Impact of Digitalization Strategies on Employee Effectiveness in the Context of Industry 4.0

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Abstract **- The emergence of Industry 4.0 follows the advanced expansion of scholarly literature. IoT refers to physical items that are embedded with processors, sensors, software, and technology, and it is a new paradigm shift that has brought the digital world and technology together. Industry 4.0 is a contemporary automation trend that merges all parts of academia in order to improve the innovative with smart digital twin digital journey. This is based on a strategy model that will be tested on a few organizations to explore how digitalization affects employee productivity and to investigate the driving forces of Industry 4.0. The impacts of Industry 4.0 on business performance are assessed using the propensity scores matching difference-in-difference method. The findings demonstrate that private and large enterprises are more motivated to promote the industry 4.0 strategy, and that government subsidies have no meaningful impact on a company's decision to adopt the approach. The use of Industry 4.0 can result in major improvements.**

Index Terms **- Industry 4.0, IoT, digitalization, technological advancement, Strategy factors, Firm's performance, employee efficiency.**

1.INTRODUCTION

There has always been a digital revolution in every industry in the previous several decades, and these new developments are linked to the adoption of new technical processes and tactics in their organization or business. We are now more drawn to the virtual world, which may be viewed as the primary driver of innovation and change across all industries. According to a Gartner report, 79% of corporate strategists claim to be digitizing their firms in order to generate new revenue streams. However, progress has been gradual, with less than half of organizations claiming to be transitioned placing digital activities at the centre of their strategy. Enterprise digital transformation investment is predicted to grow at a 15.5 percent compound annual growth rate from 2020 to 2023, according to NASCOM data (2020), with total investment reaching US$6.8 trillion. The IT sector is expected to rise by 10.9 percent in 2021, according to NASCOM. The IT sector is expected to rise in the next years, reaching USD 300-350 billion by 2025, fueled by strategy and model investment.

Shift from 1.0 to 4.0 due to external forces

The first revolution centered on using machine tools to optimize manual labour performance. The second industrial revolution was centered on increasing productivity. The third revolution places a greater emphasis on digital technology and automation software, rather than analogue and mechanical technologies. Industry 4.0 is the fourth revolution. The emphasis of Industry 4.0 is on digital technology and the Internet of Things (IoT), real-time data access, and the development of cyber-physical systems. It bridges the gap between the physical and digital worlds, allowing for improved cooperation and access across departments, partners, vendors, products, and people. Industry 4.0 enables business leaders to have a deeper understanding of and control over every element of their operations, as well as to use real-time data to improve productivity, streamline procedures, and accelerate growth. According to Ustundag and Cevikcan (2018), digital transitions in manufacturing provide various chances to use IoT to integrate physical and digital worlds.

What impact do digitalization strategies have on the digitalization of industries?

The global digital transformation market was valued at USD 998.99 billion in 2020, and is expected to reach USD 2744.68 billion by 2026, at a CAGR of 18.5 percent during the forecast period of 2021-2026,

according to a Mordor Intelligence sample report on GLOBAL DIGITAL TRANSFORMATION MARKET (2021 – 2026). Cisco and the Japanese government partnered on a digitalization project in February 2021 that includes numerous industry verticals such as government, education, healthcare, and business. Adobe Systems Inc. and FedEx teamed in April 2021 to integrate Adobe Commerce with Shop Runner, a leading ecommerce platform and a FedEx Services subsidiary. Adobe retailers will receive access to FedEx post-purchase logistical analytics as a result of the connection, which will help them drive demand, cut costs, and obtain customer insights. In June 2021, Deutsche Bank and Oracle Corporation cooperated to upgrade their database.

2. LITERRATURE REVIEW

2.1 Digitalization

According to Bounfour (2016), digital technology adoption and implementation are utilised to provide value and turn information into a digital format. Digital transformation, according to (De Waal et al., 2016), is a long-term process that adds value and alters the operation. According to Schmidt et al. (2017), businesses have been under pressure to face strong competition and technological change as a result of the rapid expansion of digitalization. According to (Sindwani, 2018), there is a movement from traditional banking services to automated banking services. According to (Nss-Schmidt et al., 2019), technological developments have a substantial impact on bank services, and the study investigated the effects of such innovations on staff engagement in the Swedish banking business. According to (Umans et al., 2018), digitalization can have both beneficial and negative consequences on employees' work performance. "Occupational stress, depression, and insomnia" are examples of such causes. Employees are affected by these outcomes.

2.2 Employee Engagement

Employee engagement, according to (Fleetwood & Hesketh, 2010), is a relatively new idea in human resource management. Employees express themselves physically, emotionally, and psychologically when performing at work, according to Kahn (1990). Employee engagement, according to (Harter et al., 2002), is defined as being involved, committed, and satisfied with one's work. Employee engagement is related to employee motivation and is connected to the level of dedication, vigour, and absorption at work, according to (Schaufeli et al., 2002). Employee engagement, according to (Harter et al., 2002, p.269), "refers to an individual's involvement, contentment, and excitement for work." Employee engagement is defined as "a desired condition that has favourable consequences on organisational efficiency and connotes involvement, dedication, passion, excitement, focused effort, and energy," according to (Jaupi & Llaci, 2015, p.192). Engagement is regarded vital and indispensable for modern firms to progress forward, according to (Schaufeli & Salanova, 2007), as engaged personnel enhance productivity, performance, and profitability. According to (Robinson et al., 2004), commitment is the initial stage of an organization's efforts toward its personnel. Employee views, behavioural engagement, change management, career progression, emotional engagement, nature of my job, and feeling valued are among the factors of employee engagement proposed by Imandin et al. (2014). According to Durkin (2007), communication is one of the most important factors that lead to employee engagement, and it is advantageous for organisations to express their values and goals openly with their employees. According to (Jaupi & Llaci, 2015), communication should be viewed as a two-way method for increasing employee engagement. Employees would feel a sense of belonging as a result, which would naturally promote engagement. Poor internal communication in an organisation and difficulty in standardising employee performance due to individuals' differences in commitment, engagement, knowledge, or attitude can influence service delivery, leading to variations in service quality, according to (Parasuraman et al., 1985).

3. LITERATURE REVIEW

Design principles are the foundation for the development of Industry 4.0 and its ramifications for particular firms and industries, according to (Ghobakhloo, 2018; Santos & Martinho, 2019). Schumacher, et al. (2020) emphasize the link between Industry 4.0 and the lean production system, while Hoellthaler, et al. (2018) argue that implementing digital technology where lean has reached its limits and digital technology can transcend them is a solid

digitalization strategy. Kristoffersen et al. (2020) go into detail about how digital technology may aid circular economy plans and why it should be included in the Industry 4.0 agenda. Digitalization is the leveraging of digitised products or processes during digital transformation, according to (Verhoef, at al., 2019; Saarikko, et al., 2020). According to Tim Jeske, Marlene Würfels, and Frank Lennings(2020), the lean technique and holistic approaches are the reason for increased productivity, employee flexibility, and efficiency in the manufacturing business.

Digital technology, according to Ustyuzhanin et al. (2018), is responsible for the development of cognitive capacities and core competences in human labour, which leads to employee effectiveness. Digital technology, according to Ustyuzhanin et al. (2018), develops a person's cognitive capacities and competencies, allowing them to integrate and be effective in realising themselves in settings of variability and uncertainty. According to (Matt et al., 2015; Sahu et al., 2018), digital transformation is defined as the transformation of an organization's structure, processes, functions, and business models as a result of the adoption of digital technologies (such as Internet of things, artificial intelligence, machine learning, augmented reality, in-memory computing) According to Wainwright et al. (2018), the evidence-based practise for information systems (EBIS) approach examines the role of digital literacy in digital transitions by making both theoretical and practical contributions to the body of knowledge. According to Correani et al. (2020), Identifying the usage of instances in comprehending digital implications, according to Lipsmeier et al. (2020), is a part of establishing a digital strategy. According to Saarikko, et al. (2020), firms must develop capabilities in order to learn how to use or use digital technology for commercial reasons. According to Tekic and Koroteev (2019), several types of leadership exist in firms depending on their digital transformation strategy. (According to Zaoui & Souissi, 2020, strategic orientation of the digital transformation can be further unpacked, as it relates to both defining the objectives and what is to be achieved through the digital transformation, as well as the planning and unpacking of transformational efforts and activities. Manufacturing companies, according to Santos and Martinho (2019), must adopt new strategic orientations and modify business models. Tekic and Koroteev (2019) established a flexible generalisation model and explained that even within manufacturing, there are differences.Demeter, et al. (2020) argued that while lean-teams can handle digital technology adoption at first, Industry 4.0 adoption requires more competencies. According to Andrieu et al. (2019), the country-level minimum cost of relocating workers in high-risk jobs (on average, 14 percent of the labour force) to occupations where they are not at risk is between 1% and 5% of a single year's GDP, on average across the nations studied. According to I.O. Kotlyarova, I.A. Voloshina, and K.N. Volchenkova (2021), the use of relevant content, the quality of education, and the effectiveness of professional development are all improved by using relevant material. A case of diglization and conctric strategic partnerships in the Reatil sector, according to Carlos Galera-Zarco1 | Marco Opazo-Basáez2 | Josip Maric3 | Maria Garca-Feijoo2. This research examines how digitization influences the formation of new strategic alliances, focusing on the process and important elements that have led to its success in our retailing unit of study. According to (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Iansiti & Lakhani, 2014), digitalization is gradually changing corporate strategy and processes. According to (Gimpel & Röglinger, 2015), fast transition has left businesses in a condition of uncertainty. As a result, businesses have begun to place a greater emphasis on the firm's tactics for engaging people. According to Morteza Ghobakhloo and Mohammad Iranmanesh (March 2021), adopting the ISM model of digital transformation is the reason for manufacturing SMEs' success. Digitalization in automotive firms tends to adapt their business models and sustainability trends, according to Chiara Acciarini, Fernando Borelli, Francesca Capo, Francesco Cappa, and Chiara Sarrocco (April 2021). According to Tim Jeske, Marlene Würfels, and Frank Lennings (2021), digitization in the manufacturing industry has an impact on productivity gains, employees, and their flexibility. According to Somayeh (May 2021), culture has a significant impact on learning technology and digitalization in the UAE, particularly in Dubai. T. Matt, Angelo Bonfanti, Alberto De Longhi, Giulio Pedrini, Guido Orzes, Federico Brunetti, Dominik(March 2020), T. Matt, Angelo Bonfanti, Alberto De Longhi, Giulio Pedrini, Guido Orzes, Federico Brunetti, Dominik, Federico Brunetti,

Dominik, Federico Brunetti, Dominik, Federico Brunetti, Dominik, Feder. According to Muhammad Fajar Wahyudi Rahman1*, Anang Kistyanto2 (July 2020), flexible work arrangements have a good impact on innovative work behaviour. digitlization claims that work-life balance rates as one of the most important workplace traits, according to Reena Chopra, Dr. Sonika Sharma (Aug 2020). Servitization and digitalization are positively associated to firm success, according to Mara-Luz Martn-Pea, José-Mara Sánchez-L opez(2020), and Elosa Daz-Garrido. Digital change has an impact on individual job performance, according to Carla Victoria Guzmán-Ortiza, Nohelia Gabriela Navarro-Acosta, Wilmer Florez-Garcia, and Wagner Vicente-Ramosa* (2020). According to Harry Bouwmana, Shahrokh Nikoub, and Mark de Reuvera (2019), BM strategy implementation approaches help digitalizing SMEs perform better. Digital literacy as an organisational capability and the use of digital technologies to improve the efficacy of employee experiences, according to Dilek Cetindamar Kozanoglu and Babak Abedin (2020). Digitalization resources are related with competitive advantages for SMEs, according to Yan Yin Lee and Mohammad Falahat (2019). According to Carlos Galera-Zarco, Marco Opazo-Basáez, Josip Maric, and Maria Garca-Feijoo (2019), digitalization adoption in the food retail sector necessitates access to capabilities previously unavailable. Efficiency is the factor of knowledge work performance that is most boosted by digitalization, according to Vilma Vuori, Nina Helander, and Jussi Okkonen. According to Harry Bouwman, Shahrokh Nikou, Francisco J. Molina-Castillo, and Mark de Reuver (2018), the impact of digitalization on business models is due to strategies and innovation. Human capital development, organisational culture, and high performance are the drivers to improve HR professionals' effectiveness in Pakistan's telecom sector, according to Muhammad Fareed*,a,b, Aqeel Ahmadc, Sri Sarah Maznah Mohd Sallehd, and Oussama Saoulab (2019). Strategy, Processes, Technologies, Products & Services, and People, according to Luca Canetta, Andrea Barni, and Elias Montini (2018), are the reasons for the manufacturing sector's Digitalization Maturity Model. Digital transformation is pushing a move to a new management environment and culture, according to Bruce Rogers, Erika Maguire, and Casey Clifford (2017).

4. OBJECTIVES OF THE STUDY

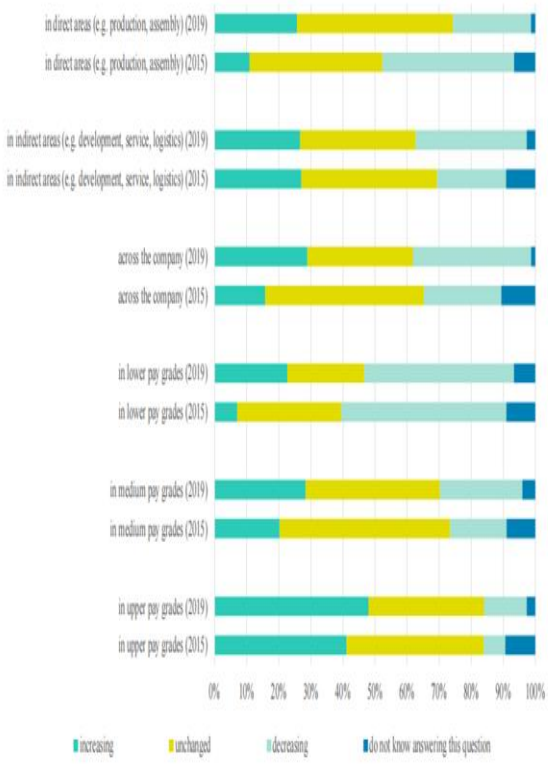
To examine the impact of digitalization strategies on employee effectiveness.

5. RESEARCH METHODOLOGY

The paper is based on the analysis of secondary data. Facts and findings were obtained from a variety of articles and research papers published between 2015 and 2021.

6. DATA ANALYSIS

1. What is the impact of Industry 4.0/digitalization on the number of employees in company?



(Figure-1)
Source: Science direct Procedia Computer Science 180 (2021) 371–380

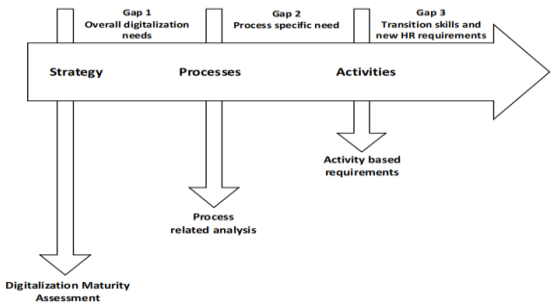
2. Mediation tests performed on BM experimentation practices to identify the relationships between BM strategy implementation practices to the overall firm performance.

Mediation test results.

Specific Indirect Effects	β	t-stat	p-value	Mediation
BM strategy implementation practices - > innovativeness - > overall firm performance	.10	2.89	0.001	Full
Resources for BM experimentation - > innovativeness - > overall firm performance	0.05	2.33	0.01	Partial
BM strategy implementation practices - > BM experimentation practices - > overall firm performance	0.04	2.04	0.03	Partial
Resources for BM experimentation - > BM experimentation practices - > overall firm performance	0.02	1.85	0.06	No mediation

Source: H. Bouwman, et al. Telecommunications Policy 43 (2019) 101828 (Figure-2)

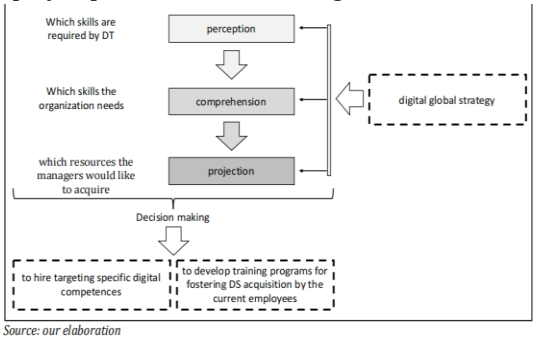
3. Digitalization maturity assessment analysis is conducted to identify the Model for the manufacturing sector.



(Figure-3)

Source: Development of a Digitalization Maturity Model for the manufacturing sector (VOL 7, ISSUE 04, 2020)

4. To examine the impact of digitalization on employee performance in banking sector.



(Figure-4)

7. SCOPE OF THE STUDY

- Fewer research, particularly in India, have looked at the influence of digitization tactics on employee effectiveness in multigenerational workforces. The purpose of this study is to look into the numerous aspects that affect employee effectiveness and the reasons for implementing proper digitalization tactics.
- The report will aid the business in developing a digital strategy. As a result, implementing these digital techniques will assist the business in saving money, resources, and improving staff effectiveness, all of which will increase productivity.

8. DISCUSSION

According to Figure (1), a study conducted in the German metal and electrical industry between 2015 and 2019 shows the influence of digitalization on the number of production industry employees Tim Jeske (2021). Figure (2) Analysis (2019) depicts the mediation tests carried out to determine the innovativeness and BM experimentation practices, as well as the linkages between resources for BM experimentation and BM strategy implementation practices, in order to determine total firm performance. The findings reveal a good direct association between BM experimentation resources and overall business performance. Overall firm performance and BM experiments. The influence of the evolution of the digitalization maturity model in the manufacturing sector is discussed in Figure (3) (2020). According to the findings of a study on the strategic relevance of DS for digital transformation, three key contributions may be identified: I managers believe it is critical to have a clear digital strategy in order to undertake digital transformation initiatives; (ii) managers believe it is critical to implement proper training initiatives both for acquiring and maintaining DS within the organization as well as for fostering informal learning among senior experts and new employees; (iii) managers, regardless of the business department, are frequently unaware of the DS required for a digital transformation; (iv) managers, regardless of the business department, are frequently unaware of the DS required for a Figure (4) This research adds to the growing body of knowledge about the strategic importance of DS for digital transformation, putting new light on the role of managers' understanding.

9. CONCLUSION

This research adds to the conversation about strategic model knowledge in the digital age. Using exploratory

research, the paper examines how digital working environments affect employee effectiveness. These publications uncovered new evidence that digitalization has either a beneficial or detrimental influence, based on earlier research. However, the negative consequences appear to be more obvious. Furthermore, the more limits exist; the more difficult it is to achieve the benefits of digitalization in terms of improving performance efficiency. The previous study had several limitations in terms of the techniques implemented in their business, and workforce diversity and demographic barriers are the primary causes of employee inefficiency. As a result, future study might be undertaken in many industries to see how digitalization tactics affect employee effectiveness.

REFERENCES

[1] Jeske, T., Würfels, M., & Lennings, F. (2021). Development of Digitalization in Production Industry–Impact on Productivity, Management and Human Work. Procedia Computer Science, 180, 371-380.

[2] Kariman, S. (2021). Usage and Knowledge of Technological Advances in a Multi-Cultural Country: The Level of Digitalisation in the UAE, Dubai. THEORY METHODOLOGY PRACTICE: CLUB OF ECONOMICS IN MISKOLC, 17(1), 43-51.

[3] Galera-Zarco, C., Opazo-Basáez, M., Marić, J., & García-Feijoo, M. (2020). Digitalization and the inception of concentric strategic alliances: A case study in the retailing sector. Strategic Change, 29(2), 165-177.

[4] Bouwman, H., Nikou, S., Molina-Castillo, F. J., & de Reuver, M. (2018). The impact of digitalization on business models. Digital Policy, Regulation and Governance.

[5] Sundstrom, M., & Egels-Zandén, N. (2016). The digitalization of retailing: an exploratory framework. International Journal of Retail & Distribution Management.

[6] Martín-Peña, M. L., Sanchez Lopez, J. M., & Díaz-Garrido, E. (2019). Servitization and digitalization in manufacturing: the influence on firm performance. Journal of Business & Industrial Marketing.

[7] Bouwman, H., Nikou, S., Molina-Castillo, F. J., & de Reuver, M. (2018). The impact of digitalization on business models. Digital Policy, Regulation and Governance.

[8] Acciarini, C., Borelli, F., Capo, F., Cappa, F., & Sarrocco, C. (2021). Can digitalization favour the emergence of innovative and sustainable business models? A qualitative exploration in the automotive sector. Journal of Strategy and Management.

[9] Brunetti, F., Matt, D. T., Bonfanti, A., De Longhi, A., Pedrini, G., & Orzes, G. (2020). Digital transformation challenges: strategies emerging from a multi-stakeholder approach. The TQM Journal.

[10] Samson, H., & Agrawal, V. (2020). Effectiveness of Digitalization in HRM: An Emerging Trend. Journal of Critical Reviews, 7(4).

[11] Winasis, S., Wildan, U., & Sutawidjaya, A. H. (2020, August). Impact of digital transformation on employee engagement influenced by work stress on Indonesian private banking sector. In IOEM (pp. 1-13).

[12] Rahman, M. F. W., Kistyanto, A., & Surjanti, J. (2020). Flexible work arrangements in covid-19 pandemic era, influence employee performance: the mediating role of innovative work behavior. International Journal of Management, Innovation & Entrepreneurial Research, 6(2), 10-22.

[13] Fareed, M., Ahmad, A., Salleh, S. S. M. M., & Saoula, O. (2020). What makes HR Professionals Effective? Qualitative Evidence from Telecom Sector of a Developing Country. Revista Argentina de Clínica Psicológica, 29(5), 200.

[14] Bouwman, H., Nikou, S., & de Reuver, M. (2019). Digitalization, business models, and SMEs: How do business model innovation practices improve performance of digitalizing SMEs?. Telecommunications Policy, 43(9), 101828.

[15] Canetta, L., Barni, A., & Montini, E. (2018, June). Development of a digitalization maturity model for the manufacturing sector. In 2018 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC) (pp. 1-7). IEEE.

[16] Holotiuk, F., & Beimborn, D. (2017). Critical success factors of digital business strategy.

[17] Jonsson, A., Areas dos Santos, L., & Gangabada Arachchilage, P. (2020). The Key Aspects of

Digitalization on Employees' Engagement in the Bank Service Delivery.

[18] Prezioso, G., Ceci, F., & Za, S. (2020). Employee skills and digital transformation: preliminary insights from a case study. ImpresaProgetto-Electron J.

[19] Jain, E., & Lamba, J. (2021). Management and Digitalization Strategy for Transforming Education Sector: An Emerging Gateway Persuaded by COVID-19. In Emerging Challenges, Solutions, and Best Practices for Digital Enterprise Transformation (pp. 69-83). IGI Global.

[20] Farrington, T., & Alizadeh, A. (2017). On the Impact of Digitalization on R&D: R&D practitioners reflect on the range and type of digitalization's likely effects on R&D management. ResearchTechnology Management, 60(5), 24-30.

[21] Lee, Y. Y., & Falahat, M. (2019). The impact of digitalization and resources on gaining competitive advantage in international markets: Mediating role of marketing, innovation and learning capabilities. Technology Innovation Management Review, 9(11).

[22] Vuori, V., Helander, N., & Okkonen, J. (2019). Digitalization in knowledge work: the dream of enhanced performance. Cognition, Technology & Work, 21(2), 237-252.

[23] Vilma, V., Helander, N., & Jussi, O. (2020). Correction to: Digitalization in knowledge work: the dream of enhanced performance. Cognition, Technology & Work, 22(2), 427-433.