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THE IMPACT OF TECHNOLOGICAL DEVELOPMENT ON CHANGES FOR CORPORATE MANAGEMENT

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Purpose: Nowadays, technology and knowledge management are becoming key components in business management methods. The paper aims is to indicate different ways of approaching technology management, taking into account factors shaping the market and determining barriers to making long-term decisions but also the ongoing digital transformation.
Methodology/Approach: The paper is a general review of technology management methods in enterprises and is based on the analysis of available domestic and foreign source literature, a synthesis of studies and reports of selected organizations dealing with the analyzed issues, as well as the authors' previous theoretical research.
Findings: The research results indicate an increase in the importance of knowledge and technology management, which result from the pace of technological change and the ongoing digital transformation in many areas that directly affect the functioning of an enterprise in the modern world.
Practical implications: The paper indicates methods of knowledge and technology management based on the challenges of modern enterprises related to digital transformation and resulting from the turbulent changes in the market of new technologies. Based on the conducted experience, the authors diagnosed key factors and elements related to methods of acquiring technology to achieve competitive advantage and improve economic efficiency.
Originality: The article expands knowledge about the impact of technology development on enterprise management methods, as well as points to current challenges arising from the issue of knowledge management, taking into account the need for selected enterprises to make long-term financial decisions. To illustrate the problem, the authors used the example of mergers and acquisitions.

Keywords: knowledge management, merger and acquisitions, corporate finance, technology, digital transformation.

1. Introduction

Technology supports the functioning of the company in various areas of its activity. The term "technology" has been evolving for many years along with technological progress, which is noticeable in many areas including economics. Derived from Greek, the term "technology" is a combination of words "techne" – art, crafts and "logos" – science, reason (Pellegrino de Souza et al., 2015, p. 94). From the economic and organizational point of view, technology is associated with a process that is strictly sequential, which means that it produces a finished product with specific functional characteristics from the initial goods (materials, semi-finished products or raw materials). The development of technological systems, mainly ICT, in enterprises dates back to the second half of the 20th century, in particular from the 1980s, and in Poland from around 2000. The process is called "management of technology", which, according to the National Research Council (NRC) in the United States, includes criteria related to: identification and assessment of technological possibilities, management of research and development works and determining the degree of feasibility of a given project, integration available technology, implementation of new technologies in processes and products but also issues related to obsolescence and technology replacement (NRC, 1987).

In the context of enterprise management, it is crucial that technology contributes to increasing (maximizing) the efficiency of resource use. It focuses, among other things, on reducing costs and, consequently, increasing potential operating revenues. Access to highly effective technologies, i.e. those that enable the highest possible number of products to be obtained from a small amount of inputs. Technology is subject to frequent changes that aim to improve management processes, creating new opportunities and thus strengthening the company's competitive position on the market.

The research was conducted based on a source literature review, available scientific examinations in the field of management and corporate finance and an analysis of reports and statements related to the issues of digital transformation and technology management. The paper aims is to analyze the factors determining the development of modern enterprises under the influence of technological changes and to present the economic effects resulting from them.

Therefore, the authors pose the following research questions:

1) Does technology influence globalization processes, including merger transactions?
2) What role do technological processes play in the context of management methods in modern knowledge-oriented enterprises?
3) What factors determine the success of implementing modern technologies according to current management concepts?
4) What barriers do enterprises encounter due to technological changes and what challenges do they face?

2. Corporate management in the context of technological changes

The development of modern enterprises depends on the adopted strategy and business model, which is often based on technological support. From the point of view of corporate management, as well as the organization of internal processes, the factors that are important are those that actually optimize communication between various groups of recipients located internally (ranking employees, management staff, owners) and externally (suppliers, customers, competitors, investors). enterprises. This is done through continuous exchange of information at various management levels but also in relations with other enterprises, public institutions and private investors. The increasing unpredictability of economic changes forces managers to make various decisions, often in a situation of incomplete information and the inability to forecast the future (Firlej, Bargieł, 2014). One of them are globalization processes, which, on the one hand, lead to the unification of markets and the creation of competition on a global scale (existence of large enterprises), but, consequently, on the other hand, the need to adapt to the conditions of the international economic environment (external perspective) and ways of organizing work and managing an enterprise. (internal perspective). The main technological factors influencing management include: automation and computerization, development of telecommunications and computer support systems, development of transport and road infrastructure but also everyday technologies, soft ecological technologies and the use of alternative energy sources, which reduce the consumption of fossil fuels and increase energy efficiency (Toborek-Mazur, Partacz, Surówka, 2023). The above diagnosis is the answer to the first research question.

The development of technology and, consequently, media (traditional and social) has accelerated many processes on the market, including: globalization. M. Łuczak notes that the more developed the technology, the greater the pace of change (Łuczak, 2017). Modern technology, especially in combination with wireless Internet connectivity solutions, leads to many changes in the functioning of enterprises. For example, when analyzing enterprises in the tourism sector, several directions are distinguished, including:

- ability to implement market innovations, in particular in terms of estimating and predicting future costs and access to new markets,
- increasing access to the tourism market by increasing tourist offers and announcements published on the Internet by travel agencies,
- improving internal business processes of enterprises related to the flow of information through electronic communication channels,
- changes in the balance of power between service providers and recipients related to increased general availability of information on new and existing markets,

- increasing cooperation between tour operators and other service providers, resulting in an increase in the diversity of holiday offers and service negotiations,
- higher level of interoperability with both internal and external participants of the business process (Kurleto, 2013).

All these activities lead to an increase in the importance of competitiveness on the markets in which the company operates, both on a national and international scale. They also influence the increase in demand for information management as a measure of the effectiveness of managing internal processes in the collection, processing and interpretation of data that represent value for the company. Objective measurement of value management is made on the basis of the so-called market value added (MVA) but also economic value added (EVA). Their use in many enterprises involves estimating a strategy that maximizes the value created. This is the case, for example, in companies interested in a merger or acquisition transaction, in which the accuracy of measurement of the possible profits and expected costs of the merger, relative to the expected value, by all participating parties, plays a key role. Therefore, in this case, one of the key factors is synergy, which is created as additional value after the merger. Economic and organizational success depends on the effectiveness of transaction management processes, from the pre-transaction phase, through signing the contract, to the integration phase. An important role here is played by access to information but also by means of optimizing decision-making processes, which are most often based on the use of modern technologies. Analyzing the subject literature, it can be concluded that the most important IT systems implemented in enterprises include (Misztal, Fajczak-Kowalska, 2020):

- Customer Relationship Management,
- Partner Relationship Management,
- Manufacturing Resource Planning,
- Enterprise Resource Planning,
- Supply Chain Management,
- Business Intelligence,
- Workflow Management,
- Knowledge Management.

The multitude of different mechanisms optimizing the decision-making process in the enterprise is important from the perspective of logistics enterprises that use IT systems to carry out multi-level resource planning. This fact results from the implementation of various management support systems, which are most often observed in enterprises from the TSL sector, i.e. transport, forwarding and logistics. In practice, it depends on the exact specificity of the business activity, but in the literature it stands out, among others: benchmarking (based on comparing, measuring, searching for and confronting various solutions compared to the solutions proposed by the so-called best in a given field, industry or group), comprehensive quality management (oriented at increasing the level of competitiveness and profitability of the

company), lean management (oriented to reduce costs, increase quality and shorten the delivery cycle), Six Sigma (a statistical tool for improving processes by increasing profitability and subordinating management to eliminate defects), outsourcing (separating some specialized tasks from one's own organizational structure to another entity) or Business Process Reengineering (through rapid redesign of processes in the enterprise resulting in cost reduction, increased efficiency and shortening the duration of processes towards the implementation of team work).

3. Factors determining the success of implementing modern technologies in an enterprise according to the concept of technology management

Enterprises have different areas of technical knowledge that enable them to achieve specific goals. It consists of an appropriate technological base, which is knowledge codified in the form of appropriate procedures, sketches, instructions or diagrams but also tacit knowledge possessed by employees and teams of employees, as well as machines and devices used in the production process. Technology in the production process is often protected by intellectual property rights in the form of patents, licenses or know-how, which together create intangible technological assets that generate additional value for the company. As technology is the basis of competitiveness and often a source of innovation within the enterprise, such value is treated as the basic source for estimating the value of the entire enterprise (Urbanek, 2011, p. 49). Therefore, it is important from the perspective of investments made by existing or potential investors.

According to M. Dolińska, enterprises focused on innovative solutions should be characterized by the ability to introduce new goods and services to the market that will allow them to achieve high revenues, while at the same time trying to further develop so that the implemented solutions do not start to lag behind the competition (Dolińska, 2010, p. 27).

According to I. Hejduk and W. Grudzewski, technology management involves managing technological changes (Hejduk, Grudzewski, 2008). However, according to K. Klincewicz, it is an interdisciplinary process that combines various functions in the company based on knowledge in the field of strategy, marketing, finance, production and research and development (Klincewicz, 2010). According to A. Becla, information technology management mainly includes creating, ensuring the efficiency of operation, modernizing and securing appropriate information and IT infrastructure in the form of hardware and software, as well as the use of organizational structures and human resources for the efficient functioning of this infrastructure (Becla, 2019, p. 37). Figure 1 indicates the most important criteria related to technology management.

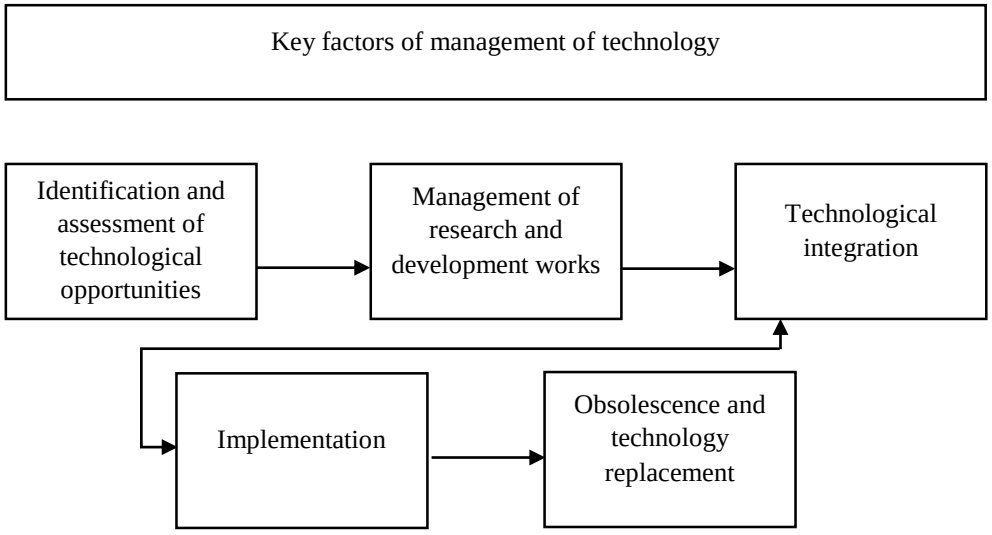

Figure 1. Key factors of management of technology.

Source: author's own studies based on (NRC, 1987).

Based on the above diagram, it can be seen that the order in which key technology management factors are disclosed follows a logical structure. Firstly, there is a need for a given company to identify and assess technological possibilities. The role of knowledge management combined with the use of information technology tools is revealed here. Although, as M. Plebańska points out, the very definition of a "technological tool" in the context of knowledge management is difficult to clearly classify due to different degrees of functionality. Nevertheless, the mechanisms supporting the knowledge management process include three basic technological systems, i.e. database technology (based on database mechanisms and programming language systems), network technology (related to the exchange of data at the hardware level using dedicated servers and software intended to perform these activities) and web (combining database and web technology, including on dedicated websites) (Plebańska, 2016).

It is worth emphasizing that between the individual knowledge management criteria and the decision-making and financial capabilities of the enterprise, technology plays a specific information role. This is the basic role of technology, because in an enterprise it is based on information processing. Answering the next research question, the authors state that in the context of knowledge-oriented management methods, technology enables the identification, collection and selection of data that generates enterprise value. However, the essence of knowledge lies in the method of its use, and not in the process of collecting information resources (Szaban, 2003, p. 44). Therefore, if we adopt a pyramidal structure (the so-called knowledge pyramid), in which the narrowest quantitative scope is knowledge, then information, and the broadest is data, then knowledge is the substrate of information and data used to take a specific action. If a given person has knowledge, he or she also has appropriate data and information that enable it to be used (to make decisions). In an enterprise, they mainly serve to assess various economic solutions (financial, management, organizational) (Kłusek-Wojciszke, Łosiewicz, 2009, p. 137).

However, only explicit knowledge (that can be saved on a medium) can be subjected to technology. This means that tacit knowledge cannot be easily captured and used, because its source is all information that is not schematic and formalized, e.g. individual skills or qualifications of an employee, which are also important from the perspective of the company's value. This is especially noticeable in mergers and acquisitions. Synergy, as the basic determinant for making these decisions, is not clearly identifiable numerically, because its size is influenced, apart from financial factors, by non-financial factors such as brand or reputation, and these are not directly identifiable (Toborek-Mazur, Partacz, 2022a). However, it is important from the perspective of enterprise valuation and it is often the subject of negotiations in the merger. Because of it, it is possible to create databases in which they are stored and processed, and then made available to various end users. As knowledge management uses information technology mechanisms, the degree of their usefulness depends on the behavior of a person (information user) – his or her skills, experience, ability to interpret facts and data.

For example, the ability to estimate investment risk allows for investments whose risk level will be as low as possible for the investor. Based on the information from the financial statements, the investor is able to make a decision about the transaction, postpone it or abandon it. From the perspective of corporate finance, it is additionally important to adopt technological solutions that will not significantly reduce the company's financial capacity in the long term and, at the same time, will contribute to reducing costs.

4. Models for creating technological potential

There are several models for creating technological potential. Some are focused on solutions coming from outside, i.e. from other enterprises on the market, universities, government or commercial research institutes and laboratory centers, and others are focused on developing their own research and development base. The basic advantage of scientific and technical solutions obtained from outside the company is that it is the shortest and most profitable, and at the same time characterized by relatively low risk, way to strengthen its own technological potential. In this sense, technology appears as a strategic resource, and technology transfer as one of the ways of development determining the market success of an enterprise (Glabiszewski, 2016).

The thesis is confirmed by R. Tylżanowski, who points out that technology transfer is an essential determinant of economic success. It is based on providing a set of information that ensures proper conduct of business activities, e.g. methods and methods of production (Tylżanowski, 2016). It is therefore a process of transferring tangible and intangible resources between specific entities for their absorption by the final buyer, both in the original and

transformed form. Such activities highlight the importance of technology companies conducting mergers and acquisitions. Mergers and acquisitions are transactions aimed at acquiring appropriate company assets, either in the form of a merger or acquisition. In the case of a merger, a new entity is created from two existing ones. However, the acquisition may be based on the purchase of licenses, patents, utility models, know-how, machines or technical devices. Therefore, the subject of takeover may be the entire enterprise, its separated part, or even individual assets. This is often associated with the flow of intellectual capital (individual skills, technological consulting), which is an important link in the process of implementing modern technological solutions. The growing interest in mergers and acquisitions among technology enterprises in Poland is confirmed by data collected by Fordata and Navigator Capital. The most active sector in M&A in 2018-2022 in Poland was the technology, media and telecommunications sector. The variability of individual data results from differences in the number of transactions carried out, also determined by the buying and selling parties within the transaction. Data on mergers and acquisitions in technology companies by sector are presented in Table 1.

Table 1.
Mergers and acquisitions in technology companies (sectoral approach)

Year	Most active sector (acquired entity)	Buyer	Seller (private investor)
2018	18%	14%	56%
2019	18%	20%	56%
2020	22%	19%	57%
2021	26%	22%	62%
2022	23%	19%	67%

Source: author's own studies based on Fordata and Navigator Capital 2018-2022.

Analysis of table 1 shows that the most active sector in Poland in terms of mergers and acquisitions was the technology, media and telecommunications sector. The highest percentage in the years examined was recorded in 2021 - 26%, and the lowest in 2018-2019 - 18%. This sector also participated to the highest extent in mergers and acquisitions transactions as a purchasing party. The range of sector involvement in the analyzed years was between 14% in 2018 and 22% in 2021. The selling side in all analyzed years were private investors, whose percentage of involvement in transactions fluctuated from 56% in 2018-2019 to 62% in 2021.

In the organization of an enterprise, it is important to manage one's own research and development works, in which it is possible to limit ineffective processes. In this context, difficulties arise in obtaining tacit knowledge, as it requires individualized employee involvement in terms of experience, competences and skills. In the literature stands out the SECI model of knowledge dimensions, which involves the conversion of tacit knowledge into explicit knowledge (Syed, Murray, Hislop, Mouzughi, 2018, p. 80). It is based on knowledge transfer within the organization and consists of 4 steps:

- socialization (transfer of knowledge between employees),
- externalization (externalizing hidden knowledge and transforming it into standardized knowledge for all employees),
- combination (served to create more complex concepts based on already cataloged formal information),
- internalization (consisting in processing explicit knowledge in such a way that it is used constantly in the individual's everyday work).

In fact, the aim of the model is to create new knowledge in the organization by encouraging employees to develop and deepen specialized competences, which improves the level of innovation, in particular in relation to research and development work. The use of tacit knowledge may therefore contribute to the increase in intellectual capital and, therefore, the increase in the competitiveness of the company on the market, which may also affect the company's valuation. For the organizational structure of the enterprise and taking into account its financial management, it will be important that the use of the increase in intellectual capital resulting from the conversion of knowledge may contribute to the optimization of workload and, therefore, the reduction of financial costs allocated to the implementation of a specific task (reducing the number of corrections and errors). , which may consequently lead to faster implementation of the entire research and development project (Śliwa, 2016). Thanks to the use of knowledge and technology, the company determines a set of various financial instruments, e.g. accounting programs, budgeting models and goods and sales management, that are adequate to the profile of its business. In production companies, this is done through appropriate warehouse management based on the coordination of demand and supply. As it is important for enterprises to reduce waste, any storage of too large or insufficient number of goods in relation to the needs leads to financial losses (Świętoń, 2020). The use of knowledge management and warehouse management in such an enterprise will therefore be aimed at developing technologies and logistics for the transport of goods that will optimize the frequency of deliveries and delivered goods, e.g. within one transport.

Another element of technology management is technological integration, which is based on the combination of available solutions with the needs of relevant departments and units of the enterprise (Partacz, 2022). Taking into account complex structures, e.g. within group of companies, it also requires coordination with various entities, in particular with the extensive and diverse business profile of the group of companies. The next step is to implement technological solutions and monitor the degree of task feasibility with the support of the implemented technology. Well-implemented technological solutions enable the achievement of operational and strategic goals through a combination of various legal, economic, financial and organizational aspects that improve the planning and commercialization process and contribute to achieving the expected level of innovation. In the last step, the wear and tear of the technology is assessed and a possible decision to replace it is made. Technology, like knowledge, gradually becomes outdated and trivialized over time, which causes its value

to decline. Thus, it can be stated that enterprises cannot stop at using one technology, but constantly monitor its economic usefulness and, if necessary, replace it with another one.

The idea of technology management is based on the combination of many different aspects of technology - science, technology, processes improving management and results from the continuity of technical changes in the world. Apart from the purely theoretical static scope, it is also understood in a dynamic way, i.e. focused on efficiency adapted to the current and potentially future achievable results of the process. It follows that the development of technology is the basis for the development of an enterprise, as it is a substrate for creating competitive leverage but also a method of limiting ineffective processes that generate costs and reduce the investment opportunities of entities. It applies to those enterprises that have too much management organization, which creates too many communication channels that hinder the rapid flow of information and, therefore, decision-making. That's what happens, when during the integration phase in merger and acquisition it is necessary to remove duplicate departments or positions that do not bring tangible benefits (Toborek-Mazur, Partacz, 2022b). Therefore, one of the most important elements of technological management should be marketing activities focused on economic analysis of the profitability of future activities, ensuring economic and technological security. This applies especially to large international enterprises that use technologies developed by external entities or that directly delegate some tasks (outsourcing) to other entities. This requires the company to adapt to the cultures and organizational and legal orders prevailing in the given country where these tasks are performed or from which the technology is obtained but also to cooperate with other companies located in a given regional market. The indicated factors determine the implementation of modern technologies and thus provide the answer to question 3.

The model of key technology management factors can be expanded with observations, among others: D. Cetnidamar, R. Phall and D. Probert. They noticed that technology management should be adapted primarily to the following criteria, i.e. identification, exploitation, selection, acquisition, protection and acquisition of knowledge in order to achieve and maintain a high market position (Halicka, 2014). One of the advantages of the technological management model is the possibility of applying it to any enterprise, regardless of its size (Cetindamar, Phaal, Probert, 2004). However, the use of technology management should be distinguished from the technology itself.

One of the basic challenges in the company is the problem of the so-called assimilation gap. It appears when an enterprise, despite implementing technological solutions, does not use it because the main obstacle is the inability to operate it, e.g. software. This fact results from the insufficient level of knowledge and skills to use it. An additional management problem is the phenomenon of information overload, which manifests itself in those entities that, due to too extensive organizational structure, have a small base of people making binding decisions. Then there is a problem related to the selection of data that are important from the point of view of a specific problem, leaving out some of them that, although not binding, may strengthen or

refute the validity of the decision being made. At the same time, as K. Klincewicz points out, companies are concerned about the risk of reducing work efficiency related to the possibility of replacing some repetitive tasks performed by employees with automated technological systems or algorithms (Klincewicz, 2016).

To illustrate the technology management process, the authors propose the analysis of the following example. The example illustrates an attempt to modernize the efficiency of the manufacturing department "Y" in company "X" by acquiring assets as part of a merger and acquisition transaction. The technology used contributed to improving the quality of manufactured "W" products by improving the quality of repeatable "C" activities in the process of processing this product. Improving quality included replacing selected manual activities in the production process with automated "S" equipment. The use of the new technology resulted from the transaction undertaken by company "X" to take over company "Z", which among its assets had equipment "S" for performing automated activities that facilitate the production of product "W" in less time than manual work. Company "X" expects the emergence of further production opportunities thanks to the takeover of company "Z" by expanding its product offer. The course of the technology management process as part of corporate management is presented in figure 2.

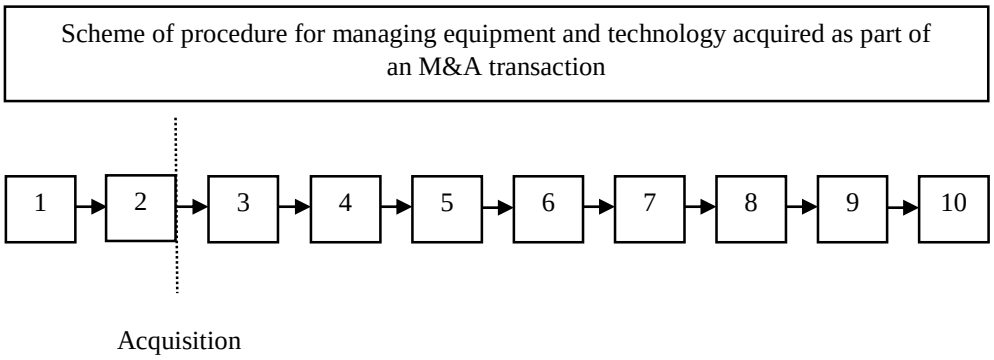

Figure 2. Management of acquired company's technology as part of mergers and acquisitions.
Source: author's own studies.

The procedure consists of 10 steps. In the first step, company "X" identified opportunities to improve its own production process by modernizing the functioning of the production department "Y". It was diagnosed that some of the tasks performed in the production process could be replaced by automated equipment to produce the "W" product. Assumptions for the implementation and operation of new equipment regarding the efficiency, time and quality of the process were prepared and developed. The company also estimated the potential financial benefits and threats resulting from the purchase of equipment, analyzing various options for purchasing technology on the market - cash purchase of a ready-made machine, leasing or taking over another entity. In the analyzed case, the company was taken over, although it was the most expensive option. Nevertheless, due to the unique technical parameters, own financial capabilities, long-term development perspective and acquisition opportunity, the owners

decided to take over. In the next (2) step, the entity "Z" was taken over along with its assets, including the "S" equipment. In step (3), company "X" started rebuilding the entire production system and production hall, adapting it to the implemented equipment. This involved equipping the workstation with additional tools for assembling and starting the machine. Subsequently, the machine was adapted to individual processing parameters in order to produce the components of the "W" product - the software controlling the equipment was updated along with the definition of additional parameters resulting from production needs. Step (4) was based on the development of technical documentation for monitoring and maintenance of the equipment by a qualified team from outside the merged companies. In step (5), the implemented technology for automatically performing activities "C" using the acquired equipment was tested.

During testing, it was noticed that adding an additional element "E" and changing the parameters will reduce the time of performing activity "C" by approximately 15%. Therefore, the software controlling the "S" hardware was updated again. Testing was based on the performance of activities, in such a way that the first test included activities performed in a simplified way (only a few selected ones, with the support and supervision of employee "P"), so that subsequent tasks were more advanced and included a lower degree of support and supervision of the employee "P". The tests used various materials and equipment components necessary to produce "W". After successfully testing the functioning of the equipment and obtaining satisfactory processing results by the machine, the technical documentation was completed in step (6) by correcting selected parameters and activities. In step (7), specialized training was carried out for employees who will be responsible for operating the "S" equipment - both through manual operation of the station and in the use of the control software. In steps (8) and (9), the effectiveness was verified, respectively, by the employee operating the equipment and by the employees of the department responsible for assessing the implemented solutions. Step (10) includes completing the verification of the usefulness and profitability of taking over enterprise "Z" and equipment "S" in the form of preparing a report.

5. Challenges related to business management resulting from technological changes

One of the basic features of the functioning of enterprises on the market is the turbulent nature of changes, which generates the need to adapt the structure of the organization in such a way that it effectively prevents various unfavorable events through anticipation. Nowadays, management is based on multidirectional processes, subsystems and projects often implemented in multidisciplinary teams. The flexibility of the organizational system is based on the ability to generate and make changes based on emerging new situations in which it is

necessary to use a specific action strategy (Dźwigoł, 2014). The more flexible the system, the better the adaptability. As K. Kozioł points out, the turbulent nature of the competitive environment is manifested, among others, by its complexity, i.e. a high number of elements and connections but also the speed of changes resulting from technological or organizational innovations, intensity - generating an increasing degree of dependence of the company on its environment, difficulty in prediction of future events and the determinants causing them and the resulting high level of risk (Kozioł, 2010).

The number of business relationships concluded between enterprises is constantly increasing, not only directly but also using technological solutions and a network organizational structure. The uncertainty of the economic environment, as well as the inability to choose specific methods and information barriers make it necessary to adapt a specific management model to the competitive conditions prevailing on the market (Szymańska, 2012). Assessment of the economic condition of an entity, taking into account financial and non-financial criteria, requires comparison to the results of competitors, which can often constitute a role model in particular areas. Enterprises use diagnostic analyzes to identify the company's strengths and weaknesses that are made in areas such as sales, production and finance but also in marketing, logistics and resources management (Toborek-Mazur, 2022).

Barriers to the functioning of an enterprise can be divided into internal and external. Internal barriers include primarily the weaknesses of the enterprise itself, and concern the issues of size, organizational structure, operating strategy, own production capabilities, financial, material and intangible resources but also skills and competences. External barriers include primarily threats arising from the company's environment. As a result of general economic fluctuations but also because of functioning in a specific market or industry (Ziemba, Świeszczak, 2013).

Table 2 contains a set of the most important challenges facing contemporary organizations, ranked according to three basic criteria, i.e. social and marketing, technological, and international and market. It is also the answer to question 4.

Table 2.
Selected challenges of modern enterprises related to technology

Social and marketing	- corporate social responsibility as a basic criterion; - making long-term decisions based on social and economic criteria; - uniting employees around the goals and values set by the company; - striving for balance in the development of employees and the enterprise; - ensuring favorable forms of employment and working conditions; - taking care of a favorable external image; - implementation of solutions consistent with moral principles according to the compliance and corporate governance system; - taking care of favorable relationships with the competitive environment but also with contractors, customers, suppliers and business partners.

Cont. table 2.

Technological	- the pace of information transfer and processing; - development of information and communication technologies; - dynamics and unpredictability of technology development, which force the need for continuous improvement and learning; - virtual simulations and real-time data processing; - variability of production technologies and the speed of technology obsolescence; - complexity of IT architecture and cyberphysical systems; - viewing technology as one of the tools supporting the decision-making and knowledge management process.
International and market	- internationalization of the management system, - the need to adapt to different organizational cultures and legal orders, - employing staff from different geographical areas, - results orientation; - interdisciplinarity of knowledge; - decentralization of technology depending on the place of its use and access to resources and raw materials used in the production proces.

Source: author's own studies based on (Marzec, 2020).

Analyzing table 2, it can be seen that there are a number of factors determining the development of enterprises on the market. Undoubtedly, the ability of organizations to adapt and anticipate helps improve the overall level of management, reducing the risk of failure resulting in unforeseen financial costs. It is noticeable not only on the new technologies market but also on the financial (84% of responses) and energy (72% of responses) markets, which are susceptible to technological changes and innovations. According to a study conducted by EY, three technologies have the greatest impact on the development of the financial industry, i.e. artificial intelligence (90% of responses), automation and robotization (54%) and cloud computing (46% of responses). The greatest barriers related to the dissemination of technology in the financial sector include high costs and lack of a sufficient level of capital (70% of responses), cybersecurity (49% of responses) and legal barriers (40% of responses). Similar indications can be seen when taking into account the results of the energy industry. The real estate industry (63% of responses) and the production and service industry (60% of responses) are the least susceptible to technological innovations (Bogusławski, 2020). The research shows that sectors that are susceptible to the dynamics associated with technology development require the implementation of additional solutions that protect not only the internal interests of the company. They must pay attention to adapting to functioning in a competitive market. The progress in the development of digital technologies has been intensified, especially in recent years, due to the coronavirus pandemic, which forced the reorganization of many enterprises, replacing some of the tasks performed stationary, i.e. at the workplace, with remote work. According to a report by the Humanites Institute, 93% of managers and 88% of employees among the surveyed enterprises declared that the pandemic accelerated digital transformation. At the same time, as many as 78% of organizations from the medium and large enterprise sector are undergoing digital transformation, and 36% of them are at an advanced stage. 92% of managers see cost optimization as the basic premise and benefit justifying investment in the development of digitalization, and 80% point out the high costs of this transformation in its initial stages. 63% of respondents believe that new

technologies negatively affect people's mental and physical health. Compared to the competition, respondents note a similar level of advancement of digital transformation - 65% on the Polish market, 44-54% on the foreign market (Humanites, 2021). Table 3 lists the reasons for digital transformation in enterprises, ranked by importance: very important, important, unimportant.

Table 3.
Reasons for carrying out digital transformation in companies

Factor	Very important	Important	Unimportant
Increasing process efficiency	49%	50%	1%
Increasing sales/revenue	45%	48%	7%
Cost optimalization	39%	60%	1%
Responding to changes	34%	64%	2%
Keeping up with the market	29%	68%	3%
Improving the services/products offered by the company	29%	67%	4%
Increasing safety among employees	17%	68%	15%
Staff development	9%	83%	8%

Source: author's own studies based on (Humanites, 2021).

The analysis of Table 3 indicates that the most important criteria for implementing digital transformation include increasing the efficiency of processes, sales and revenues. At the same time, the development of employees and increasing their safety, as well as keeping up with market trends, are considered important. These factors mainly result from digital transformation and changes in the modern world. Recognizing the internal and external barriers of the company allows you to prepare in advance for changes in the future. According to research by the Infuture Institute, 82% of respondents believed that technological factors have a very large impact on the digital transformation process. In the coming years, according to the authors, the importance of technological factors such as automation, Big Data, AI, Internet of Things, blockchain, brain machine interface, speech recognition, bioplastics and quantum computing will increase in Poland (Infuture, 2019).

6. Summary

To summarize the considerations, it should be emphasized that the success of enterprise in the modern world depends on many criteria that are not always predictable, especially in markets that are susceptible to frequent changes. Important technological factors that influence management are primarily automation and computerization, the development of telecommunications and computer support systems, road infrastructure, but also everyday life technologies and soft ecological technologies. The ongoing process of globalization and with it frequent and rapid changes on the market require long-term changes in the area of business management. It promotes the exchange of information and the dissemination of modern technologies, accelerates the transfer of development factors and disseminates knowledge,

but at the same time it means the economic expansion of international enterprises, combining the organizational cultures of transnational corporations. Additionally, it makes supervision more difficult by using various solutions in the field of internal work organization systems. Various decision criteria depend on taking into account the uncertainty factor and the need for information. This is especially noticeable in those companies that rely on technology and base the knowledge management process on technological factors, adapting it to current challenges and threats on the market. Technology enables the identification, collection and selection of data that generates value for the enterprise itself. In each case, knowledge is important as it constitutes the basis for information and data used to take a specific action. If a person has knowledge, he also has appropriate data and information that allows him to make decisions also regarding connections. Only explicit knowledge can be subjected to technology. Tacit knowledge cannot be easily captured and used, because its source is all information that is not schematic and formalized, e.g. individual skills or qualifications of an employee, which are also important from the perspective of the company's value. This is especially noticeable in mergers and acquisitions. However, both are important from the perspective of enterprise valuation and are often the subject of negotiations during the merger process. Technology transfer is an important determinant of economic success. It is based on providing a set of information that ensures proper conduct of business activities, including the selection of appropriate production methods. It is the process of transferring tangible and intangible resources between specific entities in order to be absorbed by the final buyer, both in the original and transformed form. Such activities are visible in the processes carried out by technology companies regarding connections.

Such processes are often associated with the flow of intellectual capital (individual skills, technological consulting), which is an important link in the process of implementing modern technological solutions. The authors confirmed the increased interest in mergers and acquisitions in technology enterprises in Poland. The most active sector in M&A in 2018-2022 was the technology, media and telecommunications sector. The number of business relationships concluded between enterprises is increasing, not only directly, but also using technological solutions and a network organizational structure. The uncertainty of the economic environment, as well as the inability to choose specific methods and information barriers make it necessary to adapt a specific management model to the competitive conditions prevailing on the market.

The analysis carried out by the authors shows that the criteria for digital transformation include increasing the efficiency of processes, sales and revenues. At the same time, the development of employees and increasing their safety, as well as keeping up with market trends, are considered important. These factors result mainly from digital transformation and changes in the modern world (consequences of the COVID-19 pandemic, inflation, the conflict in Ukraine and the Middle East). Recognizing all internal and external barriers of the company, taking into account technological solutions, allows you to prepare in advance for changes in the future.

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