity and responsiveness to digital transformation. Mediation analysis confirms that AI utilization partially mediates the relationship between AI-MIS and superior human resources, indicating that technological infrastructure alone is insufficient without effective application in HR processes.

The combined explanatory power of AI-MIS and AI utilization ($R^2 = 0.58$) highlights the critical role of aligning digital systems with human capital strategy.

Theoretically, this research contributes to the integration of strategic human resource management and information systems theory by empirically demonstrating that AI utilization acts as a mediating mechanism between AI-MIS integration and the development of superior human resources. It extends prior literature on AI adoption by showing not only the direct effect of technological infrastructure but also the indirect effect through behavioral engagement, particularly in emerging economy contexts.

Practically and in terms of policy implications, the findings suggest that organizations should invest not only in advanced AI-based MIS but also in building the capability and culture for effective AI utilization among HR personnel. Policies should promote digital literacy, continuous AI training, and alignment of AI tools with strategic HR objectives to maximize human capital outcomes. Furthermore, policymakers in emerging economies may consider incentivizing AI integration in HRM as part of broader digital transformation strategies to enhance workforce competitiveness and national economic productivity.

Overall, the findings underscore that the synergy between AI infrastructure and strategic AI adoption is essential for cultivating adaptive, innovative, and high-performing human resources, providing a strong foundation for sustainable organizational competitiveness in the era of digital transformation. Based on the findings and limitations of this study, follow-up research should explore longitudinal effects of AI-MIS adoption on human resource outcomes, examine sector-specific variations in AI utilization effectiveness, and investigate the moderating roles of organizational culture, managerial support, and digital skills in enhancing AI-driven HR performance. Additionally, future studies could integrate qualitative methods to capture employee perceptions and behavioral responses to AI implementation, providing richer insights into the mechanisms that translate technological capability into superior human resource development.

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