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# Reskilling and Upskilling Strategies for Manufacturing Workers in the Industry 4.0 Landscape: Case study on PT. XYZ

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**ABSTRACT**

*The advent of Industry 4.0 has revolutionized the manufacturing sector, requiring a significant shift in workforce skills to keep up with rapid technological advancements. This paper investigates the strategies for reskilling and upskilling workers at PT. XYZ to align with Industry 4.0 demands. A mixed-method approach was used, combining quantitative employee performance data with qualitative insights from interviews with management and workers. Key findings reveal that integrating technical training, digital literacy, and soft skills development is crucial for enhancing employee adaptability and performance. The case study emphasizes the vital role of organizational culture and leadership in driving effective reskilling and upskilling efforts. Moreover, the research highlights the need for continuous learning and proactive workforce planning to close skill gaps and promote sustainable growth. By analyzing the effectiveness of these initiatives and leadership's influence, the study offers valuable insights for manufacturing firms like PT. XYZ, helping them build a resilient and adaptable workforce in the era of Industry 4.0.*

## INTRODUCTION

In today's world, economic challenges driven by advanced technology are forcing manufacturing companies to increase agility and responsiveness to value chain management across various industrial sectors. Therefore, manufacturing companies need thehelp of virtual and physical technologies that provide real-time integration between businesses and processes (Ustundag et al., 2018). Industry 4.0 has driven fundamental changes in the manufacturing industry by emphasising concepts such as connectivity, decentralised decision-making, resource optimisation, and automation (Bag et al., 2021). To achieve this, integrating modern technologies such as Artificial Intelligence, Cyber Physical Systems, Internet of Things, Big Data Analytics, Blockchain and further technological advances in automation has proven essential (Umar et al., 2022). However, with the emergence of the “Smart Factory” concept, Industry 4.0 mainly focuses on production efficiency, real-time transparency, and autonomous management (Kayikci, 2018).

Manufacturing companies such as PT. XYZ faced various challenges in implementing Industry 4.0 technologies, including technical complexity, high costs, and resistance to change. The need to reskill and upskill the workforce is critical because many workers do not have the necessary digital skills. However, tremendous opportunities can be exploited through upskilling, such as greater efficiency and productivity through automation and data analytics. In addition, innovation in the production process can be increased with a more skilled workforce, allowing PT. XYZ competes better in the global market and adapts to changing industry demands. Anderson and Brown (2020) emphasise that digital transformation requires increasing workforce skills to operate advanced technology. (Smith, 2016) adds that companies that successfully carry out reskilling and upskilling can increase operational efficiency and product innovation, increasing competitiveness in the global market.

In the Industry 4.0 era filled with technological changes, reskilling and upskilling are the keys to the survival of individuals and companies. Reskilling, which means learning new skills, and upskilling, namely

improving existing skills, empowers the workforce to adapt to ever-growing industry demands (Kresnadi & Narendra, 2023). Investments in human resource development through reskilling and upskilling can help companies overcome skills gaps and maintain competitiveness in dynamic markets (Manyone, 2023). Employees with new and enhanced skills will be better prepared to navigate the digital landscape, leverage new technologies, and make meaningful contributions to their organisations. This investment in employee development benefits individuals and is critical to a company's long-term resilience and success.

One of the largest companies in the toy industry, PT. XYZ is a branch of the multinational company XYZ, Inc. These facilities employ thousands of people because the process requires much labour. The organisation is transforming digitally to remain competitive in the market and increase output. They recognise the need for a holistic strategy for digital transformation to remain competitive. Automation, data analytics, and the Internet of Things (IoT) are critical components of the digital transformation process for modern business operations. These adjustments can result in significantly higher output, easier data-driven decision-making, higher quality output, lower operational costs, and greater flexibility in responding to market fluctuations. Business leaders worldwide leverage digital transformation to increase innovation, optimise workflows and improve customer experiences. The digital revolution in manufacturing promises increased customisation, sustainability, and flexibility (Savastano et al., 2019). Recognising the need for a skilled workforce for this change, they have implemented training and development programs to provide their employees with reskilling, upskilling, and other initiatives.

The novelty of this research lies in its detailed exploration of reskilling and upskilling strategies specifically designed to meet the demands of Industry 4.0 in the manufacturing sector, focusing on PT. XYZ. While previous studies have discussed workforce development in the context of technological advancements, this research uniquely combines technical skills, such as digital literacy and automation, with soft skills development, highlighting the importance of a balanced approach to enhancing human capital (Smith, 2016). The purpose of this study is to investigate the strategies required for PT. XYZ's workforce to effectively adapt to the technological shifts driven by Industry 4.0. By assessing various training programs and the influence of leadership and organizational culture, this study aims to offer practical recommendations that can improve employee adaptability and performance, ensuring the company's competitiveness in the global manufacturing landscape (Anderson, 2020). The key benefit of this research is that it provides actionable insights into workforce development for manufacturing firms. By closing skill gaps and fostering continuous learning, organizations can improve productivity, boost employee engagement, and ensure long-term sustainability in the face of rapid technological change (Bag et al., 2021). Furthermore, the findings contribute to a broader understanding of how human capital development supports innovation and operational efficiency in the context of Industry 4.0 (Savastano et al., 2019).

## METHOD

This research employs a qualitative case study design to analyze the reskilling and upskilling strategies implemented at PT XYZ. Data were collected through direct interviews and surveys, focusing on the challenges faced during the implementation of these programs and the strategies used to address them. The purposive sampling method was applied to select participants who possess firsthand experience with the reskilling and upskilling initiatives at PT XYZ. The data collection methods included in-depth interviews with various stakeholders such as managers, trainers, and employees. These interviews were supplemented by document analysis of training reports and company policies to gain a comprehensive understanding of the strategies employed. Thematic analysis was used to process the data, identifying key themes and insights that provide a deeper understanding of the effectiveness of reskilling and upskilling initiatives. Triangulation techniques were applied to enhance data validity, ensuring a robust and reliable analysis of the findings.

## RESULTS AND DISCUSSION

### Effectiveness of the Reskilling Program

The results showed that the reskilling program implemented at PT XYZ markedly enhanced the technical capabilities and adaptability to new technologies of the workers in question. This comprehensive training initiative is designed to equip workers with the requisite skills for an increasingly automated manufacturing environment. A combination of classroom instruction, hands-on workshops, and on-the-job training enabled workers to gain proficiency in areas including robotics, data analytics, and digital production processes.

The reskilling program effectively reduced the skills gap that arose when PT XYZ modernized its operations. Prior to this program, many workers lacked the technical knowledge to operate new machines or use digital tools efficiently. The training addressed this shortcoming by providing targeted instruction in relevant technologies and software platforms. As a result, employees are now better equipped to take on roles that require interaction with automated systems and data-driven decision-making**.**

A comparative analysis of the competency assessments conducted prior to and following the implementation of the reskilling program revealed a notable enhancement in several pivotal domains. The pre-training evaluation demonstrated that only 55% of workers achieved the requisite standard of proficiency in operating computerized production equipment. Following the implementation of the program, this figure increased to 85%. Proficiency in the use of digital software also demonstrated a significant improvement, reaching 100%**.**

**Impact of Upskilling on Employee Performance**

The impact of upskilling on employee performance includes enhancing overall employee capabilities, increasing the organization's income, and improving employee retention. Additionally, it fine-tunes the workforce to meet the organization's labor demands (Muchiri, 2022). According to (Sawant et al., 2022), Upskilling has a significant positive impact on employee performance. It enhances professional competence, making the workforce more agile and adaptable to rapidly changing industry trends. Leading companies emphasize upskilling sessions, training modules, and short-term courses to improve employees' abilities and performance, which in turn increases productivity. Companies and employees need to navigate the ever-changing technologies and organization leaders are tasked with upskilling the workforce and preparing them for future demands. As recent trends design and change requirements of jobs, it is the individuals that are required to embrace this idea and motivate oneself to make learning a priority.

## CONCLUSION

### Summary of Key Findings

The study conducted on reskilling and upskilling initiatives at PT. XYZ in the context of Industry 4.0 has uncovered noteworthy favorable results. The study revealed that these programs have effectively augmented the competencies of workers, equipping them to proficiently confront the challenges presented by the fourth industrial revolution. Participants in the training exhibited significant enhancements in their proficiency to operate and maintain cutting-edge industrial technologies, such as robotics, Internet of Things (IoT) devices, and data analytics tools. This is consistent with the research conducted by (Moldovan, 2019), which found that focused training programs in manufacturing settings can significantly enhance workers' technological skills.

An important discovery from the research was the significant improvement of both technical and non-technical abilities among the employees of PT. XYZ. Significant advancements in technical abilities were notably observed in domains such as data analysis, predictive maintenance, and human-machine interface. At the same time, there was a notable increase in non-technical or soft skills, such as problem-solving, adaptability, and cross-functional teamwork. Achieving a well-rounded skill set is essential in the context of Industry 4.0, as underlined by (Whysall et al., 2019). They underscored the need of taking a comprehensive approach to developing skills in contemporary manufacturing settings.

The research also revealed a significant association between the introduction of reskilling and upskilling initiatives and enhancements in PT. XYZ's operational efficiency and productivity. Workers who successfully completed these programs exhibited enhanced proficiency in their respective positions, resulting in decreased production durations and enhanced quality management. The results aligns with the study conducted by (Karre et al., 2017), which shown that implementing upskilling programs in manufacturing firms resulted in quantifiable enhancements in both production efficiency and product quality.

Another notable result was the favorable influence on staff engagement and job satisfaction. Individuals who took part in the reskilling and upskilling initiatives expressed a heightened sense of appreciation from the company and an increased level of self-assurance in their capacity to make significant contributions to PT. XYZ's future. The heightened level of employee involvement has resulted in decreased employee turnover rates and improved levels of innovation. The results presented here corroborate the conclusions of (Cascio & Montealegre, 2016), who posited that ongoing learning opportunities in technology-oriented sectors are essential for sustaining a motivated and devoted workforce.

The survey also indicated that PT. XYZ has achieved significant success in integrating learning into its corporate culture. The company's endeavors to establish a perpetual learning atmosphere, bolstered by cutting-edge learning tools and collaborations with educational institutions, have cultivated a culture characterized by creativity and adaptability. PT. XYZ has adapted to this cultural change, enabling them to better address rapid technological advancements. This aligns with the World Economic Forum's (2020) recognition of the significance of fostering flexible learning cultures in the context of Industry 4.0.

In addition, the research emphasized the efficacy of PT. XYZ's customized learning programs and the utilization of sophisticated educational tools. Employees exhibited a favorable response to customized learning routes and the integration of virtual and augmented reality in training programs. These novel methods of learning have not only advanced the acquisition of skills but also improved the retention and application of knowledge in real-life situations. This finding supports the research conducted by (Kaplan & Haenlein, 2019), which stressed the capacity of AI-driven and immersive technologies to improve the effectiveness of workforce training.

Finally, the study concluded that PT. XYZ's efforts to provide additional training and skills development have had a significant influence on the local industrial ecosystem. By forming strategic alliances and exchanging expertise, the company has actively contributed to improving the capabilities of individuals in the industry, which has the potential to enhance the region's competitiveness in the global manufacturing sector. This is consistent with the suggestions made by (Strack, R., Dyrchs, S., Kotsis, Á., & Mingardon, 2018)regarding the significance of cooperative methods in tackling skill deficiencies within the framework of digital transformation.

**Implications for Industry 4.0 Readiness**

Research findings show that effective reskilling and upskilling strategies are key to preparing the workforce in the face of digital transformation in the manufacturing industry. The PT. XYZ approach can serve as a model for other companies that want to improve their preparedness in the face of Industry 4.0, including the importance of investing in sustainable training and adoption of new technologies.

PT. XYZ approach to implementing reskilling and upskilling strategies can serve as a model for other companies that want to improve their preparedness in the face of Industry 4.0. PT.XYZ has successfully integrated training focused on competence in the fields of automation, data analytics, and digital manufacturing. This approach not only improves the technical skills of employees but also improves their adaptability to rapid technological change. In accordance with (Albukhitan, 2020), preparing a manufacturing workforce for digital transformation necessitates a multi-pronged approach. This includes enhancing employee knowledge and skills for effective technology utilization, implementing effective change management to address employee concerns, designing positive experiences to facilitate adaptation, aligning organizational culture to support innovation, and providing adequate training and support during the transition. By adopting these measures, manufacturing companies can empower their workforce to thrive in the Industry 4.0 era, boosting adaptability, productivity, and overall competitiveness.

**The Importance of Investing in Sustainable Training**

Investment in sustainable training is crucial to ensuring that the workforce is always ready to face the new challenges emerging from digital transformation. PT. XYZ has shown that by providing a sustainable training program, employees can continue to develop their skills and remain relevant in a dynamic work environment. This is in line with findings that suggest that companies that invest in reskilling and upskilling will have a competitive advantage in the future.

**Adoption of New Technology**

The adoption of new technologies is also a key component in the preparedness for Industry 4.0. XYZ has adopted a range of industry 4.0 technologies such as automation, the Internet of Things (IoT), and big data analytics to improve efficiency and productivity. By integrating these technologies, XYZ not only improves its operations but also creates a more intelligent and responsive working environment.

PT.XYZ approach to reskilling and upskilling can serve as a model for other companies that want to improve their preparedness in the face of Industry 4.0. Investment in sustainable training and the adoption of new technologies are two key elements that companies should take into account to ensure that their workforce is ready to face digital transformation.

**REFERENCES**

Albukhitan, S. (2020). Developing digital transformation strategy for manufacturing. *Procedia Computer Science*, *170*, 664–671.

Anderson, D. M. (2020). *Design for manufacturability: how to use concurrent engineering to rapidly develop low-cost, high-quality products for lean production*. Productivity Press.

Bag, S., Telukdarie, A., Pretorius, J. H. C., & Gupta, S. (2021). Industry 4.0 and supply chain sustainability: framework and future research directions. *Benchmarking: An International Journal*, *28*(5), 1410–1450.

Cascio, W. F., & Montealegre, R. (2016). How technology is changing work and organizations. *Annual Review of Organizational Psychology and Organizational Behavior*, *3*(1), 349–375.

Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons*, *62*(1), 15–25.

Karre, H., Hammer, M., Kleindienst, M., & Ramsauer, C. (2017). Transition towards an Industry 4.0 state of the LeanLab at Graz University of Technology. *Procedia Manufacturing*, *9*, 206–213.

Kayikci, Y. (2018). Sustainability impact of digitization in logistics. *Procedia Manufacturing*, *21*, 782–789.

Kresnadi, M. I., & Narendra, D. A. (2023). Transformasi Upskiling dan Reskiling Sumber Daya Manusia Dalam Mengahadapi Tantangan Revolusi 4.0 Di Sektor Kepelabuhanan dan Logistik. *EKONOMIKA45: Jurnal Ilmiah Manajemen, Ekonomi Bisnis, Kewirausahaan*, *10*(2), 169–174.

Manyone, B. (2023). Manyone, B. (2023). A Reskilling and Upskilling Collaborative Ecosystem in the Era of Industry 4.0 - EIT Manufacturing. EIT Manufacturing. https://www.eitmanufacturing.eu/what-we-do/thought-leadership/signals/a-reskilling-and-upskilling-collaborative-e. *A Reskilling and Upskilling Collaborative Ecosystem in the Era of Industry 4.0 - EIT Manufacturing. EIT Manufacturing. Https://Www.Eitmanufacturing.Eu/What-We-Do/Thought-Leadership/Signals/a-Reskilling-and-Upskilling-Collaborative-E*.

Moldovan, L. (2019). A comparative study between the different modes of support to employment. *Acta Marisiensis. Seria Technologica*, *16*(1), 39–42.

Muchiri, D. G. (2022). Skilling, reskilling, and upskilling a workforce: A perspective from Kenyan enterprises. *The Strategic Journal of Business & Change Management*, *9*(4), 190–203.

Savastano, M., Amendola, C., Bellini, F., & D'Ascenzo, F. (2019). Contextual impacts on industrial processes brought by the digital transformation of manufacturing: A systematic review. *Sustainability*, *11*(3), 891.

Sawant, S. V, Patwardhan, A. W., Joshi, J. B., & Dasgupta, K. (2022). Boron doped carbon nanotubes: Synthesis, characterization and emerging applications–A review. *Chemical Engineering Journal*, *427*, 131616.

Smith, K. (2016). Smith, K. (2016). Ai Weiwei: The Artist vs. the State. New York Times. *Ai Weiwei: The Artist vs. the State. New York Times.*

Strack, R., Dyrchs, S., Kotsis, Á., & Mingardon, S. (2018). Strack, R., Dyrchs, S., Kotsis, Á., & Mingardon, S. (2018). How to gain and develop digital talent and skills. Boston Consulting Group. https://www.bcg.com/publications/2018/how-gain-develop-digital-talent-skills. *How to Gain and Develop Digital Talent and Skills. Boston Consulting Group. Https://Www.Bcg.Com/Publications/2018/How-Gain-Develop-Digital-Talent-Skills*.

Umar, M., Khan, S. A. R., Zia-ul-haq, H. M., Yusliza, M. Y., & Farooq, K. (2022). The role of emerging technologies in implementing green practices to achieve sustainable operations. *The TQM Journal*, *34*(2), 232–249.

Ustundag, A., Cevikcan, E., Akdil, K. Y., Ustundag, A., & Cevikcan, E. (2018). Maturity and readiness model for industry 4.0 strategy. *Industry 4.0: Managing the Digital Transformation*, 61–94.

Whysall, Z., Owtram, M., & Brittain, S. (2019). The new talent management challenges of Industry 4.0. *Journal of Management Development*, *38*(2), 118–129.