

Business Transformation in Industry 4.0 and Strategies for Facing Industry in the 5.0 Era

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Abstract in English

The purpose of this study is to confirm or refute whether companies are ready for the next industrial revolution. Current market conditions show that businesses are still struggling to digitize their business through the integration of Internet of Things (IoT), artificial intelligence (AI), cloud technology, and advanced technologies. This study uses an approach that integrates human labor in collaboration with automated processes in the supply chain. The results of this study that analyzes and evaluates the impact of Industry 5.0 on entrepreneurs where Industry 4.0 Analysis provides results based on interviews with practicing sales representatives as well. It focuses on the business landscape and its aim is to identify existing gaps, opportunities and threats. This analysis also describes the best path to transformation in the next industrial revolution.

INTRODUCTION

In 2018, Bernhard Marr, a corporate and government technology and business consultant, stated that the company was on the cusp of the Fourth Industrial Revolution (Mar, 2018). However, even today, companies are still working hard to digitize their business processes so they can compete with automation constantly evolving processes to increase productivity, improve efficiency, and promote flexibility and agility. The goal of all this is primarily to create a better customer experience, and increase profitability and revenue (Bueechl et al., 2021). Despite the relentless digital transformation in Industry 4.0, there are entrepreneurs who care much more about the future and see business processes not as they are now, but as they will be in the future. We need not mention the fact that technological developments are moving forward by leaps and bounds and Industry 5.0 is more or less part of the business environment. However, globalization, digitization, agility and other parameters of business have a duty to ensure the constant transformation is undoubtedly successful in the next step of the industrial revolution.

The purpose of this study is to analyze the state of industrial acceptance 4.0 in various industries (small and medium enterprises) in Indonesia, which will lead to further analysis, which aims to describe in detail the state of acceptance of the new Industry 5.0.

The research methodology is based on a questionnaire-based survey developed with the support of C-level managers (high-level enterprise managers responsible for company-wide decision making such as CEO, Chief Operating Officer (COO)) and Chief Information Officer (COO, CIO). A concise and clear definition of basic terms provides a solid scientific basis, according to which it is possible to understand the dynamics of the problem. Existing opportunities and analyzed problems provide support for positive business development towards Industry 5.0.

LITERATURE REVIEW

Industry 4.0

The first recognized mention of the Industrial Revolution 4.0 was in 2011 by the German government during the Hanover trade fair. This mention describes Industry 4.0 as the improvement of information and communication technology in manufacturing. The fourth step of the industrial revolution can also be characterized as a high degree of automation through fully automatic machine control, as well high use of big data and cloud technology (Ammar et al., 2022). In industry 4.0 consists of various concepts such as automation, digitization, standardization, secure and dynamic networks, and miniaturization but also general innovation and additional mechanization. The role of Cyber-Physical Systems is to monitor physical processes throughout the supply chain through real-time communication and the Internet of Things (IoT) (Tonelli et al., 2021). Fundamental changes due to the Fourth Industrial Revolution are based on developmental technologies such as IoT, Data Analytics, AI, Robotics, Cloud Technology, Blockchain, Cryptocurrency, 3D Printing and others (Hopkins, 2021). Industry 4.0 defines four design principles (Lachvajderová & Kadarova, 2021):

- Technical assistance – use of computerized tools with AI to support the efficiency and effectiveness of human workers;
- Information transparency – ability of computer systems to create virtual copies of real-world objects;
- Interoperability – integration of IoT tools, machine industry and communication support between machines;
- Decentralization – inclusion of technical systems capable of carrying out tasks independently.

To take advantage of Industry 4.0, it is necessary to properly define organizational structures other than cyber-physical systems and technical integration. Partner management, strategic workforce planning, and participation and sharing of technical standards, are the main foundations for enterprises (Hopkins J.L., 2021). When we talk about the fourth industrial revolution, in most studies the technical aspects are widely discussed, but very little attention is paid to the managerial approach and organizational culture, which are the main aspects that complement the success of Industry 4.0 (Martínez-Caro et al., 2020). These obstacles can be referred to as one of the main complications in corporate transformation. In addition, however, there are insufficient skills and little knowledge in the implementation of new technologies (Lachvajderová & Kadarova, 2021). Other barriers include workers' fear of losing their jobs due to robotization and process automation. This includes reliability issues, security issues, or concerns about IoT failures that cause confusion and misunderstanding within society (Gažová et al., 2022).

Digitization

The term digitization is used in various interpretations, for example digital change, digital revolution, digital transformation, digital society, or digital business processes. However, the terms native and original in the literature describe the transition from analog to digital, or vice versa, the transmission of analog information to digital data. Digitization aims to help transform all information that enters the company into a single unit/digital format. It also aims to process this information electronically, thus increasing flexibility, and efficiency and thereby saving process costs and entering the market more quickly (Zhu & Wang, 2021). Digitalization in the context of transformation describes the implementation of digital technology in business, society, and related changes in the connectivity of individuals and enterprises. In 2018, Urbach

(Urbach & Roeglinger, 2018) described commoditization and faster time to market as the main drivers of the power of digitalization (Urbach & Roeglinger, 2018). On the one hand, digital technologies include technologies established at sites such as SMAC (social media, mobile computing, advanced analytics, cloud computing), and on the other hand, emerging technologies such as artificial intelligence, IoT, or Blockchain (Paschek et al., 2017).

A significant advantage of digitization is the availability of data that is independent of time and place. This is made possible by the unparalleled pace of change and degree of interconnection throughout the supply chain, which plays the dominant role of the customer (Urbach & Roeglinger, 2018). Digitalization can also be expressed as a driving force for Industry 4.0 with several trends that underscore the link between digitalization and the Fourth Industrial Revolution: consumer connectivity, optimized manufacturing, empowered employees and transformed products (Javaid et al., 2021).

Industry 5.0

In the case of the Industry 5.0 analysis, we have a few: movement on what is required and how it will impact the business. Since society and companies are still in the early days of the Industrial Revolution, it is difficult to predict which direction will be taken, so we can only rely on the hypotheses and studies that have been carried out so far. In 2018, stergaard pointed out that the next step of the industrial revolution was necessary given the high consumer demand for product individualization (Østergaard, 2018). He also represents this statement in a study published in Bloomberg, which states that German car manufacturers are giving people more space in crop production, noting that adaptation is an important factor for modern consumers (Mattioli et al., 2020). Precisely because of these and many other claims, Industry 5.0 appears to be an intensive collaboration between intelligent systems and humans, where in Industry 4.0 companies focus more on automation than collaboration. Thus, machines have the potential to take on all the repetitive and monotonous tasks, while the role of people takes on the creative side and thus takes on more responsibility and increased control over the system, which should improve the general quality of production. In addition, stegaard maintains that products with a strong mark of care and human expertise are the only ones where customers pay the most. The demands of these contact people will increase in the future as consumers try to express their individuality through the products they buy. It outlines a new kind of personalization, a sense of luxury that businesses have to handle (Østergaard, 2018).

Moreover, the January European Commission, in the context of Industry 5.0, in its 2021 report described the Fifth Industrial Revolution as better meeting the specific economic and environmental requirements of “green production” for carbon neutral, energy efficient industries (European Commission, 2021). They further stated that over ten years, Industry 4.0 has focused less on the original principles of social justice and sustainability and more on digitalization and AI-based technologies to increase production efficiency and flexibility. Industry 5.0 This concept aims to provide a different focus and emphasis on the importance of research and innovation to support industry in long-term service to humanity within the boundaries of the planet (European Commission, 2021). Other studies describe Industry 5.0 as more attractive, faster, and scalable than before, mainly due to the type of technology they have available (Maddikunta et al., 2022). The mentioned effective synergy between technology and humans will also affect the ecological, economic and social world (Demir et al., 2019). This effect is accompanied by a waste prevention perspective applied in industrial recycling (Maddikunta et al., 2022):

These four perspectives for waste overuse prevention point to the enormous economic and environmental impact of reducing wastage of materials and resources, as producers are

interested in reducing material costs and minimizing the impact of industrial social processes (Lu et al., 2022). Synthesis from artificial genes (artificial DNA or DNA imprinting from synthetic biology), and the use of sustainable resources or new raw materials are other dimensions of the characterization of Industry 5.0 with potential business impact. These areas also bring the human factor to the fore in relation to nature and physical integrity (ElFar et al., 2021).

METHOD

To assess the impact of Industry 5.0 on the business structure, analysis of the state of implementation of digitization, resp. Industry 4.0 through a questionnaire. The data and information obtained is to set the starting point for evaluation and benchmarking of several attributes, such as company size by number of employees, industry, customer segment, product, business model, etc. Based on these parameters, and an analysis of the business situation is carried out, the main objective is to assess the existing weaknesses and threats parameters in implementation and realization compared to other companies. The analysis includes questions focused on a company's vision for the future and assessing readiness for the fifth industrial revolution.

Objectives and topics were introduced at the start of the interview, and after a short briefing, the initial requirements required of the respondent regarding general information about the company, such as the number of employees or the business model and customer groups, were continued. The heart of the conversation is in the spirit of questions about implementation, knowledge, implementation, and use of Industry 4.0 technologies, but also about advantages, disadvantages, and possible barriers. Next, the interview moves towards the vision and current state of implementation of Industry 5.0. Open-ended questions with examples of the groupings used, with the intention of obtaining more information from the answers of the interviewees.

The interview included small, medium and large companies in Slovakia. 250 company representatives were contacted and 39 agreed to interviews. The people targeted for interviews were primarily the Chief Technology Officer (CTO), Chief Digital Officer (CDO), Chief Information Officer (CIO), Chief Execution Officer (CEO), and Chief Automation Officer (CAO). In the case of large companies, representatives for communications or middle management also answer interviews.

RESULTS AND DISCUSSION

The following section of the article presents and evaluates the results of the interviews. 39 company representatives from eight different industries in the business-to-business and business-to-customer segments were interviewed (Table 2). It can be divided into 15 small (<50 employees), 21 medium (51–249 employees), and three large (>250 employees).

Table 2. Companies by type of segment

Industry	Number
Manufacturing	12
Technology	10
Construction	5
Telecommunication	4
Commerce	3
Transport/Logistics	2
Energy	2

Figure 1 is the result of the analysis of industrial transformation 4.0 in the samples examined. The industry categories that have changed the most include the technology, manufacturing, transportation, and telecommunications industries. The transportation industry lags far behind the telecommunications industry, which is in the lead in this respect. In third place is industrial technology, followed by trade and production sectors at the same level. The last three sectors can be considered critical, especially construction (barely 25%). The energy industry is ranked seventh ahead of the chemical industry in terms of its level of transformation.

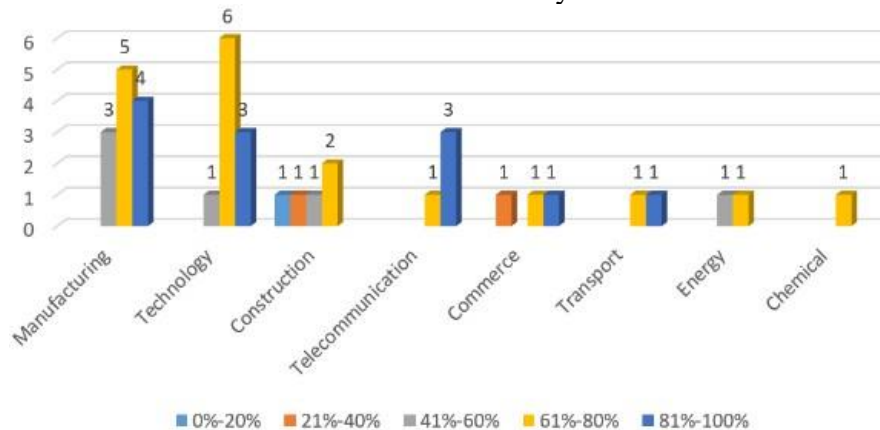


Figure 1. The level of transformation of Industry 4.0 in a selected sample of respondents

This analytical assessment confirms the theoretical assumption that digital transformation, which is an integral part of Industry 4.0, is still taking place in several industries and is slowly being adopted. The main reasons and barriers to this phenomenon can be seen in Figure 2.

From the sample of companies analyzed, most companies struggle with a lack of digital competency. When implementing new technologies, companies are required to have a rapid approach to adapting employees or to accept the need to take the actions and responsibilities associated with transformation. In such cases, a functioning corporate culture and executives have the potential to suppress these deficiencies in the background. However, functioning well corporate culture is not the only solution. Employees who are able to anticipate and learn are also very important, and their interest in new technologies goes hand in hand with their implementation. According to the analysis, the second biggest problem is considered to be a lack of technology and infrastructure (50%). Lack of technology and transformation skills combined with excessive costs and investment bottlenecks together constitute a barrier to enterprise process transformation. However, it should also be remembered that businesses that do not have a clear vision and business goals that have not been formulated (41%) lead to an unclear road map and hinder the overall transformation of the company. These obstacles and threats need to be avoided in view of the lack of technology and infrastructure (50%). Lack of technology and transformation skills combined with excessive costs and investment bottlenecks together constitute a barrier to enterprise process transformation. However, it should also be remembered that businesses that do not have a clear vision and business goals that have not been formulated (41%) lead to an unclear road map and hinder the overall transformation of the company.



Figure 2. Barriers and common threads of digital transformation in the selected sample companies

These obstacles and threats need to be avoided in future or ongoing transformations with a clear and unambiguous business vision and a careful approach to innovation through an open corporate culture and a continuous recruitment process. In addition, investment problems can certainly be avoided by establishing a clear company strategy. In terms of infrastructure technology, business has less impact. In this field, companies must suppress self-government. The other issues of the analysis focus exclusively on readiness and ability to adapt to the Fifth Industrial Revolution. The results are shown in Figure3.

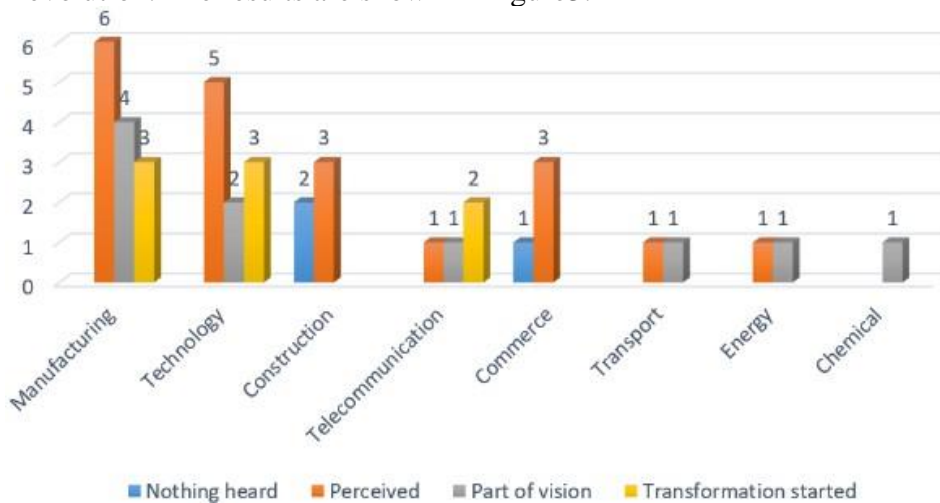


Figure 3. Industry Readiness 5.0

It is clear from Figure 3 that the technology, manufacturing, and communications industries, whose business processes are being realized or are already undergoing transformation, are experiencing pleasant results. On the other hand, companies from the construction industry as well as the commercial, chemical, and transportation industries have either not heard of the latest industrial revolution or heard very little of it, the answer is that they have only seen it. In the surveyed cases of companies from the technology, manufacturing, and communications industries, they feel the presence of Industry 5.0 and most of the companies are already at the beginning of the transformation or the companies have their vision and goals.(Xu et al., 2021). Therefore, companies and individual industries must look to the

CONCLUSIONS AND SUGGESTIONS

The industrial revolution and technological progress are happening faster and faster, and therefore companies need to set clear visions and goals for the company, as well as a clear mindset for transformation. Companies must be able to support and take steps that lead to a successful business in the future. According to the analysis, we found that some companies are still working on the implementation of Industry 4.0 elements and have never heard of Industry 5.0. Companies need to realize that guaranteed success comes only when companies innovate their processes, respond to market changes, and are thus able to provide quality products and services according to customer requirements. Industry 5.0 represents a significant shift in automation leading to the process of enhancing the ability of human workers to achieve personalization by adapting products to the next level. Therefore, in the future, it is appropriate to focus on the issues to be discussed: the skills that need to be developed, the rules between machines and humans, and it is appropriate to define how AI can affect people. Finally, it is time for companies that are lagging behind to wake up and start their transformation process, because the future is happening now, and if companies want to prosper, we must face challenges responsibly and face them.

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