

An Overview of the Situation of SMEs in Hungary in Catching up to Industry 4.0

Z. POPOVICSNÉ SZILÁGYI¹

¹University of Debrecen, Faculty of Engineering, Department of Mechanical Engineering, szilagyizita@eng.unideb.hu

Abstract: Since I have been working I have been in contact with small and medium-sized enterprises (SMEs) and large companies in various ways. I have thus been confronted with the disadvantages of the former in terms of the introduction and use of 4IF technologies. Yet most of them are aware that to remain competitive in the market, they cannot avoid digitising their operational processes to some extent. I have also found that this mainly depends on the characteristics of the organisation; for example, its orientation. Domestic SMEs are therefore currently at a competitive disadvantage in the market. However, there is no information on whether there is a trend towards development and where they themselves should develop. This would help them to develop the right, achievable vision for the future, coupled with a feasible business strategy.

Keywords: drivers, SMEs, orientation, barriers, development, Industry 4.0,

Introduction

The term Industry 4.0, which actually stands for the Fourth Industrial Revolution (4IF), first appeared in a German government newspaper article in 2011 in relation to the high-tech strategy. Nowadays, 4IF or Industry 4.0 is referred to as an industrial revolution that goes hand in hand with the digital transition (Ślusarczyk et al., 2020). This includes the transformation of corporate functions in both the manufacturing and service sectors, in asset management and in the organisation of business. These changes will affect the entire value chain, simplifying manufacturing and engineering processes, and in turn increasing product and service quality (Ślusarczyk et al., 2020). Innovations such as devices that communicate with each other via the internet (IoT), intelligent robots or cloud-based manufacturing have emerged. Therefore, most companies today recognise that these innovation efforts can increase their market share or even gain new ones (Ślusarczyk et al., 2020). Moreover, in a highly dynamic changing environment and in the face of global competition, innovation is often seen by firms as the only way to maintain their competitive advantage (Lichtenthaler, 2018).

Innovation, and the application of new technologies it offers, can be said to be smooth in a large firm environment, as most of the large firms operate in a homogeneous form; that is, they tend to have homogeneous professional activities separated in their processes (Málovics, 2011). In contrast, in the small business environment they work with a wide range of products. Moreover, the latter, i.e. SMEs, are present in different sectors, as part of different supplier networks, with different management styles and ownership structures (Málovics, 2011).

1. Attitudes of Enterprises to Industry 4.0

The achievements of Industry 4.0 could bring about significant technological development and innovation in the life of smaller organisations. They could speed up industrial processes, information flows and processing, among other things. They could also help to rethink current products and services in order to catch up with the new ones defined by the advent of digitalisation. This poses a major challenge for small and medium-sized enterprises. If they want to remain competitive, or even gain a competitive advantage, they cannot avoid the opportunities and technologies offered by Industry 4.0 (Nagy, 2017).

Academic research on Industry 4.0 focuses mainly on large companies and hardly touches the SME sector, while many large companies have suppliers among them or they are suppliers to them. So their activities and needs affect and influence each other's functioning. Therefore, it is important to know how SMEs are implementing Industry 4.0 and how this affects industrial value creation. This latter effect is also relevant for their orientation towards 4IF technologies (Müller et al., 2018).

1.1. Specific situation of SMEs in Hungary

In Hungary, the term SME is defined in Act XXXIV of 2004. According to this law, an SME is defined as an enterprise with a total number of employees of less than 250 persons and an annual net turnover of HUF 50 million or less, or a balance sheet total of HUF 43 million or less. Within this category, a small enterprise is defined as an enterprise with less than 50 employees and an annual net turnover or balance sheet total of less than or equal to HUF 10 million. Within the SME category, a micro-enterprise is defined as an enterprise with fewer than 10 employees and an annual net turnover or balance sheet total not exceeding HUF 2 million. An SME is not an enterprise in which the State or the municipality directly or indirectly owns, individually or jointly, more than 25% of the capital or voting rights.

According to the latest STADAT data for March 2021, there are just over 230,000 small and medium-sized enterprises operating - not counting one-person sole proprietorships. They therefore play a major role in the functioning of our national economy, accounting for 99% of all operating companies (Central Statistical Office, 2022).

With such a high proportion of SMEs in the economy, it is important to know what processes, practices and decision-making activities they operate under and whether they can lead to new market entry and development for them. The fate of an enterprise depends to a large extent on its ability to innovate its operating processes to stand out from its competitors. It is therefore very important for the development of the economy how SMEs adopt the technologies, or how those that have not yet incorporated them into their business model are willing to adopt 4IF technologies.

In the context of the Fourth Industrial Revolution, another important factor, sustainability, is increasingly being mentioned as an expectation that businesses are increasingly expected to meet. This term, which has three pillars: social, economic and environmental, has been widely used since the 1980s. The three pillars are interdependent and therefore need to be reflected in sustainability policies in a balanced way. It is based on the idea that businesses should operate in a way that optimises environmental, social and economic objectives. The development of environmental and industrial

safety, operator and regulatory activities for the safe operation of hazardous industrial activities and technologies is essential to ensure the sustainable development of the economy. And to protect the environment, we need social cohesion.

The figure below illustrates that sustainability can be achieved through conscious changes to the three factors. On the social side, changes are needed in community, education and social resources. Ecologically, the focus is on natural resource use and land use practices, and improving water and air quality. In terms of the economy, the objective is to create economic value.

Fairness will be achieved when there is a balance between economic engagement and social processes. Achieving a livable state requires a balance between economic commitment and environmental protection. Our planet will become a liveable place if we take responsibility for the living conditions of the present and future generations. If all three conditions are met, we will be able to achieve a sustainable future. This will happen if we can produce and consume responsibly at a high level of well-being, i.e. reduce our ecological footprint.

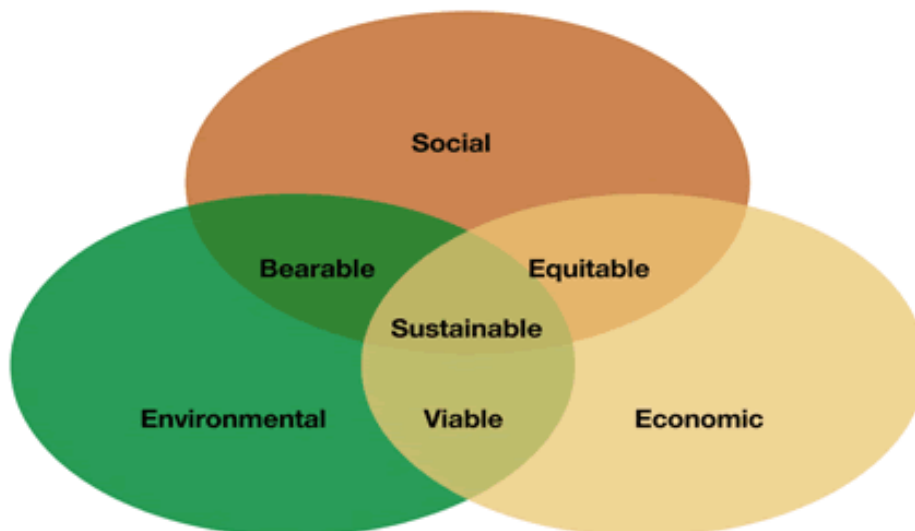


Figure 1. The triple aim system – Balance of the three pillars

Source: own editing based on EIONET (2018)

At a time when the Earth's living conditions are deteriorating and its energy resources are dwindling, the need to create a sustainable future cannot be ignored in the context of economic development. It means that all businesses should apply new technologies in such a way that the work processes and products they create are as sustainable as possible and have a long life cycle (German et al., 2020).

In the case of corporate sustainability, there is no theoretical or empirical evidence yet that current practices actually contribute to positive macro-level ecological and social processes. It can be argued that SMEs, despite the heterogeneity of the sector, have a number of distinctive operational characteristics compared to large companies, which will make their social responsibility and sustainability role different from that of large companies. Furthermore, their understanding of

corporate sustainability is that they are very sensitive to economic change because of their vulnerability. Moreover, the structural characteristics of SMEs mean that they cannot be judged simply on the basis of the application, or lack thereof, of large-scale enterprise methods.

As can be seen from the above, there are a number of aspects that Hungarian SMEs need to change in relation to 4IR technologies. Although there is progress and innovation, for example in the logistics sector, this does not extend to the whole operation of the firms.

In many cases, the lack of business orientation and willingness to adopt 4IR technologies is a barrier to 4IR technologies in domestic industries. SMEs also face other barriers. Although the willingness to embrace 4IR technologies is playing a role in shaping the vision of businesses. Its emergence as an important tool for growth and competitive advantage.

2. Business orientation and SMEs

Enterprises are fundamentally created to create wealth, entrepreneurship, innovation, change, jobs, value and growth. Entrepreneurship refers to an established corporate will as an 'entrepreneurial orientation', as well as decision-making styles, practices, processes and behaviours that lead to 'entering' new or established markets with new or existing goods or services (Renjen, 2020). This suggests that entrepreneurial orientation is an important factor for business growth and competitive advantage.

Theoretically, in order for entrepreneurial orientation (EO) to influence company-wide behaviour, a company must adopt it as an organisational mindset. This requires that employees throughout the company voluntarily engage in entrepreneurial activities within the EO. Previous research has concluded that, overall, there is a significant relationship between EO and business performance. The link between innovation capacity and business performance of SMEs is moderated by market turbulence. Firms with higher levels of innovation capability perform better in environments with higher levels of turbulence (Taigang & Keliang, 2015). Such capabilities as strategic, management entrepreneurial and conceptual competencies (EC) play crucial role in the effective performance and success of any business. It is an established fact that exposure and use of entrepreneurial competencies are the fundamental ingredients of any successful business venture (Ahmad et al., 2010).

Not surprisingly, developing and encouraging a strong tendency towards entrepreneurial behaviors among employees may be an important path to performance advantages in organizations of different types and sizes (Gupta et al., 2016). According to Hendarman and Cantner (2018), skills based on competencies are highly positively correlated with innovativeness. It is noted that entrepreneurs with specific skill sets based on competencies are considered to be innovative and can work better for their small level ventures.

Findings show that small business owners need to develop competencies in order to perform better. This can be backed in times of Covid-19 as well where entrepreneurs with competencies have performed well. even in Covid-19, small businesses performance has improved due to presence of EO and EC and based on the conclusions (Khan et al., 2021).

3. IR4 technologies

As IR4 is based on the integration of information and communication technologies and industrial technologies, it is necessary to build a cyber-physical system (CPS) in the first place. This will create a smart factory that will help manufacturing become more digital, information-driven, customised and green (Taigang & Keliang, 2015). To achieve this progress, new achievements offer huge opportunities in many areas of industry, as they are based on digitalisation and artificial intelligence, which together allow machines to behave autonomously. Their introduction has an impact on the entire value chain; simplifying manufacturing and engineering processes, improving the quality of products and services, optimising the relationship between the customer and the organisation, and opening up new business opportunities. Furthermore, by changing the educational requirements and the current operating environment, the economic benefits are significant (Ślusarczyk et al., 2020). All of these together increase the efficiency of the socio-economic system.

Cloud computing innovation comes from a search engine platform and is a computing technology that offers high performance at low cost. Virtual technology provides cloud computing, dynamic sharing, resource sharing and other services under variable conditions (Taigang & Keliang, 2015).

To apply these innovative technologies qualified and more importantly entrepreneurial workforce is required. Therefore, without consideration of employees' entrepreneurial orientation, the potential of new technologies may not be fully realized and workers may not meaningfully engage with them. As employees have very limited or no decisional powers in regards to using a new technology. It follows that administrators and managers should encourage development of entrepreneurial skills among employees across organizational levels (Gupta et al., 2016). Employees' proclivity towards entrepreneurial activities is an important factor in understanding reactions to new technologies in mandated contexts. Even when the decision to use a new technology has already been made at the upper echelons of an organization, it does not mean that it will be readily adopted by individuals working in the organization (Silva, 2007).

4. Willingness of SMEs

The willingness of firms, especially small and medium-sized enterprises, to introduce new things varies widely. Companies that have a security strategy, i.e. are prepared for changing economic phenomena, are able to recognise the potential of 4IF technologies and are willing to apply them in a flexible way to cope with the changes they bring. This attitude depends on a number of factors, including the different economic environment or the skills of the workforce, and the nature and type of firm. In Hungary, too, some firms are highly efficient in the use of their resources and recognise opportunities for improvement in good time and take steps to exploit them. While others shut themselves away from this form of development (Müller et al., 2018). It would be in the interest of businesses to be informed and able to act in real time to changes in the economy, especially now in times of pandemic and economic crises. This period can also cause serious disruption for 4IF technologies. Yet studies show that firms' resilience would be effective in mitigating the damage to the economy if they had the ability to recognise potential changes. (Ślusarczyk et al., 2020).

Individual entrepreneurial orientation will be positively associated with the willingness to use a mandated technology. Entrepreneurial orientation encompasses a basic willingness to depart from the 'ways things have always been done' (Gupta et al., 2016). Perceiving ease-of-use is strongly related to willingness to use a new technology.

Michna and Kmiecik's study results reveal that open-mindedness culture has both a direct and indirect (through knowledge sharing) impact on willingness to implement Industry 4.0 in SMEs. Results suggest that in terms of micro-enterprises, open-mindedness is more important and knowledge-sharing is less important for willingness to implement Industry 4.0 than in larger enterprises. Moreover, regardless of the company size, financial performance is positively related to willingness to implement Industry 4.0. The research results provide SME managers with guidelines on what activities within the company should be strengthened if the goal of the company is to implement Industry 4.0 solutions (Michna and Kmiecik, 2020).

5. Barriers

Studies have shown that larger firms are much more prepared for technologies of Industry 4.0 than SMEs (Kent et al., 2019). The latter ones struggle to adapt and implement the technologies. Therefore, the barriers are more evident in the SME sector. Although not all the information on this has yet been explored (Kent et al., 2019).

One of the problems for SMEs in relation to 4IF technologies is the issue of network security in relation to network communications technology, including cyber espionage and hacking. Fear and lack of preparedness for cybercrime, both in terms of technical and theoretical knowledge (Frank et al., 2010).

On the other hand, they do not have the basics needed to implement digitalisation and automation, i.e. digital design, simulation and networked production data management. To achieve this, the activities and workflows in the organisation would have to be transformed (Müller et al., 2018).

Other obstacles include lack of knowledge, lack of application of standards, excessive focus on company operations at the expense of business development, and lack of employee training. There is a lack of knowledge and understanding of the interaction between newer technologies and people, and scarce financial and human resources. Overall, these constraints make small businesses less ready for Industry 4.0 (Kraus et al., 2012).

More barriers are a lack of understanding of the strategic importance of Industry 4.0 and a lack of employee knowledge about Industry 4.0. The technology trajectory may sometimes prevent the company from experimenting with new systems because they already have spent a lot of money on specific programming in some systems, which will be perceived as waste when they have to start up with new systems, even though they may contain new and important features for their business (Jan Stentoft Arlbjörn, 2019).

However these above mentioned facts are not the whole on the scale. As some studies had the results that the main barriers to implementing Industry 4.0 include not only the lack of skilled workforce but the lack of financial resources, concerns about cybersecurity, and organizational resistance. Even more, researchers identified driving forces of Industry 4.0 as growing competition, striving to improve

sustainability, innovation, productivity, and firm performance. Nevertheless, human resources, their competences and skills, openness to change, and willingness to learn are crucial for adoption of Industry 4.0.

SMEs are less capable of coping with technological, financial, and human resources challenges regarded to Industry 4.0 than large enterprises. Lack of knowledge, a short-term strategy mindset, a manager's attitude towards Industry 4.0, costs, and uncertain return on investment may be of key importance for the development of Industry 4.0 in SMEs [9,10]. Thus, the development of Industry 4.0 in SMEs may be different than in large enterprises, which results from the characteristics of SMEs (Michna and Kmiecik, 2020).

Conclusion

From the above it can be concluded that currently Hungarian SMEs are not sufficiently prepared to integrate technologies of industry 4.0 into their daily operations. Innovation and catching up with new technologies is necessary for them to stay in the market. This also brings with it the issue of sustainability, which will become an even more central issue for businesses in the future. However, performance of small businesses can contribute greatly in the economic development of the country.

Moreover, small businesses have relatively more tendency towards risk taking propensity which causes the most significant relationship with entrepreneurial competencies (Khan et al., 2021). Therefore, it is strongly recommended to emphasize the strengthening of mechanisms associated with fundamentals of entrepreneurship as it would further help the competitiveness of small enterprises (Khan et al., 2021).

It is confirmed that the performance of small businesses is significantly influenced by an individual's orientation towards entrepreneurship. Having orientation of one thing does not necessarily result in success, rather competencies of the individual matter a lot. An entrepreneur having right orientation can make the business successful but if an entrepreneur possess the required competencies, the performance results of the business can be better.

There is no single or overall recipe or set of skills or competencies that can ensure success of a small business, but certain things highlighted in this study and extant literature on the subject, can surely help entrepreneurs or potential entrepreneurs with entrepreneurial orientation in managing or overcoming certain operational or strategic hurdles.

Government support can help with increasing the knowledge level at small businesses to increase consciousness of an application pull and the opportunities with technology pushes. The relatively low degree of readiness and application among SMEs may indicate an untapped potential for innovating business models using Industry 4.0 technologies (Jan Stentoft Arlbjörn, 2019).

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