

Marta Wiśniewska✉, *Jakub Grabowski*✉
Piotrkowska Academy

ENHANCING THE COMPETITIVENESS OF ENTERPRISES IN THE FACE OF CONTEMPORARY CHALLENGES AND TRENDS WITH THE USE OF BLOCKCHAIN TECHNOLOGY

ABSTRACT

The article focuses on blockchain technology as a tool for supporting enterprises' competitive potential. The subject of the theoretical considerations was the issues related to the competitiveness of enterprises in the face of market changes and contemporary trends, primarily events associated with the outbreak of the COVID-19 pandemic and the war in Ukraine. The main part of the publication was devoted to the determinants of the activity of enterprises on the Polish market concerning the implementation of blockchain technology. The empirical part indicated, among others, the essence and areas of application of blockchain technology in large enterprises and the possibilities of its practical use in the conducted business. The research undertaken aimed to analyse the possibility of treating blockchain technology as a factor in strengthening the competitiveness of enterprises. At the same time, it was found that large enterprises in Poland do not perceive the capabilities of blockchain-based technology, which may result from insufficient knowledge of its operation and functionality. Low awareness of the complexity and versatility of blockchain technology applications in the corporate sector may constitute a barrier to further disseminating this technology.

Key words: competitive advantage, blockchain, distributed ledger technology

JEL codes: G15, G20, G29

Introduction

Companies, regardless of their size or industry, participate in market competition. The ability to win is most generally a manifestation of their competitiveness. Irrespective of the period in which they operate, enterprises carry out their economic activities under certain conditions of the broad market environment, constituting the reference point for their activities. Based on scientific analyses, the environment is identified with the impact of factors outside the respective enterprise but that has a direct or indirect impact on its activities – including sales opportunities, the scope of activities or development strategies and plans [Penc 1997, p. 79; Koźminski et al. 2002, p. 33]. This environment should be considered by taking several dimensions into account: economic, technical, socio-cultural, legal-political or environmental. Obviously, the individual dimensions also have their

✉ M. Wiśniewska, Piotrkowska Academy,
marta.wisniewska@apt.edu.pl, <https://orcid.org/0000-0001-5500-316X>

✉ J. Grabowski, Piotrkowska Academy,
jakub.grabowski@apt.edu.pl, <https://orcid.org/0000-0003-1344-2142>

components – the form or scope of which may change over time [Pujer 2016, p. 23] and may additionally vary depending on where business activity is conducted.

The functioning of enterprises in a globalised world is characterised by a high level of unpredictability, forcing them to constantly adapt to changes. Changes are closely related to competitiveness, the adaptation of companies to changing conditions and anticipation of these conditions [Gąsior et al. 2022. p. 6]. Taking such external determinants into account is, in a way, a necessity in a situation where the respective entity wishes to maintain its ability to compete. Therefore, external factors are – in addition to internal factors, broadly understood enterprise resources as well as the entrepreneur's experience, know-how and skills – one of the determinants of competitive advantage. Based on the three factors listed above, the model assumes that to achieve long-term competitiveness, enterprises should focus on building competencies in the area of managerial skills and abilities to accumulate resources and take advantage of emerging opportunities and respond to changes taking place in the environment [Man et al. 2002, p. 123-142]. However, depending on the size of the company, its market experience or the current market situation, its ability to undertake specific reactions may vary [Gąsior et al. 2022. p. 16-17].

Blockchain technologies may also be one of the tools used to exploit the competitive potential of enterprises by offering a revolutionary solution in many aspects of the functioning of the economy and modern enterprises. The primary feature of this technology is the attribute of consistent and reliable authentication of every transaction between anonymous users [Zaleska 2019, p. 294]. Blockchain technology and the opportunities it offers are practically applicable in modern enterprises and institutions [Wiśniewska 2019, p. 103-116]. In particular, this technology is often applied in areas such as finance, trade and supply chain management, manufacturing and energy industries, media, healthcare and public sector services [PITT 2022]. Other relevant applications available to businesses, regardless of their size and industry, may also include security and acceleration of transactions, authentication of documents, supply chain management or verification of the business partner's receivables [Wetoszka et al. 2021].

The assumption of the authors of this article is to locate the implementation processes of blockchain technology in the broader context of shaping the competitive potentials of enterprises. The analysis focuses on identifying the applications of blockchain technology in enterprises and describing the actual conditions of such processes.

Taking the above into account, the objective of the present analysis focuses on identifying the possibility of treating blockchain technology as a factor strengthening the competitiveness of enterprises.

Competitiveness of enterprises in a changing market environment

The competitive potential of the business sector is an issue that is widely and thoroughly described both in terms of science and practice. It can be treated as an attribute (i.e., understanding the competitive advantage as a specific feature of an enterprise that allows it to operate and survive in a competitive environment or as a process, as an effort to achieve a specific feature) [Gorynia et al. 2009, p. 48-49]. The attributes that determine the market advantage of one entity over another at a given moment are not objective.

Nevertheless, and without any doubt, the set of these features should determine the company's ability to design, manufacture and/or market better products/services than those offered by its competitors [Moon et al. 1995, p. 37-43, Ajitabh et al. 2004, p. 45-61], as well as implement innovations [Ali et al. 2000, p. 1-3].

The ability to pick the individual attributes to match the place and time may prove decisive when maintaining a competitive advantage is considered. In accordance with this premise, competitiveness is a measurement of an organisation's overall capacity to outperform rival businesses in the market in order to achieve or maintain a certain competitive position. In this approach, the competitive position of an enterprise is defined as its favourable position vis-à-vis its competitors, as determined based on quantitative and qualitative diagnostic criteria [Stabryła 2000, p. 66-67], which is conditioned by the use of one or more factors (so-called "success factors") distinguishing its mode of operation [Moszkowicz 2003, p. 29]. None of the potentially considered success factors (competitiveness attributes) should be treated as leading or superior to the others. Depending on the place and time, various attributes may gain significance.

The aforementioned conclusion is inferred from the requirement that businesses operating in certain circumstances modify their operations in response to emerging trends. It is, in a way, the basic assumption of this article, in which changes in the external environment are treated as an environment for shaping the internal resources of enterprises and a kind of tester for the entrepreneurial attitudes of decision-makers. This assumption takes on significance in the face of the dynamic changes that have been taking place in the globalised environment in recent years. The dynamics of change is another aspect that must be kept in mind. It may be uneven within individual areas of the environment in particular periods or places of business activity. In this context, it is worth recalling two events that significantly reformatted the environment of enterprises: the COVID-19 pandemic and the geopolitical disturbances caused by the war in Ukraine. Both events, due to their dynamic and – to some extent – unpredictable nature, can be described as "black swans" (i.e., unpredictable events or phenomena) [Taleb 2020, p. 11-12].

The first of these events intensified the digitisation of several processes. Due to the progressive development of the coronavirus epidemic, it was decided to limit the manifestations of socio-economic life. Of course, the scope of restrictions was different and varied from country to country, but the consequence of these actions was – apart from the economic slowdown – also the relatively permanent social changes manifested, for example, in changing shopping habits or becoming accustomed to remote work. And although the need to implement digital solutions has been recognised for a long time, it was "thanks" to the pandemic that these processes experienced acceleration. The solutions encompassed a wide range of corporate processes, including communication, dispersed teamwork, remote and digital collaboration with contractors, electronic document flow and providing customers with value in a totally new approach. At the same time, the level of advanced solutions may differ, including, in addition to simple applications, platforms that apply AI to support companies in their marketing and sales activities or data warehouses and analytical tools that enable data pooling [EY 2020]. In addition, the pandemic also had various economic consequences which also required action on the part of enterprises to adapt to new conditions; for example, a collapse in demand mainly related to restrictions on mobility or the activities of selected industries introduced by states, disruptions of supply chains, operational downtime imposed administratively or resulting

from lack of labour resources, unfavourable price trends (due to disruptions of supply chains) or, finally, deterioration of the financial situation of customers – companies in difficulty in the result of the crisis and people losing their jobs [Bank Pekao 2020].

In turn, the war in Ukraine, apart from many negative consequences, caused a crisis resulting in a dramatic increase in the prices of energy carriers, for example. It also stepped up the debate on the need to accelerate the transition processes towards renewable energy sources and, more broadly, on changes that consider progressive climate change and environmental degradation. Challenges in this scope relate to several areas related to energy efficiency leading to the reduction of greenhouse gas emissions and the broadly understood resource management. As a result, the requirement to develop sustainable products, services and business models will become the norm and transform consumption patterns so that waste will be prevented in the first place [Grabowski 2021].

Obviously, the two above-mentioned crucial areas for the modern world are not the only ones that affect the functioning of enterprises, forcing them to take adaptive measures. Societies and economies are experiencing several noticeable changes, especially in the long term. The Infuture.institute draws attention to them in its Trend Maps published since 2018. In 2022, the map was first divided into seven megatrends (Mirror World, Technocentric Biology, Climate Aftermath, Deglobalisation, Society of Incoherence, Demographic Shifts, Health Crises), to which 54 trends were assigned [Infuture.Institute 2022]. Individual trends are analysed in relation to various aspects of everyday life, taking their maturity into account. The more mature the trends, the faster a response they require. In the 2022 edition of the Trend Map, trends requiring a relatively fast response on the business side were recognised. For example, these were the increasing multifunctionality of services to respond to as many consumer needs as possible without having to incur excessive expenditures, the raw material crisis (related to climate change, growing population, an economy based on continuous growth, but also difficulties in transport or long lead times resulting from the closure of factories), generational changes consisting of reaching the voice of a generation that was the first to be brought up in a completely digital world or, finally, a trend in which technology, merging with everyday human life, becomes almost imperceptible to people (invisible technologies). The latter trend demonstrates direct links with blockchain technologies but, in any case, their application can support the process of adapting to changes in the environment.

Blockchain technology – its essence and application in business

Blockchain technology, also called distributed ledger technology (DLT), collects and stores transaction data. This technology is a distributed, shared and trusted database managed by a network of computers that operate under predetermined rules called blockchain. The distributed database in the form of a blockchain contains the history of all transactions or changes verified and accepted by every participant. The essence of this technology is the phenomenon of joining blocks of subsequent transactions to the previous ones, creating a chain so that the recording of payments is made in parallel on all computers in the network [Michalczyk 2018, p. 42-43].

Blockchain technology can be used in various areas of the economy, both in the corporate and public sectors. One of the applications of this technology concerns the performance of contractual obligations, which is associated with the conclusion of so-

called “smart contracts”. They consist of defining and fulfilling the conditions contained in the contract automatically without third parties [Hulicki et al. 2017, p. 43]. By using the properties of the smart contract, the interests of both parties to the transaction are safeguarded if one of them fails to perform [Zuwała 2018, p. 64]. Blockchain-based solutions can also be used, among others, in verifying entities – the purpose of which is to detect and counteract market manipulations, including money laundering. The distributed ledger technology also renders it possible to create a single database containing all available information about a given customer. This database automatically updates when a new document is shared by one of the users [Ciupa 2018, p. 106-108]. Payment systems are yet another area where blockchain technologies are applied. In the case of international payments, the process of consolidating the data required for the approval of transactions is prolonged due to the need to compare the data records held by all entities involved in transactions. Due to its decentralised and dispersed character, blockchain technology allows each participant to analyse the records and verify the correctness of the details of their transactions [Ciupa 2018, p. 106-108].

The potential of blockchain technology is also noticed in the context of the Internet of Things (IoT). The concept of IoT is based on constant technological progress and is associated with a global network connecting many devices that can exchange information on their own. The use of blockchain technology in this area can support the enterprise in the security dimension, including reducing the risk of hacker attacks, by reducing the number of potential locations that can be hacked [Rot 2017].

Blockchain technology is an attractive solution for enterprises due to incomparably lower operating costs compared to other systems and its significant efficiency, which results from the lack of participation of intermediary institutions in transactions [Muszyński 2016, p. 1]. At the same time, the literature emphasises that an important advantage of the blockchain solution is the decentralisation of various types of data registers. Thanks to the transparency of these records, people who use the blockchain system have a complete insight into the transaction history. This technology also allows direct cooperation between foreign entities by eliminating the intermediary institution, thus offering a breakthrough solution [Hulicki et al. 2017, p. 36]. Particular importance in the functioning of blockchain technology is attributed to the elimination of time-consuming clearing and settlement procedures, which consist of registering changes of ownership and money transfer through central institutions dedicated to these purposes.

Blockchain technology does, however, come with a variety of benefits as well as hazards, such as the possibility of unlawful use. The literature indicates barriers related to the implementation of blockchain technology, including regulatory conditions or issues related to society’s adaptation to the solution. At the same time, it is emphasised that the benefits resulting from the use of blockchain, such as cost reduction, significantly outweigh its barriers – which is an incentive for economic operators to look for solutions that eliminate obstacles to its development and implementation [Zimnoch 2016, p. 227-231]. In addition, the advantages of blockchain technology facilitate business in the digital world and, despite the shortcomings or threats that this technology may generate, it creates great opportunities for further development and wide application in the economy [Boniecki et al. 2017, p. 12-13].

The information in the Deloitte Tech Trends 2022 report confirms that blockchain and other platforms based on distributed ledger technology have already

found practical applications in the business world. Companies operating in global markets are open and ready to introduce next-generation blockchain technology, which significantly changes their approach to managing information [Deloitte Insights 2022]. Blockchain and other distributed ledger technology platforms are fundamentally changing how we do business in organisations and assist many companies in re-designing how to manage their fixed and digital assets effectively. Thanks to advances in technology, companies can experiment with blockchain, which affects the emergence of interesting solutions in many industries [Deloitte Insights 2022]. In addition, the results of a 2021 worldwide survey among managers of financial services companies indicate that digital assets and underlying blockchain technologies are treated as a strategic priority in these organisations. For almost all respondents participating in the survey, digital assets are perceived as very important for their industries in the near future, and they also perceive blockchain technology as widely scalable and widely accepted in business practice [Deloitte Insights 2021].

In Poland, blockchain technology is at the stage of expansion and implementation. An opportunity to further develop and accelerate the implementation of innovations based on this technology in Poland was the 2020 launch of a digital sandbox for startups and companies that can test their solutions in safe conditions [Wetoszka et al. 2021]. The interest in blockchain in Poland itself is as high as in other countries in the world. In many cases, one hears not only about the theoretical applications of this technology, but also about the real implementations and benefits it brings. Particularly numerous implementations can be found in regulated sectors, such as banking or insurance, but also wherever there is a relationship and communication between the company and the customer is required. A number of activities are undertaken by the National Support Centre for Agriculture in Poland to use the concept of a distributed ledger to identify food at every stage of its production. Blockchain technology enables a quick analysis of the entire production chain, thus allowing it to react to any deviation from the guaranteed product quality. Increasing consumer awareness and expectations necessitate new ways to also guarantee quality among food producers. The largest Polish companies producing food meet the regulations and try to use the achievements of technology to increase transparency using blockchain technology [PITT 2022, p. 30].

Research methodology

Topics related to the impact on the competitive potential of enterprises, as well as blockchain technologies, have been described by both scientific and industry literature for several years now. To a growing extent, these two types of literature have recently taken on practical aspects of the issues mentioned above. As the authors' intention was to link both threads, it was necessary to carry out empirical research. It was preceded by a theoretical analysis based on the subject literature. It was the first stage of the research process, during which the focus was on publications in the field of management theory, building a competitive advantage and blockchain technology. These topics were covered by the subject terms used to search scientific publication databases and library collections. At the same time, attempts were made to establish the links and relationships between the implementation of blockchain technology by enterprises and building a competitive advantage in the context of dynamically changing environmental

conditions. This analysis led us to identify a research gap in the lack of studies directly linking these two subjects.

Diagnosing the phenomenon in the above-mentioned scope implied the need to conduct an empirical study. Taking into account the requirements of blockchain technology and its high implementation costs – as well as the fact that it is used by many entities on global markets (such as banks and financial institutions) and, above all, the largest global companies [Wiśniewska 2020, p. 266-278] – large Polish enterprises from various sectors of the economy were selected as our research subject (sample $n = 101$)¹. The selection of companies for our research was random. However, for the purpose of this study, no more detailed decisions concerning the selection of the sample were made. This is because the intention of the authors of this survey was not to identify specific resources and activities of enterprises in the area of blockchain technology, but to find out attitudes and opinions related to the possibilities of its use in business processes.

The survey was carried out as part of the mixed mode procedure, which assumed the possibility of conducting the survey in the form of a questionnaire made available to respondents via electronic channels or a survey-assisted telephone interview.

Results

A variable and unpredictable external environment requires companies to adapt their business models to specific conditions. Uncertain economic situations, geopolitical turmoil, changing consumer habits and preferences, environmental and climate challenges, progressing digitisation of processes, etc. all somehow force enterprises to verify the methods used so far to implement their business processes by implementing innovative solutions, including solutions at the company level. At the same time, blockchain technologies require the organisation to undertake a specific commitment of resources, which may sometimes constitute a barrier to such implementations. These barriers or challenges that must be met (depending on the perspective that we adopt) may be financial (e.g., high costs of investment in technology), organisational (e.g., a lack of infrastructure or R&D departments in enterprises) or related to human resources (e.g., a lack of adequate IT staff) [Öztürk 2020, p. 14771-14789]. In this respect, large enterprises have an advantage over smaller entities as their capabilities in these areas are relatively greater. This study identifies the activities undertaken by such entities in implementing blockchain technology.

The population covered by the study consisted mainly (more than two-thirds of the sample) of enterprises operating mainly in media and advertising, insurance and IT, but also in healthcare, forwarding and transport. Almost half of the companies have been operating on the market for over 10 (up to 20) years, while companies with a relatively short market experience (up to 10 years) were less numerous in the surveyed population (18.8%). Table 1 presents the characteristics of the surveyed companies, taking into account the area of business activity and market experience.

¹The original assumption of the research was its implementation on a sample of $n = 100$; however, the approach that combined the telephone interview with an online survey resulted in an additional response from a representative of a company after the survey was closed.

Table 1. Characteristics of the population of enterprises covered by the study

Area of activity [%]	
Services	63.4
Retail	15.8
Manufacturing	12.9
Finance	7.9
Market experience [%]	
Up to 10 years	18.8
11-20 years	47.5
21-30 years	30.7
Over 30 years	3.0

Source: survey among large enterprises, $n = 101$.

The conducted research demonstrates that despite the relatively greater potential for implementing blockchain technology into enterprises, the awareness of the possibilities in this area still seems insufficient. For 58.4% of company representatives, this is a topic so unrecognised that they could not clearly indicate the potential of blockchain technology for use in their business (Table 2).

Table 2. Opinion of the representatives of the surveyed enterprises on the possibility of widespread use of blockchain technology in their business

	Total [%]	Area of activity				Market experience in years			
		manufacturing ($n = 13$)	retail ($n = 16$)	finance ($n = 8$)	Services ($n = 64$)	up to 10 ($n = 19$)	11-20 years ($n = 48$)	21-30 years ($n = 31$)	over 30 years ($n = 3$)
Definitely yes	2.0	0	0	1	1	1	0	1	0
Rather yes	27.7	1	5	3	19	7	14	7	0
It is hard to say	58.4	6	9	4	40	10	31	16	2
Rather not	11.9	6	2	0	4	1	3	7	1
Definitely not	0.0	0	0	0	0	0	0	0	0

Due to the relatively small numbers for the groups distinguished on the basis of the area of activity and market experience, the data is presented in absolute terms in relation to them.

Source: survey among large enterprises, $n = 101$.

In total, some 30% of the representatives of the companies participating in the study saw such possibilities, with only a few indications being decisive. This was relatively the most common in banking (financial sector), while manifested to the smallest extent in manufacturing companies, where the belief that such applications were non-existent was also the greatest. It also seems that the age of the company is such a variable that may be conducive to implementing blockchain technology. This may be indirectly related to the age of the management staff, although this is obviously only an assumption because this aspect was not covered by the study. In any case, in the companies with a maximum of 10 years of market experience, opinions confirming the possibility of using blockchain technology in business appeared relatively often. In the case of the oldest companies, there were no indications of this type of possibility, although one should keep in mind the low number of enterprises in this group.

Table 3. Occurrence of business premises regarding the application of blockchain technology in the surveyed enterprises

	Total [%]	Area of activity				Market experience in years			
		manufacturing (n = 13)	retail (n = 16)	finance (n = 8)	services (n = 64)	up to 10 years (n = 19)	11-20 years (n = 48)	21-30 years (n = 31)	over 30 years (n = 3)
Definitely yes	1.0	0	0	1	0	0	0	1	0
Rather yes	15.8	0	3	2	11	1	9	6	0
It is hard to say	72.3	6	12	5	50	16	37	17	3
Rather not	10.9	7	1	0	3	2	2	7	0
Definitely not	0.0	0	0	0	0	0	0	0	0

Source: survey among large enterprises, $n = 101$.

Awareness of a specific phenomenon, blockchain technology in this case, is the basis for the potential assessment of the possibility of taking appropriate action. However, according to the following data, it is also unfavourable because only some of the representatives of enterprises that perceive the possibility of widespread use of blockchain technology in business perceived business premises for this type of implementation (Table 3).

Table 4. Current involvement of the surveyed enterprises in the implementation of blockchain technology

Specification	Total	Area of activity				Market experience in years			
		manufacturing (n = 13)	Retail (n = 16)	finance (n = 8)	services (n = 64)	up to 10 years (n = 19)	11-20 years (n = 48)	21-30 years (n = 31)	over 30 years (n = 3)
Implementation/development of blockchain technology is at the stage of plans only		0	1	0	0	0	1	0	0
Blockchain technology is at the research stage	9.9	1	1	2	6	1	5	2	2
Blockchain technology is applied in practice	1.0	0	0	1	0	0	0	1	0
We do not plan to get involved in the development of blockchain technology	88.1	12	14	5	58	18	42	28	1

Source: survey among large enterprises, $n = 101$.

Again, representatives of financial sector entities were the ones who most often expressed such a type of evaluation. At the same time, such conditions were most frequently observed in the case of companies with a slightly longer market experience (21-30 years), while, as indicated above, the general awareness was higher in the case of companies with a maximum of 10 years of market experience. In this case, however, it seems that an objective assessment of the available resources may verify real business opportunities in this area. Just as the awareness of the possibility of widespread use of

blockchain technology in business does not translate into the perception of business premises for their implementation, the perception of opportunities does not automatically translate into real actions in this area. Table 4 presents the state of involvement of the surveyed enterprises in implementing blockchain technology.

Regarding the specific possibilities of applying blockchain technology in the surveyed enterprises, the relatively low awareness in this field identified in the study was generally confirmed. Almost half of the respondents (45.5% – cf. Table 5) indicated the lack of such applications, and another 23.8% could not specify them. Some 24% of the respondents perceive the potential of blockchain technology in the area of payments, which coincides with the results of previous research on the global market [Wiśniewska 2020, p. 266-278] and the undoubted advantages of this technology in the field of finance, often indicated in the subject literature.

Table 5. Possibilities of applying blockchain technology in the surveyed enterprises

Total	[%]
None	45.5
Payments	23.8
Digital Records	6.9
Supply chain management	1.0
Customer database management	1.0
I don't know	23.8

Source: survey among large enterprises, $n = 101$.

The low awareness of the public regarding blockchain technology was further demonstrated by the answers to the question regarding the indication of the advantages of this technology (Table 6). Here, too, the majority of respondents indicated either the lack of advantages of blockchain technology concerning other systems or did not have knowledge in this area (66.3% of indications in total).

Table 6. Advantages of blockchain technology in relation to other systems according to the representatives of the surveyed companies

Total	[%]
None	44.6
I don't know	21.8
Increased transaction security	17.8
Lower costs	17.8
It is hard to say	4.0
Transaction speed	1.0

Source: survey among large enterprises, $n = 101$.

The use of blockchain technology in international payments can significantly reduce the settlement time for various types of business transactions. A significant benefit of using blockchain technology in this field is to enable real-time verification of financial flows, eliminating lengthy data consolidation processes. However, despite the subject of the potential use of technology in the field of finance and banking raised in the literature, many solutions based on blockchain can be referred to many other economic sectors, including manufacturing, commercial and service enterprises. Such solutions may include, for example, intelligent contracts (i.e., autonomous programs) – the launch of which takes

place automatically, thus constituting a guarantee and irreversibility of the implementation of the provisions between the “parties” to such a contract. Improvements in digital recordings can also be perceived as a universal application of this technology. In the area of data security, thanks to the innovative technology applied, there may be a significant improvement in the efficiency of processes in the company (i.e. faster and more accurate process of data analysis, detection of fraud and non-compliance, as well as reporting). Blockchains can be used to protect privacy in terms of data property, data transparency and auditability or access control [Hulicki et al. 2017, p. 38-39].

In many companies, using blockchain technology in the supply chain may constitute an opportunity to enhance their competitive potential. Such action may contribute to eliminating areas characterised by inefficiencies and improving operational processes at various levels of companies’ activities. The application of blockchain technology to the so-called “open production networks” would, in practice, mean the emergence of a tool to verify the country of origin of the individual components of a given product (control at every stage of the supply chain) [Hulicki et al. 2017, p. 37]. The potential impact of blockchain on the principles of supply chain operation and the indication of other applications were the subject of both theoretical considerations and empirical research [Szewczyk 2019, p. 591-600, Wang et al. 2019, p. 62-68]. Similarly, the application of blockchain technology in the context of the Internet of Things can also bring numerous advantages for companies [Rot et al. 2018, p. 122-134].

Improvements in digital asset storage, including in liquidity and availability of capital, could be another example of the benefits for businesses in terms of increasing their market competitiveness. Blockchain technology provides market participants with constant insight into the state of their assets, which enables better risk analysis and effective decision-making processes. Retail and service companies, in turn, can significantly improve operational processes through accelerated settlements, synchronised monitoring and management of the flow of receivables or liabilities in real-time by all parties to the transaction.

To sum up, it should be noted that blockchain is a system with massive potential in many sectors of the economy. Companies implementing tools based on this modern technology can gain many benefits, thus increasing their competitiveness and streamlining numerous business processes. Worldwide, this technology is being dynamically developed and improved, therefore becoming an important element of economic growth. In Poland, however, due to the still low awareness of potential users, blockchain technology is not a common solution. In most surveyed companies, managers do not plan to develop it. Attempts, by subject literature, to explain the noticeable lack of trust in the mentioned technology boil down to issues with understanding the essence of the mechanisms on which it operates and the possibilities of using them in economic practice [Wiśniewska 2020, p. 274]. Furthermore, the lack of trust in blockchain technology is due to regulatory gaps directly affecting its application. Even cryptocurrencies based on blockchain technology, popular on the financial markets, are not legally considered a national means of payment. While most regulators accept this technology, the regulatory environment of this area remains unresolved.

Conclusions

Enterprises operating in a changing environment must constantly adapt their activities to the changes occurring in their environment. The COVID-19 pandemic and political events related to the war in Ukraine have significantly affected the processes taking place in Polish enterprises, consequently forcing them to adopt numerous adjustment measures. Challenges in this area referred, among others, to the need to implement digital solutions in several areas related to efficiency, including energy efficiency or skilful management of resources.

At the same time, it is worth emphasising that enterprises operating on the global market function in conditions of intense competition, as well as constantly growing customer requirements. In connection with the above, the technological development of the organisation, aimed at streamlining processes and increasing their market advantage, is becoming an issue of growing significance. Innovative tools, including blockchain technology, can significantly affect how business is conducted, improve the quality of communication with customers and, thus, fully exploit the competitive potential of enterprises on the international market.

The objective of the research was to analyse the possibility of treating blockchain technology as a factor in strengthening the competitiveness of enterprises. Based on the theoretical considerations and empirical research, it can be concluded that the application of blockchain technology by enterprises can support their processes of adapting to changes in the environment and, therefore, their ability to enhance their competitive potential. Blockchain technology offers an innovative economic solution and can be applied in various business areas. The advantages of this method are primarily the lower operating costs (when compared to other systems) and high efficiency at the same time.

Despite the high potential and mood on the Polish market conducive to implementing this technology, the public's awareness concerning the possibilities in this area remains low. The applications of blockchain technology are recognised by Polish entrepreneurs primarily in banking and finance, and rarely in manufacturing, retail or services. As a result, Polish companies rarely use blockchain technology in business activities. Manufacturing companies are the least involved in these processes, with greater activity regarding the practical application of the technology in the financial sector. The potential of blockchain technology was most often seen in the area of payments.

A lack of sufficient knowledge regarding the substantive and technical aspects of blockchain and low awareness of the complexity and versatility of the applications of this concept in business may become a barrier in Poland for the process of popularising and implementing blockchain technology.

References

- Ajitabh, A., Momaya, K. (2004). Competitiveness of firms: review of theory, frameworks and models. *Singapore management review*, 26(1), p. 45-61.
- Ali A.J., Abbas J. (2000). Rethinking competitiveness. *Journal of Competitiveness Studies*, 8(1), 1-3.
- Bank Pekao (2020). *Gospodarka w czasach pandemii. Spojrzenie sektorowe na bazie pierwszych doświadczeń globalnych*, Warszawa, <https://media.pekao.com.pl/pr/500840/jak-pandemia-koronawirusa-wplynie-na-polska-gospodarke-analiza-banku-pekao-s-a> [accessed: 12.11.2022].
- Boniecki R., Rawłuszko J. (2017). Możliwości wykorzystania technologii BlockChain w biznesie. *Ekonomiczne Problemy Usług*, 126, 9-13.

- Chang Moon H., Peery N.S. (1995). Competitiveness of product, firm, industry, and nation in a global business, *Competitiveness Review*, 5(1), 37-43. <https://doi.org/10.1108/eb046319>
- Ciupa K.M. (2018). Technologia blockchain i jej wpływ na rozwój infrastruktury rynku kapitałowego, [In:] T. Czerwińska, A.Z. Nowak (eds). *Rynek kapitałowy – regulacje i fundamenty*. Wydawnictwo Naukowe Wydziału Zarządzania Uniwersytetu Warszawskiego, Warszawa.
- Deloitte Insights (2022). *Tech Trends 2022*, <https://www2.deloitte.com/pl/pl/pages/technology/articles/Raport-Deloitte-Trendy-Technologiczne-2022.html> [accessed: 12.11.2022].
- Deloitte Insights (2021). *Deloitte's 2021 Global Blockchain Survey*, <https://www2.deloitte.com/us/en/insights/topics/understanding-blockchain-potential/global-blockchain-survey.html> [accessed: 12.11.2022]
- EY (2020). *15 technologicznych rozwiązań w czasach pandemii COVID-19*, https://www.ey.com/pl_pl [accessed: 12.11.2022]
- Gąsior A., Grabowski J., Ropęga J., Walecka A. (2022). Creating a Competitive Advantage for Micro and Small Enterprises Based on Eco-Innovation as a Determinant of the Energy Efficiency of the Economy. *Energies*, 15(19), 6965. <https://doi.org/10.3390/en15196965>
- Gorynia M., Nowińska-Łażniewska E. (eds), (2009). *Kompedium wiedzy o konkurencyjności*. Wydawnictwo Naukowe PWN, Warszawa.
- Grabowski J.(2021). EU Environmental and Climate Policies as A Source of Development Challenges for the Enterprise Sector. *Proceedings of the 38th IBIMA Conference*, 23-24 November, Sevilla, Spain.
- Hulicki M., Lustofin P. (2017). Wykorzystanie koncepcji blockchain w realizacji zobowiązań umownych. *Człowiek w Cyberprzestrzeni*, 1, 28–53. <https://doi.org/10.21697/cwc.2017.1.03>
- Infuture.Institute, (2022) *Mapa Trendów*, <https://infuture.institute/mapa-trendow/> [accessed: 12.11.2022].
- Koźmiński A.K., Piotrowski W. (2022). *Zarządzanie. Teoria i praktyka*. Wydawnictwo Naukowe PWN, Warszawa.
- Małyśka-Kaleta A. (2015). Płeć, gender i marketing a zachowania konsumentów w ujęciu kulturowym. *Handel Wewnętrzny*, 357(4), 276-285.
- Man T.W., Lau T., Chan K.F. (2002). The competitiveness of small and medium enterprises: A conceptualization with focus on entrepreneurial competencies. *Journal of business venturing*, 17(2), 123-142. [https://doi.org/10.1016/S0883-9026\(00\)00058-6](https://doi.org/10.1016/S0883-9026(00)00058-6)
- Michalczyk W. (2018). Bariery rozwoju bitcoina jako nowej formy pieniądza międzynarodowego. *Ekonomia XXI wieku*, 17, 41-67.
- Moszkowicz M. (2003). Przewagi konkurencyjne – próba systematyzacji. [In:] J. Jeżak (ed.). *Rozwój teorii i praktyki zarządzania strategicznego*. Polsko-Amerykańskie Centrum Zarządzania, Łódź.
- Muszyński M. (2016) Blockchain, czyli jak technologia Bitcoina robi karierę. *Forbes*, 1.08.2016, <https://www.forbes.pl/technologie/blockchain-technologiabitcoina-rewolucja-w-cyberbezpieczenstwie/7z71ncj> [accessed: 12.11.2022].
- Öztürk C., Yildizbaşı A. (2020). Barriers to implementation of blockchain into supply chain management using an integrated multi-criteria decision-making method: a numerical example. *Soft Computing*, 24, 14771-14789.
- Penc J. (1997). *Leksykon biznesu*. Placet, Warszawa.
- PITT (2022). *Blockchain w Polsce, wersja 2.0, Raport Polskiej Izby Informatyki i Komunikacji, 2022*. Retrieved: <https://www.raportblockchain.pl/> [accessed: 11.11.2022].
- Pujer K. (ed.), (2016). *Zarządzanie przedsiębiorstwem w zmiennym otoczeniu w kontekście zrównoważonego rozwoju*. Wydawnictwo Exante, Wrocław.
- Rot A. (2017). Zastosowanie technologii Blockchain w kontekście bezpieczeństwa rozwiązań Internetu rzeczy. [In:] L. Kiełtyka, A. Wrzałik (eds). *Wspomaganie zarządzania z wykorzystaniem technologii IT*. Wydawnictwo Politechniki Częstochowskiej, Częstochowa.

- Rot A., Zygała R. (2018). Technologia blockchain jako rewolucja w transakcjach cyfrowych. Aspekty technologiczne i potencjalne zastosowania, *Informatyka ekonomiczna*, 4(50), 122-134. <http://dx.doi.org/10.15611/ie.2018.4.09>
- Stabryła A. (2000). Zarządzanie strategiczne w teorii i praktyce firmy. Wydawnictwo Naukowe PWN, Warszawa – Kraków.
- Stoner J.A.F., Freeman R.E., Gilbert D.R. (2001). Kierowanie. PWE, Warszawa.
- Szewczyk P. (2019). Application of blockchain technology in supply chain management. *Zeszyty Naukowe. Organizacja i Zarządzanie*, 136, 591-600.
- Taleb N.N. (2020). Czarny łabędź. Jak nieprzewidywalne zdarzenia rządzą naszym życiem. Wydawnictwo Zysk i S-ka, Poznań.
- Wang Y., Han J.H., Beynon-Davies P. (2019). Understanding blockchain technology for future supply chains: a systematic literature review and research agenda. *Supply Chain Management: An International Journal*, 24(1), 62-84. <https://doi.org/10.1108/SCM-03-2018-0148>
- Wetoszka M., Dublanka D. (2021). Rozwój technologiczny blockchain przyspiesza, <https://biznes.newseria.pl/news/rozwoj-technologii,p1688914668> [accessed: 12.11.22].
- Wiśniewska M. (2019). Istota i możliwości wykorzystania technologii blockchain w gospodarce. [In:] M. Wasilewski, S. Zabolotnyy (eds.). *Strategie interesariuszy na rynku finansowym*. Wydawnictwo SGGW, Warszawa, 103-116.
- Wiśniewska M. (2020). Importance of business solutions based on blockchain technology. *The Scientific Journal European Policies, Finance and Marketing*, 24(73), 266-278. <https://doi.org/10.22630/PEFIM.2020.24.73.43>
- Zaleska M. (red.), (2019). *Świat bankowości*. Difin, Warszawa.
- Zimnoch D. (2016). Wpływ technologii blockchain na efektywność banku. *Studia Ekonomiczne*, 281, 220-233.
- Żuwała A. (2018). Możliwości wykorzystania technologii blockchain. *Studies & Proceedings of Polish Association for Knowledge Management*, 87, 58-68.

Wzmacnianie konkurencyjności przedsiębiorstw w obliczu współczesnych wyzwań i trendów dzięki wykorzystaniu technologii *blockchain*

STRESZCZENIE

W artykule skoncentrowano się na technologii *blockchain* jako narzędziu wspierającym potencjał konkurencyjny spółek. Przedmiotem rozważań teoretycznych były zagadnienia związane z konkurencyjnością przedsiębiorstw w obliczu zmian rynkowych oraz współczesnych trendów, przede wszystkim wydarzeń związanych z wybuchem pandemii COVID-19 oraz wybuchem wojny na Ukrainie. Zasadnicza część publikacji została poświęcona uwarunkowaniom aktywności przedsiębiorstw na rynku polskim w zakresie wdrażania technologii *blockchain*. W części empirycznej wskazano m.in. na istotę i obszary zastosowania tej technologii w dużych przedsiębiorstwach oraz możliwości praktycznego jej wykorzystania w prowadzonym biznesie. Celem podjętych badań była analiza możliwości potraktowania technologii *blockchain* jako czynnika wzmacniania konkurencyjności przedsiębiorstw. Jednocześnie stwierdzono, że duże przedsiębiorstwa w Polsce nie dostrzegają możliwości technologii opartych na łańcuchach bloków, co może wynikać z niewystarczającej wiedzy na temat jej działania i funkcjonalności. Niska świadomość złożoności i uniwersalności zastosowań technologii *blockchain* w sektorze przedsiębiorstw może być barierą w procesie upowszechniania się tej technologii.

Słowa kluczowe: przewaga konkurencyjna, blockchain, technologia rozproszonych rejestrów