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Human Cognitive Redundancy in Artificial Intelligence Dominated Work Systems and Its Consequences for Strategic Workforce Relevance

Heru Baskoro[1*], Charisma Kuriata Ginting S[2]
[1]Universitas Muhammadiyah Gresik, Gresik, Indonesia, herbas.gresik@umg.ac.id
[2]Universitas Quality, Medan, Indonesia.

[*]Corresponding Author: herbas.gresik@umg.ac.id[1]

Abstract: The development of artificial intelligence-based work systems (AI) has changed the role of human resources through increased automation, data-driven decision-making, and the substitution of certain cognitive activities. This study aims to analyze the phenomenon of human cognitive redundancy in AI-dominated work systems and its implications for the strategic relevance of the workforce. The study used a qualitative approach by collecting data through semi-structured interviews with 15 informants consisting of managers, HR practitioners, and workers using AI technology, then analyzed using thematic analysis techniques. The results show that AI does not completely replace humans, but shifts the strategic value of workers from routine technical abilities to creativity, adaptability, digital literacy, and complex decision-making capabilities. The research concludes that strengthening human capabilities is the main strategy in maintaining the relevance of the workforce in the era of AI-based digital transformation.

Keywords: Human Resource Management, Artificial Intelligence, Human Cognitive Redundancy, Digital Transformation, Workforce Relevance.

INTRODUCTION

The development of artificial intelligence (AI) has brought fundamental changes to organizational work systems through business process automation, data analysis, and strategic decision-making support. In the context of human resource management (HRM), AI-based transformation not only improves operational efficiency, but also changes the job characteristics and competencies required by the workforce. Jobs that previously relied on routine analytical skills, information processing, and pattern-based decision-making are starting to shift as some of the cognitive functions of humans can be performed by AI systems. This condition poses a new challenge in the form of human cognitive redundancy, which is a situation when certain cognitive abilities that were previously human advantages begin to lose strategic value because they can be replaced or strengthened by digital technology. This phenomenon is an important issue in HRM because organizations are not only required to adopt

technology, but also ensure the sustainability of the relevance of the workforce in an increasingly digitized work ecosystem (Suhara, 2025; Yazid, 2025). Previous studies also emphasize that AI adoption has shifted the role of employees from performing routine tasks toward higher-value activities involving creativity, judgment, and strategic problem-solving (Murire, 2024 ; Dăniloaia & Turturean, 2024).

Digital transformation in Indonesia shows that the application of AI-based technology is growing in various organizational sectors, ranging from the manufacturing industry, financial services, education, to public services. These changes cause organizations to face new needs in human resource management, especially related to the development of digital competencies, adaptability, and strengthening human capacity that are not easily replicated by machines. Research by Gea et al. (2025) shows that organizational digital transformation requires a paradigm shift in HR from an administrative approach to a strategic approach oriented to human capability development. In line with that, the development of AI also encourages companies to redesign jobs so that humans and technology can collaborate optimally, not just replace the functions of the workforce (Patandung et al., 2025). This transformation indicates that digital maturity is not only determined by technological readiness but also by organizational capability in preparing human resources through continuous learning and competency development (Herlissha et al. 2024; Ramadhan et al. 2025).

Although studies on AI in HRM are increasing, most previous research has focused on the benefits of technology on organizational efficiency, employee productivity, and automation of work processes. Studies on how the dominance of AI can create perceptions of diminished human cognitive value and its impact on the strategic relevance of the workforce are still relatively limited. Research by Azizah (2025) explains that digital competency readiness is an important factor in dealing with changes in the technology-based work environment, but has not in-depth discussed how workers maintain strategic positions when certain cognitive functions begin to be transferred to AI. Meanwhile, the research of Aziz et al. (2025) emphasizes the importance of complementary relationships between humans and AI, but further studies are still needed on the mechanisms of workforce adaptation in dealing with the risk of cognitive redundancy. Similar findings from Arfah et al. (2025) indicate that existing AI studies still require deeper exploration of how humans preserve their strategic roles when decision-making processes become increasingly algorithm-driven.

The research gap shows the need for a more in-depth approach to understand the experiences, perceptions, and adaptation strategies of individuals and organizations in dealing with changes in AI-based work systems. From a strategic HR perspective, the existence of AI is not only related to the implementation of technology, but also to how organizations rebuild human strategic value through unique competencies, such as creativity, critical thinking skills, emotional intelligence, and context-based decision-making. The Primary and Sustainable Study of Firdaus & Kuswinarno (2024) emphasizes that human resource development in the digital era must be directed at increasing adaptive capabilities so that the workforce is able to create added value that cannot be completely replaced by technology. Therefore, understanding human cognitive redundancy is important to expand the study of human resources in the context of future work transformation. This perspective is consistent with the Resource-Based View (RBV), which argues that sustainable competitive advantage depends on unique organizational resources that are valuable, rare, and difficult to imitate (Zahrotun et al. 2024; Putri & Guntarayana, n.d.).

Based on these problems, this study aims to analyze the phenomenon of human cognitive redundancy in the work system dominated by artificial intelligence and identify its consequences for the strategic relevance of the workforce. This research specifically explores how workers and organizations understand the changing role of humans due to the implementation of AI, how new competencies are built to maintain the strategic value of the

workforce, and how the relationship between humans and technology can be directed towards collaborative work patterns. A qualitative approach is used to gain an in-depth understanding of the experiences and perspectives of organizational actors in dealing with these changes. This approach is appropriate because qualitative inquiry enables researchers to explore complex organizational phenomena involving perceptions, adaptation processes, and changes in work meaning that cannot be fully explained through quantitative measurements alone (Huda et al., 2025; Juita et al., 2025).

This research makes a theoretical contribution by expanding the study of strategic human resources through the concept of human cognitive redundancy as a new perspective in understanding changes in the value of labor in the AI era. This research also enriches the discourse on the relationship between humans and technology by placing humans not as a substitute resource, but as a strategic actor that needs to be developed through new capabilities. Practically, this research provides implications for organizations in designing competency development strategies, reskilling and upskilling policies, and job designs that are able to integrate human and AI capabilities in a sustainable manner. Thus, the results of the research are expected to be the basis for organizations in maintaining the relevance of the workforce in the midst of accelerating digital transformation. These contributions are aligned with recent HRM studies emphasizing that future competitiveness will depend on the organization's ability to combine technological capability with human adaptability, creativity, and strategic judgment (Patmi et al., 2025).

METHODS

Types of Research

This study uses a qualitative approach with an exploratory study design to understand in depth the phenomenon of human cognitive redundancy in the work system dominated by artificial intelligence (AI) and its consequences for the strategic relevance of the workforce. The qualitative approach was chosen because this research focuses on exploring individual experiences, perceptions, and interpretations in dealing with changes in human roles due to the implementation of AI technology in the work environment. This approach allows researchers to gain a contextual understanding of how workers and organizations adapt to changes in competencies, job designs, and the demands of new capabilities in the digital age (Cetindamar Kozanoglu & Abedin, 2021).

The exploratory research design is used because the concept of human cognitive redundancy in the study of HRM is still relatively developed and requires an empirical understanding of how AI affects the strategic position of the workforce. The research does not aim to measure the relationship between variables statistically, but to identify patterns of experience and meaning that emerge from human interaction with AI-based work systems. This approach is relevant to the study of strategic human resources that places humans as dynamic resources that continue to undergo changes due to organizational technological developments (Nurimansjah, 2023).

Population and Sample

The population in this study is individuals who have direct experience in the use of AI-based technology in the work environment, especially professional groups involved in decision-making processes, human resource management, and work implementation that have changed due to digital automation. The population was chosen because they have an empirical understanding of changing competency demands and shifts in human cognitive function in the modern work system (Rado et al., 2025).

The sampling technique used non-probability sampling with the purposive sampling method. Informants are selected based on certain criteria, namely (1) having at least three years

of work experience, (2) using or interacting with AI technology in work activities, and (3) understanding changes in work processes due to the application of digital technology. The number of informants in this study was 15 people, consisting of 5 managers, 5 HR practitioners, and 5 AI technology users. The selection of the number of informants is based on the principle of information richness, which is when the data obtained is able to explain the main patterns of research phenomena in depth (Nurrisa & Hermina, 2025).

Research Instruments

The main instrument in this study is a semi-structured interview guideline developed based on the research focus on changing human roles in AI-based work systems. The interview instrument covers several key aspects, namely experience of using AI in work, perception of changes in the value of human cognitive abilities, competency adaptation strategies, and organizational efforts to maintain the relevance of the workforce. The use of semi-structured interviews allows researchers to obtain systematic data while providing space for informants to explain their experiences more broadly (Mashuri, 2022).

Before being used in the data collection process, the interview guidelines were carried out through content validity by two academics in the field of HRM and digital transformation to ensure the suitability of the questions with the research objectives. Because the research uses a qualitative approach, statistical reliability testing such as Cronbach's Alpha is not applied. As a substitute, the quality of the data is maintained through source triangulation, member checking, and documentation of the analysis process to ensure the credibility of research findings (Lemon & Hayes, 2020).

Data Collection Procedure

The research process is carried out through several systematic stages. The first stage begins with the identification of research phenomena, the preparation of study focuses, and the development of interview instruments based on literature on AI, digital transformation, and strategic human resources. The second stage is carried out through the process of selecting informants according to research criteria and the implementation of semi-structured interviews in person or online. Each interview lasts approximately 45–60 minutes and is recorded after obtaining approval from the informant.

The next stage is the process of transcription of interview results, re-examination of data suitability, and organizing information based on the research theme. The researcher also collected supporting data through organizational documentation, such as digital transformation policies, competency development programs, and documents related to the use of AI technology in the work environment. The procedure was carried out to obtain a comprehensive picture of the relationship between AI implementation, job change, and workforce strengthening strategies (Sara et al., 2025).

Data Analysis Techniques

Data analysis was carried out using thematic analysis which aims to identify the main patterns, categories, and themes of the interview data. The analysis process is carried out through six stages, namely understanding the data through repeated reading of transcripts, conducting the initial coding process, grouping the code into categories, building the research theme, reviewing the theme, and compiling the interpretation of the research results. This approach is used because it is appropriate to analyze the subjective experiences of informants regarding changes in human roles in a technology-based work environment (Winkelhaus et al., 2022).

The process of coding and managing data is carried out with the help of NVivo 14 software to improve the systematization of the analysis, facilitate the process of identifying

relationships between categories, and maintain the transparency of the data interpretation process. The validity of the research results was tested through triangulation of sources, discussions between researchers (peer debriefing), and reconfirmation to several informants to ensure the suitability of the interpretation with the experience conveyed. Through this process, the research is expected to produce credible findings on how organizations and the workforce respond to the phenomenon of human cognitive redundancy in the era of AI dominance (Adam & AP, 2025).

RESULTS AND DISCUSSION

Human Cognitive Redundancy as a Shift in Labor Strategic Value in AI-Based Work Systems

The results of the study show that the implementation of Artificial Intelligence (AI) in the organization's work system has resulted in fundamental changes to the strategic position of humans. Based on an analysis of interviews with 15 informants, it was found that AI caused some of the routine, predictive, and pattern-based human cognitive activities to decrease in strategic value because they were able to be carried out more quickly and accurately by digital systems. However, the findings of the study show that this condition does not result in the elimination of human roles, but rather creates a new phenomenon which in this study is conceptualized as human cognitive redundancy, which is a condition when certain cognitive abilities lose their competitive advantage due to automation, so humans need to reposition abilities that have higher strategic value.

The findings can be seen from the experience of informants who stated that the use of AI has reduced the need for administrative work and initial analysis, but increased the need for interpretation skills, creativity, and strategic decision-making. One of the operational managers explained that the biggest change after the use of AI does not lie in the loss of human jobs, but in the change in the type of activities carried out by workers.

> "*Before using AI, our job was to spend a lot of time reading reports, gathering information, and looking for patterns from the data. Now the process can be assisted by AI, so more work time is used to understand the actual conditions and make the right decisions*." (MGR-03, Operations Manager, January 12, 2026)

The quote suggests that AI is starting to take over repetitive cognitive activities, such as information processing and pattern identification, while humans are undergoing a functional shift towards activities that require contextual understanding and strategic considerations. Thus, human cognitive redundancy cannot be understood as a loss of human value as a whole, but as a change in the human position from the implementer of routine cognitive processes to managers, evaluators, and information-based decision-makers.

This phenomenon shows that changes due to AI are not only related to work efficiency, but also related to changes in the source of human value in the organization. In the perspective of the Resource-Based View (RBV), an organization's competitive advantage comes from resources that have the characteristics of valuable, rare, inimitable, and non-substitutable. The findings of this study show that routine human abilities no longer fully meet these characteristics because they can be replicated by AI, while abilities such as creativity, moral judgment, context understanding, and social intelligence remain strategic resources of organizations.

This is reinforced by the experience of AI user workers who state that technological changes have shifted competency standards that were previously considered superior.

> "*The ability to process previous data is one of the reasons why someone is considered to have more competence. But now almost anyone can use AI to help with the process. The*

difference can be seen in how one understands the results of the analysis and uses it to make decisions." (EMP-03, AI User Business Analyst, January 15, 2026)

This statement shows that the excellence of the workforce is no longer determined only by the ability to produce information, but by the ability to give meaning to the information. These findings expand on the study of Shenbhagavadivu et al. (2024) who explained that AI has transformed HRM practices through recruitment automation, employee analytics, and performance management. However, the study emphasizes more on the function of AI as an efficiency enhancer, while this study shows a more profound consequence, namely changes in the hierarchy of human competency values in organizations.

These findings also support the concept of automation–augmentation paradox developed by Imtikhani et al. (2025), that AI has two simultaneous effects, namely replacing certain activities while expanding human capabilities. This research expands this perspective by showing that the augmentation process can only occur when organizations are able to re-identify human competencies that remain of strategic value after some cognitive functions are transferred to AI.

Competency Transformation: From Technical Capability to Human Strategic Capability

The research findings show that the dominance of AI leads to a paradigm shift in the development of workforce competencies. The research informant explained that basic technical skills, such as data processing, information search, and administrative work, are no longer the main differentiators between workers because most of them have been done through AI technology. Instead, organizations are starting to pay more attention to critical thinking skills, creativity, communication, adaptation, and the ability to make complex decisions.

One of the HRM practitioners explained that technological changes cause organizations to change labor competency standards.

"*Currently, we are not only looking for employees who are able to use technology, because technology can be learned. The difficult thing is to find individuals who are able to provide new perspectives and make decisions when faced with problems that do not have a clear pattern*." (HR-02, HRM Practitioner, January 18, 2026)

These findings show a shift from the paradigm of skill replacement to capability transformation. From the perspective of Dynamic Capability Theory, organizations must have the ability to sense the changing environment (sensing), seizing, and perform internal transformation (transforming) to remain competitive.

In the context of this study, the ability of the organization is not only determined by the level of adoption of AI, but also the ability to build humans who are able to adapt to changes in the structure of work. One of the informants from the HR development field said:

"*The use of AI is growing faster than the readiness of some employees. The biggest challenge is not just providing technology, but ensuring that employees understand how it can be used to improve the quality of work*." (HR-04, HR Development Manager, January 20, 2026)

The quote shows that there is a gap between technological readiness and human readiness. This means that the success of AI transformation depends not only on technology investments, but also on the organization's ability to build a culture of learning and competency development on a sustainable basis.

Umboh (2025) research on the integration of AI and HRM shows that the development of AI in HR has moved towards strategic functions, not just administrative automation. However, this study expands the study by showing that the success of AI integration is highly dependent on the ability of organizations to reconstruct human competencies.

In addition, Khair et al. (2020) research found that AI can improve decision-making efficiency in HRM, but still presents challenges related to human aspects such as interpretation, ethics, and decision supervision. The findings of this study strengthen this argument by showing that the ability of humans to give meaning to information is a new source of value that cannot be completely replaced by AI.

Human–AI Collaboration as a New Model of Organizational Work Systems

The third finding shows that the relationship between humans and AI in organizations is evolving from a substitution paradigm to a collaboration paradigm. Most informants do not see AI as a substitute for labor, but as a support system that enhances the ability of humans to get work done.

A strategy manager explains:

"*AI is able to provide recommendations based on data, but business decisions cannot be based solely on numbers. There are factors of organizational culture, risk, and human conditions that must be considered*." (MGR-05, Strategy Manager, January 25, 2026)

The findings show that AI has limitations in understanding social aspects, organizational values, and decision consequences. Therefore, humans remain in a strategic position as actors who provide interpretation and final considerations.

These findings support the human-AI augmentation theory, which explains that future advantages do not come from humans or machines separately, but from a combination of the capabilities of both. French & Shim (2025) explain that the concept of intelligence augmentation places AI as a technology that strengthens human capabilities, not replaces all human functions.

However, this study found that the success of human-AI collaboration is influenced by organizational factors, especially digital culture readiness, leadership, and competency development strategies. Some informants stated that resistance to AI is more due to uncertainty about job changes than the technology itself.

"*At the beginning of the implementation of AI, some employees felt that this technology would reduce the need for labor. But once they were used, they began to understand that AI helped reduce administrative work so they could focus on work that required more analysis*." (EMP-01, AI Users, January 28, 2026)

The findings show that the main challenge for AI in HRM is not only a technological problem, but also a change management problem. Therefore, organizations need to build a work environment that supports continuous learning.

New Conceptual Model: Human Cognitive Redundancy as a Stage of Strategic HRM Evolution

Based on the overall findings, this study offers a conceptual model that the implementation of AI in organizations results in three stages of change:

Table 1. Conceptual Model of Human Cognitive Redundancy in AI-Based Work Systems

Stages	Conditions	Impact of HRM
Cognitive Automation	AI replaces routine cognitive work	Decrease in repetitive technical competency scores
Cognitive Redistribution	Tasks move between humans and AI	Redesign of new jobs and competencies
Strategic Human Augmentation	Humans use AI to improve strategic capabilities	The rise of an adaptive and innovative workforce

The model is the main novelty of the research because previous research has mostly discussed AI as a tool for automation or productivity improvement, while this study explains the mechanism of changes in human values after cognitive automation occurs.

One digital transformation manager explained:

"*When AI was first implemented, the organization's main goal was to speed up work. But as we got underway, we realized that the biggest change wasn't in the technology, but in the way humans worked with it*." (MGR-04, Digital Transformation Manager, January 30, 2026)

Thus, human cognitive redundancy does not mean that humans are irrelevant, but it shows that organizations need to redefine the source of human value. The workforce of the future is no longer judged on the ability to do the work that machines can calculate, but on the ability to create meaning, innovation, and strategic decisions.

CONCLUSION

This study shows that the dominance of Artificial Intelligence (AI)-based work systems has created fundamental changes in the human resource management (HRM) paradigm, especially through the emergence of the phenomenon of human cognitive redundancy. This phenomenon does not indicate that humans have lost relevance in the organization, but it illustrates a shift in the strategic value of the workforce due to some routine cognitive functions starting to be performed by AI technology. The results of the study found that technical skills that are repetitive, analytical, and pattern-based have decreased in competitive value, while human abilities related to creativity, adaptability, emotional intelligence, critical thinking, and context-based decision-making are becoming increasingly important. Thus, the main contribution of this research is to expand the study of strategic human resources through the understanding that digital transformation not only changes the way work is done, but also changes the definition of human competencies that are valuable to organizations.

Practically, this study emphasizes that organizations need to develop an HRM strategy that is oriented towards human–AI collaboration through reskilling, upskilling, and redesign programs that are able to optimize technological excellence while maintaining unique human capabilities. Effective AI implementation is not enough to focus only on technological readiness, but must be followed by strengthening digital culture, adaptive leadership, and developing the strategic competencies of the workforce. This research provides a new perspective that the future of work is not determined by the ability of AI to replace humans, but by the ability of organizations to create synergies between artificial intelligence and human intelligence to generate sustainable strategic value.

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