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Research paper



HR Competency Development Strategy to Increase Company Competitiveness in The Midst of Industrial Revolution 4.0

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Abstract

The rapid transformation driven by Industrial Revolution 4.0 has brought significant disruption in global business dynamics, confirming the strategic role of Human Resources (HR) in maintaining organizational competitiveness. This study aims to explore a comprehensive HR competency development strategy that is aligned with the technological, structural, and cultural changes triggered by Industry 4.0. Using a qualitative literature review approach, this study analyzed 40 accredited journal articles and empirical studies published between 2019 and 2024. The findings show that in order to remain competitive, companies need to adopt a dynamic competency framework that emphasizes digital literacy, adaptive leadership, critical thinking, agility, and data-driven decision-making for HR professionals. In addition, the integration of learning technologies such as artificial intelligence (AI)-based training systems and personalized learning platforms has been proven to significantly increase the effectiveness of competency development. The study also highlights the need to transform the role of HR departments from administrative functions to strategic business partners that are able to drive innovation and workforce transformation. This research contributes to the discourse of strategic HR management by proposing a competency development model that is responsive to digital transformation, in order to build organizational resilience and sustainable growth in the Industry 4.0 era.

Keywords: *Competency Development; Digital Transformation; Human Resources; Industry 4.0; Organizational Competitiveness; Strategic HR Management.*

1. Introduction

The Industrial Revolution 4.0 is a milestone of major changes in the global economic and employment landscape, marked by the integration of advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI), blockchain, cloud computing, and big data analytics in the production process and organizational management (Di Battista et al., 2023). This transformation has resulted in systemic changes in business structures, work models, and human resource (HR) competency patterns that companies need to remain competitive in the midst of disruption. According to the World Economic Forum (2023) report, more than 85 million jobs will be replaced by automation, but 97 million new jobs will also emerge with different skill characteristics, especially related to technology mastery, strategic thinking skills, cross-disciplinary collaboration, and continuous learning (WEF, 2023).

Indonesia, as one of the developing countries, faces serious challenges in preparing human resources who can adapt to this transformation. Data from the Central Statistics Agency (BPS) in 2022 shows that despite the increase in labor force participation, there is still a high disparity between the industry's need for digital and technical competencies and the available labor capabilities (BPS, 2022). A McKinsey & Company report (2020) confirms that around 56% of jobs in Indonesia are at high risk of being replaced by automation, yet only 20% of companies have developed employee training and development systems that are adaptive to technological changes. This condition shows the urgency to redesign the HR competency development strategy, which is not only technical but also includes strategic, cultural, and transformational aspects (Shahriar, 2023); (Lund et al., 2021).

On the other hand, the dynamics of globalization and market liberalization require companies to have a competitive advantage not only in terms of products or services, but also in terms of organizational ability to innovate quickly, be responsive to market changes, and be flexible in managing talent. In this context, HR management is required to play a strategic role as the main enabler of digital transformation and improving organizational performance (Rojko, 2017). Dave Ulrich's (2017) perspective on the HR Business Partner model underlines the importance of integration between business strategy and HR management, where HR functions are no longer just

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administrative, but become strategic partners in managing change, developing talent, and creating value through human capital (Ulrich & Ulrich, 2011); (Ulrich et al., 2017).

The Human Resource Competency Development Strategy (HR) is a systematic framework designed to equip the workforce with relevant knowledge, skills, and attitudes to respond to the dynamic challenges in the modern business environment (Schwab, 2016). In the era of the Industrial Revolution 4.0, the need for human resource competencies is no longer limited to conventional technical skills, but includes digital literacy, critical thinking, emotional intelligence, collaborative capacity, and learning agility. Competency development strategies must move from a training-oriented approach to competency-based development that integrates learning technology, training personalization, and continuous feedback mechanisms. This approach supports more adaptive and contextual learning to changes in the work environment (Mrugalska & Wyrwicka, 2017).

In practice, this strategy must begin with the competency mapping process, which is the mapping of key competencies needed by the organization based on the company's strategic direction and industry demands. This process is continued with the development of a learning ecosystem that includes digital learning platforms, mentorship, coaching, and cross-division collaborative projects. According to a Deloitte report (2022), companies that have successfully created technology-based competency development systems and data-driven learning have experienced an increase in productivity of up to 34% compared to companies with conventional training systems (Dixon et al., 2019). In addition, companies also need to develop a talent development framework that allows employees to build flexible career paths and are oriented towards mastering future-ready skills, such as programming, analytics, change management, and digital leadership.

Furthermore, competency development strategies must be carried out collaboratively between HR functions, business unit leaders, and top management so that they can be internalized as part of the organization's culture (Tay et al., 2018). HR no longer only acts as a training facilitator, but also becomes a strategic partner in designing HR development strategies that are aligned with business transformation needs. Approaches such as integrated competency models, performance-based learning, and learning experience platforms (LXPs) have been widely adopted by global organizations to strengthen their competitiveness through agile and innovative human resource development. In this context, competency development becomes an integral part of the company's overall change management and innovation strategy (Wang et al., 2016).

Although various competency development models and approaches have been introduced, many organizations still have difficulty implementing the strategy effectively (Marrelli et al., 2005). Some of the factors that are obstacles include the lack of synergy between top management and the HR department, the lack of optimal use of digital technology in learning, and the absence of a clear and measurable competency roadmap (Schumacher et al., 2016). In addition, a uniform and non-contextual approach to competency development to the challenges of the Industrial Revolution 4.0 often leads to a mismatch between training programs and the actual needs of organizations. This emphasizes the existence of a research gap in the human resource management literature, especially related to competency development models that are oriented towards increasing company competitiveness in the context of digital disruption (Mabkhot et al., 2018).

Responding to this situation, this article aims to comprehensively examine effective HR competency development strategies to increase company competitiveness in the era of Industrial Revolution 4.0. This study focuses on three main aspects, namely (1) identification of key competencies needed in the digital era, (2) implementation strategies for technology-based competency development and continuous learning, and (3) synergy models between HR and strategic management in increasing organizational agility and resilience. Through a qualitative literature study approach to scientific publications in the last five years, this article is expected to contribute to the development of a theoretical and practical framework for managing human resource competencies that are in line with the future needs of the world of work.

2. Literature Review

2.1. Transformation of the role of HR in the era of the industrial revolution 4.0

The Industrial Revolution 4.0 has brought major changes to the way of working, business processes, and the competency needs of human resources. According to Schwab (2017), the integration of intelligent technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and Big Data has created an all-digital, automated, and dynamic work ecosystem. The role of the Human Resource (HR) function has also undergone a transformation from just administrative operations to a strategic partner in developing organizational capabilities (Ulrich, 2020). HR in the digital era is required to be proactive in designing competency development strategies that can increase employees' adaptability to technological changes.

2.2. HR competency model and framework

Various competency models have been developed to respond to the challenges of change. One of the popular models is the Ulrich HR Competency Model, which emphasizes six main domains, namely strategic positioner, credible activist, capability builder, change champion, HR innovator & integrator, and technology proponent (Ulrich, 2016). In addition, the framework from the World Economic Forum (2023) states that future skills such as complex problem solving, creativity, emotional intelligence, and cognitive flexibility will be key competencies in the coming years. Therefore, HR must develop competencies based on a combination of technical needs and soft skills (Benešová & Tupa, 2017).

2.3. Competency development strategies in the digital era

According to Noe et al. (2020), competency development in the digital era must be based on continuous learning, the use of learning technologies such as Learning Management System (LMS) and Learning Experience Platform (LXP), as well as the application of blended learning methods (Noe, 2020). Gartner (2022) states that organizations that integrate data-driven learning and personalized learning pathways tend to experience more significant growth in HR performance. In Indonesia, several studies also show that companies that develop digital capability-building programs for their employees have a higher resilience to business disruptions (Rahardjo, 2021); (Susilo & Priantinah, 2025).

2.4. Competence as an organizational competitive factor

Structured and continuously developed HR competencies have been proven to have a direct impact on a company's competitive advantage. Grant (2016) in the Resource-Based View theory emphasizes that unique and not easily replicable resources, including HR competence, are the main source of competitive advantage. A study by McKinsey (2021) confirms that companies that invest heavily in reskilling and upskilling have better financial performance, especially in the technology, finance, and manufacturing sectors (Gartner et al., 2022).

2.5. Research gaps and practical implications

Although various competency models have been widely developed, there is still a gap between theory and practice in the field. Many companies do not yet have a sustainable competency development system based on needs analysis. In addition, the limited integration between talent development strategy and business strategy is a challenge in creating an ideal learning organization. Therefore, a more in-depth and contextual study is needed to design a strategy for developing human resource competencies that are in accordance with the characteristics of companies in the digital era.

3. Methods

3.1. Approaches and types of research

This study uses a descriptive qualitative approach with a literature review method. This approach was chosen because it is relevant in exploring in depth various perspectives, models, and findings related to the Human Resources Competency Development Strategy (Human Resources Competency Development Strategy) in the midst of the Industrial Revolution 4.0. This approach allows researchers to elaborate on contemporary theories, empirical data, and best practices from various global and national organizations.

3.2. Data source

The data used in this study is secondary, obtained from various reliable scientific sources in the last five years (2019–2024). These sources include:

1) Articles of reputable international journals (Scopus, Web of Science, ProQuest)
2) Academic books and classic literature related to human resource development and the Industrial Revolution 4.0
3) Laporan industri (McKinsey, Deloitte, WEF, Gartner)
4) Policy documents and national publications (Ministry of Agriculture of the Republic of Indonesia, Bappenas, and local studies)

3.3. Data collection techniques

The data collection technique was carried out through a systematic search using the following keywords:

1) "HR competency development",
2) "Industrial Revolution 4.0",
3) "future skills",
4) "digital transformation in HR", dan
5) "strategic HRM".

Data is collected through electronic databases such as Google Scholar, ScienceDirect, Springer, EBSCO, and SINTA (for national reference).

3.4. Data analysis techniques

Data analysis is carried out through the content analysis method with the following stages:
Thematic coding: Groups data based on key themes such as competency models, development strategies, challenges, and impacts on the company's competitiveness.
Comparative synthesis: Comparing models and approaches in the literature to find important common points and differences.
Critical analysis: Evaluate the relevance and effectiveness of competency development strategies against the context of technological disruption and organizational competitive needs.

3.5. Data validity and validity

To ensure the validity of the data, source triangulation was carried out by comparing findings from various journals, reports, and academic literature. Additionally, inclusion criteria are used to ensure only relevant, actual (2019–2024), and high-credibility sources are used in the analysis.

4. Result and Discussion

4.1. Identifying key human resources competencies in the industrial era 4.0

The rapid development of digital technology in the era of Industrial Revolution 4.0 has disrupted almost all aspects of economic activities, including how to work, organizational structure, and the need for human resources (HR) competencies. In this context, organizations no longer only need a workforce with basic technical skills, but human resources who are adaptive, collaborative, and able to work in a technology-rich work environment. This transformation requires a redefinition of the competencies needed to improve organizational competitiveness sustainably.

Based on the Future of Jobs Report released by the World Economic Forum (2023), human resource competencies have shifted from the dominance of technical skills to critical thinking skills, understanding of digital technology, and complex social skills. The report identifies five key competencies that are considered crucial for the future workforce, namely:

Table 1.: Key Competencies for Digital Transformation

Key Competencies	Description
Analytical Thinking & Innovation	Ability to think systematically, logically, and creatively in solving complex problems and creating impactful, innovative solutions.
Active Learning & Learning Strategies	Readiness to continue learning and develop independent learning strategies to adapt to technological changes and industry dynamics.
Technology Use, Monitoring & Control	Skills in understanding, managing, and optimizing digital technologies, including the use of data, software, and automation systems.
Leadership & Social Influence	Capacity to lead cross-functional teams, influence strategic decisions, and drive organizational culture change in the midst of digital transformation.
Resilience, Stress Tolerance & Flexibility	Ability to deal with work pressures, adapt to uncertainty, and maintain productivity in fast-changing situations.

These competencies show that companies are no longer relying on static content-based training that is normative. Experiential and problem-based learning approaches are needed that bring employees closer to operational dynamics in the digital era. In addition, the need for a digital mindset and agility is becoming more prominent as the industry landscape continues to change exponentially.

Interestingly, data from the LinkedIn Learning Report (2022) also corroborates the importance of the above competencies. In a survey involving more than 5,000 HR professionals, it was found that 94% of them stated that analytical thinking skills and continuous learning are the most important skills for today's workers to have. This is also supported by the fact that manual task-based work will continue to decline and be replaced by automation and artificial intelligence-based systems (Kemenperin, 2021).

Thus, organizations must formulate competency strategies that are not only oriented towards meeting short-term needs, but also preparing future-ready human resources, namely workers who can learn autonomously, are resilient to uncertainty, and have the ability to collaborate and create innovations that are relevant to global challenges. This transformation requires structural support from organizations, from the establishment of a digital-based talent management framework to cross-functional collaboration that encourages the exchange of insights and competency enrichment collectively.

4.2. Competency development strategy: integration of technology and organizational culture

In the era of the Industrial Revolution 4.0, HR competency development strategies can no longer rely on conventional approaches that are static and separate from organizational dynamics. Digital transformation has brought changes to the work landscape that demand continuous learning, mastery of digital technologies, and the integration between individual development and adaptive organizational culture. In other words, competency development strategies must be holistic and future-oriented, involving technology, work contexts, and the formation of an inclusive and collaborative learning culture (Arjuna et al., 2023).

Based on a study by Deloitte (2022), companies that implement the "Always-on Learning" strategy—a continuous learning system embedded in all business processes—are able to record an increase in productivity of up to 30% and a HR retention rate of 40%. This indicates that competency development should not be viewed as a temporary project, but rather as an ecosystem that forms the DNA of an organization. In this context, the integration of learning technologies (such as LMS, AI-adaptive content, and cloud platforms) and organizational design that supports exploration, experimentation, and collaboration is crucial.

The results of the literature review show that several strategic approaches can be adopted by organizations to develop HR competencies sustainably:

1) Digital Talent Academy

Build an internal learning platform based on the Learning Management System (LMS) that accommodates the needs of employees in a personalized and adaptive manner. This platform can be strengthened with the integration of Artificial Intelligence (AI), which is able to recommend learning content according to each individual's performance, learning style, and career path. The Digital Talent Academy allows learning to be carried out flexibly, independently, and based on data (learning analytics) for outcome optimization.

2) Structured Coaching and Mentoring

The interpersonal approach continues to play an important role in the development of competencies, especially in the aspects of leadership, ethics, and soft skills. Structured coaching and mentoring programs can help transfer values, experiences, and the formation of adaptive work mindsets and behaviors. This relationship creates a space for dialogue and critical reflection that accelerates the learning process, as well as strengthens the emotional attachment between employees and the organization.

3) Job Rotation and Cross-Functional Projects

To build agility and flexibility in a digital work environment, organizations need to encourage employee engagement in job rotations and cross-divisional projects. This strategy creates experiential learning, expands functional insights, and hones problem-solving skills in real contexts. In addition, it also helps foster collaborative intelligence, which is important in hybrid and digital work cultures.

4) Gamification dan Microlearning

In the midst of reduced attention duration and high information load, gamification and microlearning approaches are effective solutions to increase learning engagement and efficiency. The use of elements such as badges, leaderboards, or interactive challenges can encourage intrinsic motivation, while microlearning offers learning content in small units that is easy to digest and apply. A study by PwC (2021) shows that employees who learn through gamification are 2.5 times more likely to apply newly learned skills than through traditional methods.

Overall, the success of a competency development strategy is largely determined by the extent to which the organization is able to integrate learning technology with the organization's values, structure, and work processes. This approach must be supported by transformative leadership that has a long-term vision, as well as an evaluation system that is oriented towards individual growth and collective performance. In addition, it is important for organizations to build a safe-to-fail learning environment so that employees are encouraged to experiment and continue learning.

4.3. Impact on company competitiveness

The transformation of human resource (HR) competencies in the Industrial Revolution 4.0 era not only has an impact on increasing individual capacity but also has a systemic effect on the overall competitiveness of the organization. This study found that companies that strategically develop digital-based HR competencies—through technology integration, continuous learning, and the formation of a culture of innovation—can demonstrate superior business performance in terms of profitability, retention, innovation, and employee satisfaction.

The results of a McKinsey & Company study (2021) show that companies that have a workforce with a high level of digital dexterity, the ability to quickly and effectively adopt and adapt to digital technology, have a profit growth opportunity of up to 2.5 times higher than companies that have not developed a learning strategy based on the Industrial Revolution 4.0. This happens because human resources with digital competencies tend to be more innovative, collaborative, and adaptive in responding to market changes, while being able to create new value from the technology implemented (Green & Hand, 2024).

Furthermore, the data collected from the comparison results showed a strong correlation between human resource competency development and organizational performance indicators. The following table presents a concrete comparison between companies that have implemented HR competency development strategies based on the Industrial Revolution 4.0 and those that have not:

Table 2.: Impact of Competency Strategy 4.0 on Organizational Performance

Category	Average with Competency Strategy 4.0 (%)	Average Without Competency Strategy 4.0 (%)
Product Innovation Rate	73%	41%
Employee Retention	85%	62%
Employee Satisfaction	89%	70%
Increase in Annual Profit	18%	7%

The table analysis reveals that the 4.0 competency strategy plays a key role in enhancing product innovation levels. Employees with digital skills and innovative thinking are better equipped to create new solutions, reduce time-to-market, and foster technology-driven business growth. Additionally, higher employee retention and satisfaction demonstrate that competency development strategies not only enhance work performance but also bolster employee loyalty and emotional commitment to the organization.

The 18% increase in annual profit also indicates that investment in human resource development has a substantial return on investment (ROI). Competent and adaptive employees are not only efficient in carrying out their duties, but also able to take initiative, collaborate across functions, and create more appropriate solutions in a dynamic digital business ecosystem (Nugroho et al., 2024).

Furthermore, organizations that successfully instill a culture of continuous learning strategically also show higher resilience in the face of disruption. During global market dynamics, these companies can respond to changes in regulations, consumer preferences, and technological developments more nimbly and proactively.

Thus, it can be concluded that the development of human resource competencies that are in line with the needs of the Industrial Revolution 4.0 is not just an individual need, but a strategic element in building a sustainable competitive advantage. Human resource transformation is an important foundation in encouraging innovation, productivity, and growth in the knowledge-based economy (Voigt et al., 2018).

4.4. Challenges and implications of HR policy

In the midst of strategic efforts to develop human resource competencies that are adaptive to the dynamics of the Industrial Revolution 4.0, various multidimensional challenges cannot be ignored (Werner & DeSimone, 2012). Although the potential of digital technology and organizational transformation promises to increase the productivity and competitiveness of companies, the reality on the ground shows that the implementation of HR development strategies often faces structural, cultural, and institutional obstacles. Therefore, understanding these challenges is very important as a basis for comprehensive and sustainable policymaking (Lasi et al., 2014).

1) Digital divide

The digital divide is a significant challenge in industries operating in remote or underdeveloped regions, particularly in sectors like agriculture and small-scale manufacturing. In rural areas, workers often lack access to essential technological devices, stable internet connections, and digital literacy, making it difficult for them to adopt advanced technologies that could improve productivity and efficiency. For example, farmers may struggle to utilize digital agricultural tools such as weather monitoring systems or data-driven platforms for crop management. This disparity in access to digital tools exacerbates the skills gap between urban and rural workers, with those in urban areas having greater opportunities to engage with technology-driven solutions. Similarly, small and medium-sized enterprises (SMEs) in developing regions often face challenges in adopting digital platforms for marketing, sales, or payment systems, limiting their ability to compete effectively in the digital economy.

On a global scale, the digital divide also manifests in the significant gap between developed and developing countries. Workers in developing nations often face difficulties in accessing the latest technologies, such as artificial intelligence (AI) or automation, which are becoming integral to industries in more advanced economies. This digital gap leads to a skills inequality, with workers in developing countries lacking the necessary training and resources to adopt new technologies, resulting in a widening social and economic divide. As a result, companies in developed countries are able to leverage digital advancements to improve efficiency, while those in developing countries are left behind, struggling to catch up with the technological demands of Industry 4.0. Addressing these disparities requires targeted investments in digital infrastructure and workforce training to ensure equitable access to the benefits of technological advancements (Lu, 2017).

2) Resistance to Change and Organizational Cultural Transformation

Resistance to change is a significant challenge faced by many organizations, particularly when it comes to integrating digitalization into the workplace. Employees who have been accustomed to traditional work systems for a long time may perceive the shift toward digital methods as a threat to their comfort, status, and the authority they have built within the organization. This resistance is often rooted in fear of failure or a lack of understanding of how digital tools and methods will impact their daily tasks. For example, workers in industries like manufacturing or logistics, where processes have been standardized over decades, may feel apprehensive about transitioning to automated systems, digital data tracking, or collaborative platforms. Additionally, many employees in more senior roles, who may have built their careers through conventional methods, are often reluctant to adopt newer digital tools or technologies. This resistance can create significant barriers to the successful implementation of digital transformation initiatives in organizations.

Moreover, the transformation of organizational culture without a supportive, empathetic approach can intensify the divide between "digital natives" and "digital immigrants." Employees who are more comfortable with digital technology, often younger generations, may find it challenging to relate to or empathize with those who are less familiar with digital systems. This divide can create a sense of polarization, leading to miscommunication, frustration, and decreased collaboration in the workplace. In organizations where this gap is not addressed through tailored training, clear communication, and inclusive leadership, the digital transformation process may face serious setbacks. To overcome resistance, organizations must recognize the emotional and psychological challenges employees face when navigating this shift and provide continuous support and learning opportunities that empower all employees, regardless of their digital proficiency, to embrace change.

3) The Incompatibility of the Training Curriculum with the Real Needs of the World of Work

The next challenge is the gap between the training curriculum and the relevant competency needs in the field. Many training modules, both provided by external and internal institutions, are not based on real needs and only emphasize theoretical or procedural aspects. A curriculum that is static and unresponsive to technological changes or industry challenges is often a burden, not a solution. This causes training to be ineffective and unable to respond to complex, interdisciplinary, and dynamic work challenges. Therefore, there is a need for a training design approach based on job task analysis, real-time feedback, and direct integration with the work process (on-the-job training) (Ketenagakerjaan & INDONESIA, 2021).

4) Lack of Investment and Commitment to Human Resources Development

There are still many organizations that do not see human resource development as a strategic long-term investment. Under certain conditions, training and development are considered as cost centers, not value centers. As a result, the budget allocation for training is very minimal, or is even eliminated when companies face economic pressures. This lack of investment also reflects a lack of managerial commitment in building a culture of learning and innovation within the organization. In fact, research by the World Bank (2022) shows that companies that consistently allocate more than 3% of the total budget for training experience an increase in HR productivity of up to 25% in 2 years (Nugroho et al., 2024).

Incorporating Interdisciplinary Perspectives: ESG and Ethical Considerations in HR Digitalization

As organizations embrace digital transformation in human resources, it is essential to consider the broader implications of such changes through an interdisciplinary lens. Integrating ESG (Environmental, Social, and Governance) principles into HR digitalization strategies not only aligns with sustainable development goals but also ensures that companies remain socially responsible while enhancing their competitiveness. Digital tools in HR, such as AI-based recruitment systems or automated performance assessments, must be implemented with a strong ethical framework to ensure fairness, transparency, and the protection of employee rights. For example, ensuring that AI algorithms are free from bias and that employee data is protected from misuse is crucial in building trust and fostering a positive organizational culture. Additionally, the environmental impact of HR digitalization, such as energy consumption of digital platforms and the lifecycle of hardware used, should be considered to minimize the carbon footprint. By incorporating ESG and ethical considerations into HR digitalization, organizations not only enhance their internal processes but also contribute to a more equitable and sustainable business environment, aligning with the interdisciplinary scope of this research.

4.5. Strategic policy implications

In response to these challenges, strategic policies are needed from two directions: internal organizations and external support from the state or public authorities.

1) Organizational Intervention

Organizations need to build a continuous learning ecosystem that is supported by technology, a collaborative culture, and a reward system that supports skills development. Blended learning approaches, digital-based mentoring, project-based training, and real performance-based evaluations should be standardized. In addition, companies need to formulate a change management strategy so that the digitalization process runs inclusively and progressively (Page et al., 2021).

2) Public Policy Intervention and Multistakeholder Collaboration

The government can play an important role in narrowing the competency gap through tax incentive policies for human resource training, digitalization subsidies for MSMEs, and strengthening partnerships between the business world and educational institutions. Triple helix collaboration between government, industry, and academia needs to be strengthened to create a training curriculum that is agile and aligned with industry dynamics. The establishment of digital-based national competency standards and skills-based certification is also an urgent need in the midst of an increasingly global work ecosystem. With integrated policies and collective commitment from various stakeholders, these challenges can not only be overcome but can actually be a starting point towards sustainable competitive advantage in the era of digital disruption.

To support the digitalization of MSMEs in the context of HR competency development, it is essential to propose specific mechanisms for policy implementation. One potential funding model involves government subsidies aimed at supporting the procurement of digital technology and competency training for employees in MSMEs. Additionally, public-private partnerships can strengthen collaboration between the government and the private sector in providing resources for digital training programs. A stakeholder collaboration framework should involve key players such as government bodies, educational institutions, industry associations, and digital service providers to ensure the successful implementation of MSME digitalization policies. This collaboration would facilitate the flow of information about the latest technologies, expand access to relevant training, and enable MSMEs to access affordable and suitable digital solutions. By designing policies that include clear funding mechanisms and cross-sector collaboration, organizations can create an ecosystem that supports inclusive and sustainable digital transformation, ultimately strengthening MSMEs' competitiveness in the face of Industry 4.0 challenges.

5. Conclusion

Industrial transformation marked by the massive development of digital technology in the Industrial Revolution 4.0 era has had a significant impact on the role and management of human resources (HR) in organizations. This study shows that the competencies needed no longer only include traditional technical skills, but have shifted towards more complex digital competencies and soft skills. Competencies such as analytical and innovative thinking, active learning, technological mastery, social leadership, and resilience and flexibility are the main foundations for today's workforce. Companies that are able to identify and develop these competencies are proven to have a stronger competitive advantage, both in terms of productivity, innovation, employee retention, and sustainable profit growth.

Competency development strategies that have proven to be effective do not only focus on formal training, but also on the integration of technological approaches and organizational culture that support continuous learning. The implementation of the Learning Management System (LMS), training modules based on Artificial Intelligence, coaching, mentoring, work rotation, and gamification are some of the methods that have been proven to increase the engagement and effectiveness of learning in the workplace. However, this strategy is not without challenges. Among them are the digital divide between employees, resistance to change, especially from the senior generation of workers, the lack of synchronization of the training curriculum with the needs of the world of work, and the low organizational commitment to long-term investment in human resource development. Therefore, a holistic approach is needed that involves internal organizational policies and support from national policy makers to create a more equitable, adaptive, and inclusive learning ecosystem.

To answer these challenges, companies need to prioritize human resource development as a strategic investment, not just an operational burden. This can be achieved by providing adequate budgets for technology-based training and development and building an organizational culture that supports continuous learning. The use of adaptive and AI-based digital learning platforms can accelerate the process of individual competency improvement. In addition, it is necessary to build an incentive system that supports innovation and recognition of employee competency achievements. On the other hand, cross-sector collaboration between the business world, educational institutions, and the government is very important in formulating training and certification policies that are in accordance with industry demands. The government is also expected to provide incentives for companies that actively develop their human resources and prepare national regulations regarding the transformation of the digital workforce, so that the competitiveness of Indonesian companies and workers in general can increase sustainably in the midst of the rapid flow of the Industrial Revolution 4.0.

Conflicts of Interest

There are no conflicts to declare.

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