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Research Article

Digital challenges of production processes in a company

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Abstract – Industry 4.0 will facilitate and simplify communication processes in manufacturing. Digital technologies are gaining ground, from the emergence of cloud computing to Big Data analytics and IoT. The rapid evolution of digital technologies has fundamentally changed the competitive landscape of manufacturing companies, forcing manufacturing companies to digitise and transform their organisations. ERP systems play a key role for SMEs, as this is an area where SMEs have been lagging far behind large companies. At the same time, there are technical and human barriers to the adoption of advanced technologies, the combined effect of which can cause serious disruption to manufacturing processes. In recent years, digitalisation changes have created a number of new opportunities to secure long-term competitive advantages by systematically improving production performance and/or gradually reducing production costs. The aim of this paper is to illustrate the emerging challenges through a concrete company case study.

Keywords – Digitalisation, ERP System, Tracking, Production, ICT

I. INTRODUCTION

There is an active automation and digitisation of the economy taking place around the world, and traditional business models are being transformed as a result. Today, Industry 4.0 and IoT are buzzwords. However, the use of these terms is not clear. The diversity of terms, such as Internet of Things (IoT) or Industry 4.0, and the different approaches to their definition lead to mistakes in the adoption of new technologies by companies. [1]

The term Industry 4.0 is often used as an umbrella to cover a range of related innovations, including automation of the human-machine interface. In the field of industrial applications, the following characteristics are considered as specific to Industry 4.0: interoperability (the ability of different IT systems to work together), virtualisation, decentralisation, real-time capability, service orientation, modularity. [2]

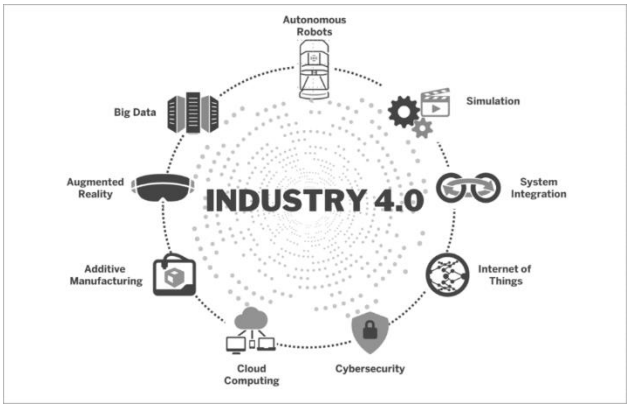

Fig. 1 Industry 4.0 [3]

II. DIGITALISATION AND ICT

Information and communication technology plays an increasingly important role in our society. Three trends are redefining the role of digital tools in supply chain management:

1. the evolution of products to be digitised - the digital world and the constant expansion of IoT
2. the convergence of design, implementation and visibility systems - integrating functions and functionality
3. customers' demand to tailor their products and services to their specific needs - mass customisation. [4]

Experience so far shows that most domestic supply chains are a mix of paper-based and IT-supported processes.

The concept and scope of digitalisation has been increasingly explored in recent years, and it is clear that it is slowly moving beyond its original meaning.

Digitisation as a term refers to the digitalisation of processes, content and objects that were previously (partly or entirely) physical or analogue. [5] This may raise the question of what technological innovations the technologies used in the digitalisation process bring us.

III. THE INVESTIGATED COMPANY

The company under investigation is a manufacturing company operating in a county seat in Western Hungary, an SME due to its size, whose production processes were investigated. The manufacturing company itself has a history of several decades, the profile of the company has changed radically in the last three decades, from the former series production to the continuous shift towards customized production.

It is well known that custom or low-volume production, by its very nature, offers a higher value-added ratio compared to high-volume production, but also requires more flexible process design and traceability.

Let us assume that identification is the accurate recognition of an element, which consists of the capture, transformation and storage of data, and the information system required for this consists of the following components: network; hardware: server, computer; software: database, programs, operating system and interface logic. [6]

The company also needs to improve in this area.

The company has an ERP system that can handle small batch production. An ERP system is expected to be able, when a batch ID is entered, to be able to specify all the products (and their customers) that are made from the same batch. However, if you have to recall the final product because of a material or component, the problem is that even products without defects can be recalled if the batch management is not strict. [7] So you can conclude that tracking is a problem.

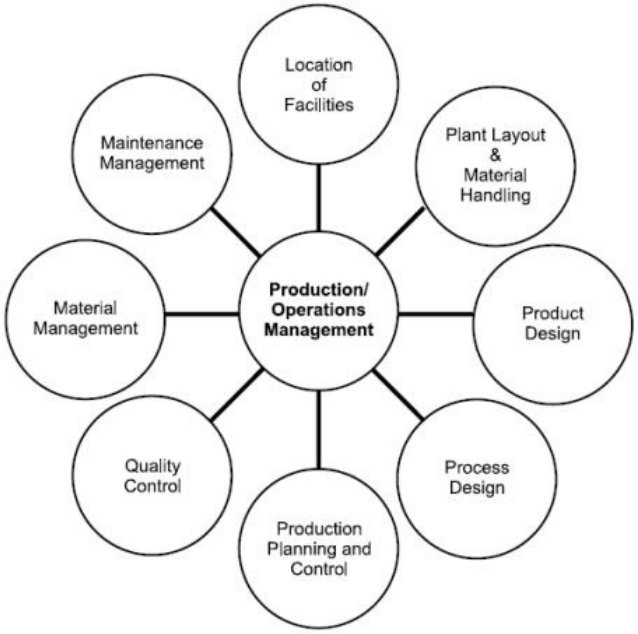

Fig. 2 Production/Operations Management [8]

IV. THE ERP SYSTEM

The role of corporate governance systems has become an essential requirement for the operation of companies, including SMEs, in recent decades. [9]

Fig. 3 ERP [10]

The benefits of ERP systems are:

The most significant advantage of ERP software is that it manages almost all of the organisation's processes and stores all of the organisation's data in a single database, rather than separate, fragmented, individual solutions.

As a result, collaboration between departments is facilitated and decision-making can be based on real data.

The use of ERP systems makes the organisation's operations more efficient by monitoring processes.

The data and information that can be extracted from an ERP solution enables management to make informed decisions in a timely manner.

By using ERP software, the organisation can identify changes more quickly and respond to them faster.

With ERP systems, internal and external collaboration is easier and more efficient. [11]

Yet today's ERP systems are anything but basic and have little resemblance to the ERP of decades ago. They are now delivered via the cloud and use the latest technologies – such as artificial intelligence (AI) and machine learning – to provide intelligent automation, greater efficiency, and instant insight across the business. Modern cloud ERP software also connects internal operations with business partners and networks around the world, giving companies the collaboration, agility, and speed they need to be competitive today. [12]

V. THE FUTURE OF ERP

Digital transformation is accelerating - and ERP is at the heart of it. As enterprises adopt digital technologies in every part of their business, they are fundamentally changing the way they do business. One of the key digital business accelerators, according to Gartner, is "banishing lag" - in other words, eliminating all the negative forces that slow down the business, including outdated processes and systems. So it's no surprise that companies are already demanding more robust ERP systems. The three main trends are:

Cloud: the preference for cloud ERP will continue to grow as more companies discover its benefits - including "anywhere" access.

Vertical integration: enables companies to get the advanced functionality they need without painful integration issues or data locked in information silos. We are also seeing a move towards greater flexibility.

User personalisation: staff, customers and suppliers all want content and functionality that meets their specific needs or interests and makes them more productive. [12]

Fig. 4 Future trends in ERP [13]

In addition, there are several developments that can provide a significant competitive advantage for any business: full mobile application integration, a standard requirement for more modern ERP systems. The emergence of AI, Machine Learning in business processes. The emergence of webshops, an integral part of modern ERPs, where users can search for solutions to a specific problem. Social approach. The emergence of modern technological solutions in ERPs, IOT integration, the possibility of using blockchain, are among the trends that have emerged everywhere today. Given the continuous evolution of modern ERPs, companies can be sure that by choosing such a solution, they will have a continuous opportunity to access the most modern solutions in line with current trends. [14]

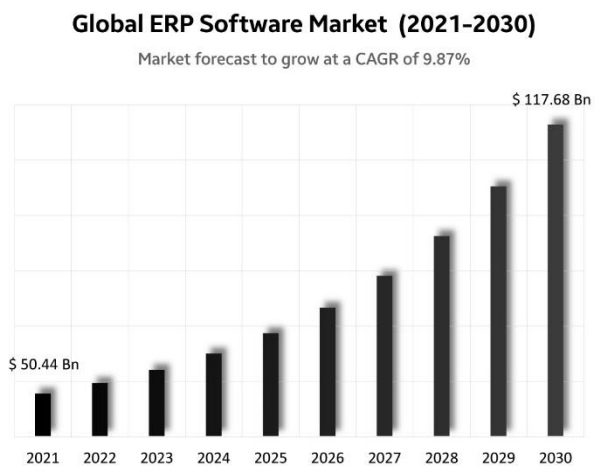

Fig. 5 Global ERP Software Market (2021-2030) [15]

The manufacturing and service segment of the industry sector held the largest market share of 20.45% in 2021. ERP software helps monitor daily operations, manage customer service, and track daily performances in this segment. Other advantages of the software include smoother inventory control, real-time information tracking, and production planning. Manufacturers are switching to ERP solutions because of the growing need to track vendor performance and improve visibility throughout the supply chain to help them with efficient operations planning and management. [15] [16]

VI. CONCLUSION

We can talk about the emergence of new technologies in the field of production systems, mainly due to the rapid development of information and communication technologies. This rapid change, however, makes it difficult to assess the assets, which does not make it any easier for companies. However, SMEs are now beginning to recognise the opportunities offered by digitalisation. Importantly, they are beginning to realise that digitalisation is not just a substitute for day-to-day operational tasks, but can also be used at a tactical and strategic level, an opportunity that is not only available to large companies today.

For the company under review, the digitisation of processes is currently a priority. This will improve the measurability of processes. This can help to increase efficiency. On the one hand, this requires an improvement of the information system: e.g. an update of the current ERP system, e.g. a new version is suitable for batch identification. At the same time, it is necessary to improve the network and build the missing infrastructures. On the other hand, it is important for employees to understand the benefits of implementing a new system or process, in addition to the new obligations.

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