



Human Capital Development through Reskilling and Upskilling Programs for Corporate Digital Transformation

Nurul Hardiyanti D*

Hasanuddin University, Makassar City, Indonesia
*darwishnh24a@student.unhas.ac.id

Abstract. Digital transformation requires companies to have human resources (HR) that are adaptive, innovative, and competitive. Technological changes such as artificial intelligence, big data, and the Internet of Things have created a significant skills gap, making reskilling and upskilling important strategies in human capital development. This study aims to analyze the role of reskilling and upskilling programs in strengthening human capital to support corporate digital transformation. The method used is a literature study through an in-depth review of relevant literature, scientific journals, and previous research results. The results show that reskilling helps employees adapt to role changes due to automation and digitization, while upskilling strengthens existing skills to remain relevant to technological developments. The integration of these two strategies has been proven to increase productivity, innovation, and the long-term competitiveness of companies. However, implementation challenges remain, such as high training costs, digital literacy gaps between generations, and organizational cultural resistance. In conclusion, human capital development through reskilling and upskilling is a strategic investment that not only maintains workforce sustainability but also strengthens the success of a company's digital transformation.

Keywords: Human Capital, Reskilling, Upskilling, Digital Transformation, Human Resources.

1 Introduction

Digital transformation has brought significant changes to the world of work and business models. Companies are required to adapt to new technologies such as artificial intelligence, big data, cloud computing, and the Internet of Things (IoT), which have a direct impact on human resource (HR) competency requirements. According to [1], HR readiness in developing creativity and changing mindsets is essential in order to face the challenges of the Industrial Revolution 4.0 and move towards the era of Society 5.0. These changes in the competency landscape have created a significant skills gap. Many old skills are no longer relevant, while new skills based on digital technology are in high demand [2] emphasize that the shift in human roles due to automation and artificial

asset within the organization. In the context of human resource management, human capital development can be carried out through two main strategies, namely reskilling and upskilling. Reskilling aims to provide new skills so that employees can fill roles that have changed due to digitalization, while upskilling focuses on strengthening existing skills to remain relevant to technological developments[3] In Indonesia, the digital talent development strategy has become a national agenda, including through a gender-based research and innovation talent development program launched by the Ministry of Communication and Information Technology[4] For companies, reskilling and upskilling are not just technical requirements, but also strategic investments to increase long-term competitiveness. Research shows that the integration of Industry 4.0 policies, education, and HR innovation can drive productivity, efficiency, and business sustainability in the digital age.

2 Literature Review

Human Capital in the Digital Age human capital is an intellectual asset that includes the knowledge, skills, and competencies of employees that contribute to the productivity and competitiveness of an organization. Long-term strategic investment, while in the digital context, human capital is seen as a driver of innovation and sustainability [5]

Reskilling as an Adaptation Strategy reskilling is the process of equipping employees with new skills so that they can adapt to changes in their roles due to digitalization. Emphasize that reskilling is crucial to reduce the risk of job displacement due to automation. In the Indonesian context, reskilling is also in line with the national agenda of developing digital talent to face the Fourth Industrial Revolution and Society 5.0 [6].

Upskilling to Strengthen Competence Upskilling focuses on deepening existing skills to remain relevant to technological developments developed a Digital Transformation Skills Framework that emphasizes the importance of digital literacy, analytical skills, and cross-disciplinary collaboration as core competencies for the future. Studies in the government sector also show that upskilling improves civil servant performance in facing the challenges of public service digitalization Digital Transformation and New Competency Requirements[7] Digital transformation is not only a technological change, but also involves a shift in organizational culture, work patterns, and business models. Digitization requires companies to develop new competency strategies that are in line with business model innovation. Research at a government training institution shows that the Corporate University model is effective as a means of developing digital talent in the public sector. Integration of Reskilling and Upskilling in Human Capital Development The literature emphasizes that the success of digital transformation is determined by the integration of reskilling and upskilling programs in human resource development strategies. According to[8], organizations that combine these two strategies are able to create a workforce that is adaptive, innovative, and ready to face disruption. Furthermore, government policy support for national talent development, including digital training incentives, further strengthens the role of reskilling and upskilling as instruments for long-term human capital development [9].

3 Metodology

This research method uses a literature review method, which involves an in-depth study and analysis of various literature sources relevant to the topic being studied, including the results of previous research[10] . The literature that serves as the main reference in this study includes books on research methodology, scientific articles, and other publications that are closely related to theoretical studies. Literature studies play an important role in every research process because they serve as the starting point for determining the topic and formulating the title. Through this research, researchers gain comprehensive insight into the underlying theories, the latest developments, and other relevant material that supports the research. Thus, literature studies provide a solid foundation for researchers in developing a systematic and in-depth framework to respond to identified issues or problems[11].

4 Results

Table 1. Research Results of Human Capital Development through Reskilling and Upskilling Programs for Corporate Digital Transformation

No	Author and Year of Publication	Research Title	Research Results
1	Asih Setiawati and Muhammad Iqbal Fadillah, 2023 [3]	Corporate University Development Model in Government Training Institutions	This research produced a Corporate University (Corpu) development model for government training institutions with four main stages: (1) strategic planning, (2) architecture, (3) management, and (4) organizational culture. Corpu proved to be more strategic and comprehensive than regular training, and encouraged the creation of learning organizations that are adaptive to change.

- 2 Arya Tanta, Khaolatif Rabbani, Mubedi, Naerul Edwin Kiky Aprianto, and Nuril Hadi Sofyan, 2024 [4] Integration of Industry 4.0 Policies in Technology-Based Economic Development This study found that the integration of Industry 4.0 policies can increase productivity, global competitiveness, and inclusive and sustainable economic growth. However, the success of integration is highly dependent on the readiness of human resources, the strengthening of digital infrastructure, and synergy between the government, industry, and education.
- 3 Aulia Sari Damanik, Nurdahyanti, Zuchairunnisa, and Abdul Fattah Nasution, 2024 [5] Digital Transformation in Training Development for Human Resource Quality Improvement The success of human resource development is not only achieved through formal training and education. The key is a shift in mindset from *a fixed mindset* to *a growth mindset* so that human resources become more creative, innovative, and adaptive to the era of the Fourth Industrial Revolution and Society 5.0.
- 4 Ahmad Zulbilal, Ayan Torrido, and Mardiyah, 2024 [6] Digital Skills Development and Workforce Innovation: A Systematic Review of Human Capital Management in Education This systematic review identifies the main challenges in developing teachers' digital skills, namely infrastructure limitations, lack of training, and policy gaps. On the other hand, there are great opportunities in the form of integrating digital competencies into the curriculum, data-based assessment, and cross-sector collaboration. This study recommends data-based policies, continuous training, and an inclusive digital curriculum.
- 5 Joni Manumpak Paralian Gultom, 2022 [7] The Urgency of Multidimensional Pastoral Leadership in the Digital Age Multidimensional pastoral leadership has proven to be indispensable in the digital age, especially in addressing the fatigue and emotional crises experienced by church leaders. This study emphasizes the importance of emotional intelligence, creativity,

- communication, and innovation in pastoral leadership. The recommended strategy is to combine physical and virtual ministries and to develop visionary leadership that is adaptable to technology.
- 6 Nadia Divania Purba, Nurani Gultom, Aisyah, Laney Sartika, Erniati Silalahi, and Alfi Nura 2025 [14] Analysis of Human Resource Management Development Strategies to Improve Organizational Competitiveness in the Era of Globalization Strategic human resource management (HRM) is crucial to improving organizational competitiveness in the era of globalization. This strategy involves improving competencies, developing leadership, and utilizing digital technology. In addition, adaptation to multinational work cultures and strategies is also vital. Reskilling and upskilling are also essential. The ultimate goal is to create a competent, productive, and loyal workforce for organizational sustainability.
- 7 Izzatul Mula, Auliya Ristiani, 2025 [9] Transformation of Job Structures and Skill Requirements in the Era of AI Technology and Automation in the Global Market The era of AI and automation has fundamentally changed the structure of work. Routine jobs are being replaced by machines, while the demand for analytical, creative, and interpersonal skills is increasing. A significant skills gap has the potential to exacerbate socioeconomic inequality if not addressed immediately. To adapt, investment in reskilling and upskilling is essential. In addition, collaboration between governments, educational institutions, and industry is needed to design policies that support this transition.
- 8 Naila Dzakiya Rahmayani, Andhini Ummu Hanifah, Arya Najwan Hamiansyah, Muhammad Fathir Analysis of the Effectiveness of Reskilling and Upskilling Programs in Addressing the Skills Gap in The Pre-Employment Card Program is considered effective in improving workforce skills, as evidenced by high participant satisfaction

	Rahman, and Nigaluh Salsabila, 2025 [15]	Indonesia	and its contribution to reducing the Open Unemployment Rate (TPT) to 4.76% in February 2025. However, this program still faces challenges such as uneven certification standards.
9	P. Paryanto, Harry Indrawanb, Nur Cahyob, Siti Aisyahb, A.A. Simaremareb, Agus Suprihantoa, and Sulardjakaa, 2021 [11]	Digital Transformation of Power Plants in Indonesia: A Study from the Perspective of Technology and Human Resources	Based on the results of the study, power plants in Indonesia are technologically well-prepared for digital transformation. However, significant improvements in the digital competence and mindset of employees are needed through upskilling programs so that innovation and digitization projects can be accelerated.
10	Juli Anggraini, Nabila Kintan Oktadonna, and Martini, 2025 [17]	Human Resource Transformation in the Era of Industry 5.0: Challenges and Opportunities for Employee Development	

Human Capital Development through Reskilling Programs for Corporate Digital Transformation Reskilling as a Response to Technological Disruption Research findings from various sources confirm that the development of artificial intelligence, automation, and IoT is displacing many routine jobs. Reskilling programs have emerged as a solution to move workers to new technology-based positions. For example, a study by [13] shows that the Corporate University model can be a strategic platform for reskilling because it creates an adaptive learning organization. Reskilling for Improving Human Resource Quality, emphasize that reskilling not only expands technical skills but also changes the mindset from a fixed mindset to a growth mindset. This is crucial so that employees can be more creative, innovative, and adaptive to the demands of digital transformation. The Integrity of Reskilling in Organizational Strategy Reskilling cannot be implemented partially, but must be integrated into the company's digital transformation strategy. The integration of Industry 4.0 policies is only effective when accompanied by human resource readiness. This means that reskilling needs to be part of the company's strategic roadmap, not just a temporary training program.

Table 1. Thematic synthesis matrix of reskilling and upskilling contributions, enablers, and barriers

Theme	What the reviewed evidence indicates	Illustrative sources
Reskilling for role transition under automation	Reskilling is primarily mobilised to redeploy workers from declining routine roles towards technology-enabled tasks, reducing displacement	[9,15]

	risk and supporting continuity of operations.	
Upskilling for digital competence deepening	Upskilling strengthens digital literacy and applied technical capability so employees remain productive and effective as tools and workflows change.	[6,11]
Institutional learning architectures	Organisational learning systems, including structured Corporate University models, provide a governance mechanism for continuous capability renewal and alignment with strategic transformation priorities.	[3]
Mindset and learning culture as catalytic conditions	Transformation-ready human capital requires a shift towards learning orientation and adaptive mindset, because technical training alone does not secure behavioural adoption or innovation.	[5,11]
Policy and cross-sector collaboration	Productivity gains from digital transformation are amplified when firms coordinate with government and education actors, aligning training incentives, infrastructure, and competency pipelines.	[4,13]
Persistent implementation barriers	High costs, uneven infrastructure, and gaps in training access and standards remain recurring constraints that can weaken programme effectiveness and create uneven outcomes.	[6,15]
Human capabilities as complements to digital skills	Communication, creativity, and emotional intelligence are repeatedly positioned as complements to technical upskilling, supporting change adoption and sustained performance.	[7,14]

Table 2 demonstrates that reskilling and upskilling operate through distinct but interdependent pathways. Reskilling is most consistently linked to structural labour adjustment under automation and AI, with studies emphasising its role in redeployment and in moderating displacement risks that otherwise can intensify inequality [9,15]. Upskilling, by contrast, is presented as capability deepening that enables employees to extract value from digital tools and maintain operational performance as processes become data-driven and technology-mediated [6,11]. Importantly, several sources stress that capability development is most effective when institutionalised through organisational learning architectures, which convert episodic training into sustained capability renewal and strategic alignment [3].

A further pattern concerns the enabling conditions required for skill development to translate into transformation outcomes. The evidence suggests that learning culture and mindset shift are not auxiliary considerations but central implementation mechanisms, because they shape whether employees adopt, adapt, and innovate with new technologies in practice [5,11]. At the system level, cross-sector coordination and policy support appear repeatedly as amplifiers of impact, particularly where infrastructure and talent pipelines constrain firm-level initiatives [4,13]. Nonetheless, the literature also reveals persistent barriers, including high training costs, uneven digital infrastructure, and variability in certification standards, which may limit both the equity and the effectiveness of reskilling and upskilling interventions [6,15]. Collectively, these results indicate that human capital development for digital transformation should be treated as an integrated capability system that links role

transition, competence deepening, organisational learning infrastructure, and enabling policy conditions, rather than as isolated training activities

5 Discussion

The Impact of Reskilling on Digital Transformation Research shows that reskilling can increase productivity, accelerate technology adoption, and strengthen innovation in business processes. A case in point is a program in the energy sector, which found that the digital transformation of power plants can only be successful if human resources are retrained in digital skills. Challenges in implementing reskilling include high training costs, limited digital infrastructure, technological literacy gaps between generations, and organizational cultural resistance. However, research by Rahmayani on the effectiveness of the Pre-Employment Card program proves that with the right design, reskilling can help significantly reduce the open unemployment rate (TPT). Thus, reskilling becomes a strategic instrument in human capital development, not only to maintain employee job sustainability but also to strengthen the company's competitiveness in the era of digital transformation. Human Capital Development through Upskilling Programs for Corporate Digital Transformation. Upskilling as a Competency Strengthening Strategy Research shows that upskilling is one of the main pillars in human capital development in the era of digital transformation. Upskilling is understood as improving existing skills to remain relevant to technological developments. The need for digital literacy, data analysis, and artificial intelligence is increasing, so employees need to deepen these competencies in order to keep up. Integrity Upskilling with Digital Transformation Digital transformation is not merely the adoption of technology, but also includes organizational cultural change. Research by Zulfalil emphasizes the importance of inclusive curricula, cross-sector collaboration, and data-driven policies to support sustainable upskilling [6]. This is reinforced by the ASN Management Outlook, which shows that strengthening digital competencies is also important in the public sector to improve service quality. The Impact of Upskilling on Productivity and Innovation The research findings in the document show that investment in upskilling has a positive impact on productivity and innovation. For example, the Corporate University model has been proven to strengthen a long-term learning culture and make organizations more adaptive [3]. In addition, emphasizes the importance of gender-based digital training, where upskilling women in ICT can expand the inclusive digital talent base [13]. Challenges in Implementing Upskilling Despite its positive impact, the implementation of upskilling faces a number of obstacles, including: High training costs, which often become a burden on companies; a digital divide between generations, especially between senior employees and digital native generations; an organizational culture that does not yet support continuous learning, resulting in resistance; and uneven digital infrastructure across various industrial sectors [11]. Relevance to Digital Transformation Overall, the research results confirm that upskilling is an important instrument in supporting digital transformation. By strengthening employees' digital skills, companies not only increase productivity and efficiency, but also build a culture of innovation that becomes the foundation for organizational sustainability in an era of disruption.

6 Conclusion

Reskilling has proven to play an important role in human capital development because it helps employees adapt to changes in their roles due to automation, artificial intelligence, and digitalization. Reskilling expands employment opportunities to remain productive and supports organizational sustainability. Upskilling serves to deepen existing digital skills, thereby increasing productivity, efficiency, and innovation within the company. Upskilling programs can also strengthen a culture of continuous learning and long-term competitiveness. Integrating reskilling and upskilling into digital transformation strategies results in a workforce that is adaptive, innovative, and ready to face technological disruption. The main challenges in implementing these two programs include high training costs, digital literacy gaps between generations, and organizational cultural resistance. However, with support from top management, government policies, and cross-sector collaboration, these challenges can be overcome. Overall, human capital development through reskilling and upskilling is a strategic investment that supports the success of a company's digital transformation. Recommendation for companies: Develop a reskilling and upskilling roadmap that is integrated with the digital transformation vision. Allocate a dedicated training budget and leverage digital learning platforms. Encourage the creation of a learning organization or corporate university to support a culture of continuous learning. For Human Resources (HR) Management, Conducting regular skill assessments to identify skills gaps. Develop mentoring, coaching, and project-based learning programs to make learning more applicable. Facilitate employees in mastering digital literacy, data analytics, and collaborative skills. For Government and Regulators. Provide incentives and subsidies to support digital training in companies. Strengthening collaboration with industry and universities in providing reskilling and upskilling programs. Developing a national policy to accelerate the development of digital talent to support a technology-based economy. For Academics and Researchers Conducting further research on the effectiveness of reskilling and upskilling in various industrial sectors. Developing adaptive digital curricula that meet the needs of the Indonesian workforce. Provide data-driven studies to support decision-making in digital human resource policies.

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