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USING BIG DATA TO OPTIMIZE ECONOMIC PROCESSES IN THE DIGITAL AGE

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ABSTRACT

Big Data in recent years have become a source of information about the state of development of economic processes and systems. With proper analysis and interpretation, Big Data can be used to support management decision-making and development of a company's or organization's strategy. For the in-depth study of the chosen topic, more than 40 sources of scientific literature were studied, which made it possible to evaluate both the theoretical aspects of Big Data development and the practical possibilities of implementing big data in the development of modern business. In view of this, the purpose of the research is to determine the features of using Big Data to optimize economic processes in the digital age, taking into account the potential opportunities for analyzing large data sets. To achieve the goal, both general scientific methods (analysis, synthesis, induction, deduction) and special methods of statistical data analysis and forecasting using built-in Microsoft Excel algorithms were used. As a result of conducting research and analysis of statistical material, it has been proven that the significance of Big Data will increase over time, and new opportunities for using this type of information will open up for companies. The scientific novelty of the work consists in defining a wide range of opportunities and prerequisites for using Big Data to support approved management decisions for tactical and strategic business development. The use of Big Data will create prerequisites for more active and stable development for business, as it will allow a more systematic and balanced approach to the analysis of various types of data on the state of the external and internal environment of the business, to determine potential development opportunities and directions of strategic promotion in the market.

Keywords: digital data, data processing, economic statistics, justification of economic decisions, digital economy, industrial development

JEL Classification: P40, E44, O33

INTRODUCTION

Research Problem

The modern global economy can be characterized as rapidly developing, and one of the main features of this development is the active digitalization of not only economic but also social processes in general. In addition, tracking economic development processes requires processing increasingly large amounts of data of various kinds: on the state of the macroeconomic environment, on business development, on the efficiency of certain industries, on consumer demands for various groups of goods and services, etc. All these data sets are becoming more and more voluminous every year and require the latest tools for their storage, processing and analysis. At the same time, it should be realized that processing and analyzing such large data sets opens up great opportunities for various users to support the process of making management decisions based on big data analysis. Such large data sets are the so-called Big Data, which are huge volumes of heterogeneous digital information that is coming in rapidly, which cannot be processed in traditional ways, but allow to identify patterns between events that cannot be found by humans (Al-Sai et al., 2022; Hammond-Errey, 2022). With a properly constructed query, you can get an excellent result for optimizing any area of activity. That is why big data has become the most valuable economic resource over the past decade. Today, information is another important national strategic resource in addition to the three main resources: land, air, and water. The global economy as a whole and the

economic systems of the most powerful countries are gradually realizing the transition to the digital age, in which the role of big data is hard to overestimate, and large companies processing data and using the results of their analysis are creating the Big Data industry.

Research Focus

The scope of Big Data application is extremely broad, as it is difficult to imagine a production or service sector where large data sets cannot be used today, so the integration of big data processing and analysis systems is now typical for all production and service sectors and is also actively used in the process of scientific research, including economic research. To optimize economic processes, Big Data is used in the context of minimizing costs and maximizing revenue, tracking consumer tastes, and understanding customer requests for products and services. Thus, Big Data, today is an innovative field that opens up great opportunities for optimizing various economic and financial processes.

Research Aim and Research Questions

The main aim of the study is to determine the peculiarities of using Big Data to optimize economic processes in the digital era, taking into account the potential possibilities of analyzing large data sets.

To achieve this goal, the following tasks need to be realized such options: to define the essence of Big Data and specify its place and significance in the modern world developing in the digital era; analyze the statistics of Big Data application in the world; to assess the prospects and determine the peculiarities of applying Big Data analysis for the development of economic processes at different levels, in particular, to justify the feasibility of making management decisions.

LITERATURE REVIEW

The processes of promoting digital tools in various spheres of economic life are associated with the development of the production and service sectors, and digital transformation is manifested in the widespread introduction of digitalization in analogue segments of information technology and in traditional sectors of the economy, which for a long period of their development did not use any information technology at all, but the current integration of digital tools allows for their more rapid and targeted development.

In most developed countries, digitalization processes are being implemented quite actively in various spheres of social and economic life, and the positive results are reflected in GDP growth rates, an increase in the number of jobs, their composition and structure, an increase in the range of professions, an increase in the quality and speed of services, the removal of internal obstacles to company development, optimization of company costs, etc. In general, the experience of implementing digital technologies has a positive impact on the development of social and economic processes and ensures higher efficiency of all types of resources (Cong et al., 2021; Lucato et al., 2019; Deng et al., 2022; Onoprienko, Lovciová, Mateášová, Kuznyetsova, Vasylieva, 2023). And modern society has entered the so-called digital age, as it is almost impossible to imagine the modern world without digital tools. In addition, in the modern world, one can already observe a strong dependence of economic development results on digitalization, as it provides ways to expand and sustainably interact between counterparties in the modern world (Bag et al., 2023; Zhu et al., 2019). This statement was proven by the covid-19 pandemic, during which digitalization and information technology, in general, proved to be able to keep the economy, business, finance, public administration, services, etc. in "working order" (Martin et al., 2022). The pandemic has advanced digital transformation and shown that the level of survival of enterprises, industries, and individuals directly depends on the ability to use the resources of the digital economy. This fact has increased the relevance of in-depth theoretical study and identification of problems that hinder the development of digitalization in practice (although even before the pandemic, there were studies that pointed to the threats of lagging behind in the development of digitalization even in traditional areas such as agriculture or public administration).

Scholars (Afonasova et al., 2019; Bamel et al., 2021; Barbaglia et al., 2022) who pay attention to digitalization in economic theory can be divided into two groups. While one group (Mian et al., 2016; Jun et al., 2019; Kitchin, 2014) sees digitalization primarily as a threat to economic development, the other (Abou-Foul et al., 2021; Bannikov et al., 2022; Aleksieienko et al., 2020; Scopsi, 2019), on the contrary, considers it a means of ensuring economic stability, flexibility, and expanding development opportunities. At the same time, the number of supporters of the second group is growing, as global trends show that digitalization does not lead to unemployment, but rather creates new, more skilled jobs; it does not pose a threat of losing control over artificial intelligence but allows it to be used to solve complex and complex everyday problems.

There is no denying the fact that in recent years, the topic of digitalization has received a fairly high degree of theoretical elaboration on certain technological aspects of implementation in the national economy. This is reflected in a significant

number of research articles (Arslanalp et al., 2019; Huan et al., 2023; Suzhen et al., 2020; Kuznyetsova, Sydorchenko, Zadvorna, Nikonenko, Khalina, (2021) that conceptualize new economic concepts and phenomena or rethink already known ones, such as data, data analysis. And in the context of working with data and analyzing it, the concept of big data emerges. In the modern field of information processing, work with large files is combined into the concept of Big Data. In a general sense, these are methods and tools for processing huge layers of various digitized information. The term originated in the late noughties of the third millennium and described the phenomenon of rapid growth of information flows. The global information base is estimated at 46 trillion gigabytes (Holwerda, 2021).

Sources of information are developing rapidly, and the following should be highlighted:

- Internet - websites, social networks, various web applications, online games, etc.;
- information structures of companies - information databases, transaction archives, etc.;
- metrology and mobile communications - readings of continuous operation of reading devices, sensors, and mobile operator databases (Akhter et al., 2022; Austin et al., 2021).

Big data can be presented in different forms (Andersson et al., 2022; Hughes-Cromwick et al., 2019):

- data on Internet user queries;
- archives of laboratory tests of diagnostic centre patients;
- data from sensors of large industrial equipment;
- reports from the transport tracking system of a logistics service;
- detailed information about all purchases in the online store;
- industry, regional, national, and global statistics.

In the early years, Big Data analysis methods were used mainly for scientific research on data analysis. Nowadays, it is a promising tool for business development and building marketing strategies. The main issues of working with massive data are secure exchange and automated analysis. Multifunctional analysis platforms are used for massive data that cannot be processed manually. To understand the terminology correctly, you need to know the basic characteristics of Big Data. These include data that meets several criteria (AlNuaimi et al., 2021):

- in the classical sense, it has a daily volume of more than 150 GB. The current exchange of information is increasingly measured in terabytes;
- regular updating and processing online. Data on various operations are continuously fed into the information repository;
- information is heterogeneous. Files can have different sizes and formats. They can be organized into a structure or scattered;
- information flows are variable, may have peaks in loading, periodicity, dependence on seasons and other circumstances;
- files have different degrees of significance, which the analysis algorithm must determine and structure;
- it is possible to visualize the results of the analysis. For example, it is not possible to automatically convert non-digitalized information into a visual format;
- reliability, the accuracy of the information, and admissibility of methods of obtaining it. Incorrect information will lead to analytical errors.

Increasingly, Big Data is becoming an important tool for companies to build business strategies and marketing. The more information that can be processed, the more accurate the results will be (Ardito et al., 2021; Del Giudice et al., 2021; Hrynychshyn, 2021). Big data is used to analyze customer requirements for existing products and create projects with high potential for popularity.

Within any company, big data helps to analyze in three ways forming a general idea of the company's state and its perception by consumers assessing the company's competitive position, researching the needs of customers and the target audience.

At the same time, Big Data is part of the overall concept of Industry 4.0 and the digital society, which creates almost unlimited opportunities for the development of various levels of economic systems and processes (Cherniaieva et al., 2023; Dykan et al., 2021; Oneshko et al., 2020).

All these aspects can be constantly used by the company to obtain data that can be used to form a rational and reasonable action plan for the further development of the company in general or the promotion of a particular product or service.

AIMS AND OBJECTIVES

The purpose of the study is to determine the peculiarities of using Big Data to optimize economic processes in the digital era, taking into account the potential possibilities of analyzing large data sets. To achieve this goal, the following tasks need to be realized

- to define the essence of Big Data and specify its place and significance in the modern world developing in the digital era;
- analyze the statistics of Big Data application in the world;
- to assess the prospects and determine the peculiarities of applying Big Data analysis for the development of economic processes at different levels, in particular, to justify the feasibility of making management decisions.

METHODS

General Background

In the first stage of the study, the essence of Big Data was defined, and its most characteristic features were specified using the method of analyzing scientific sources with the use of synthesis approaches. It was determined that large data sets, which are currently used to obtain information important for the company and other users, have certain characteristics, which were systematized using the generalization method.

The next step in the work was to analyze the statistical material using the methods of graphical presentation of results and trends, which made it possible to identify trends in the development of the digital economy in the world and the use of Big Data in completely different areas of social and economic life. The analysis was based on statistical data processed using statistical analysis and extrapolation methods.

After analyzing the statistical material, the author systematized the possibilities of Big Data for modern economic systems and, based on the application of the systematization method, identified the potential use of Big Data to optimize economic systems at the macro-, meso- and microeconomic levels.

Data Analysis

The main source of data is statistical materials and scientific literature related to various areas of Big Data application and its business opportunities. For most companies today, Big Data opens up new horizons for analysing the state and potential opportunities for business development and formulating further development strategies.

RESULTS

In the current literature on data analysis and digital tools, the term "big data" or Big Data is used to describe large and complex data sets. Whether it's healthcare data or social media metrics, modern technology means that large structured or unstructured data sets can be made available in near real-time. Importantly, big data cannot be analyzed using traditional methods. The size, speed, and complexity of big data require specialists to use software, which, in turn, depends on significant processing power and storage capabilities. The use of big data analytics, despite being expensive, allows organizations to gain great potential for data processing and use the results of such analysis to make important management decisions and, as a result, gain a competitive advantage.

By 2029, the value of the big data analytics market is expected to reach more than USD 655 billion, up from about USD 241 billion in 2021 (Langworthy, 2019).

Summarizing the scientific sources on the analyzed topic (Feshina et al., 2019; Girard, 2019; Ostropolska, 2021; Kuznyetsova, Kozmuk, Klipkova, Stetsevich, (2021), we can determine that the main characteristics of Big Data are defined as six Vs, Table 1.

Table 1. Main characteristics of Big Data.

Characteristics of Big Data	Description
Volume	Volume - from 150 GB per day
Velocity	Speed. The volume and content of big data are changing every second, so it needs to be collected and processed on large computing capacities. For example, the flightradar24 service, which displays all aeroplane routes online
Variety	Diversity. A big data set can include photos, videos, and texts, files of various sizes and formats, and data from many sources. This data can be both homogeneous and heterogeneous
Veracity	Reliability. Big data is collected only from trusted sources and analyzed using accurate and objective methods. Therefore, corporations and international organizations make strategic decisions based on this data
Variability	Volatility. Big data is updated online, so its flow is unstable. It is affected by transmission speed, changing sources, user actions, and changing seasons. When analyzing data, you need to consider and predict all these factors. For example, airline travel data should be used with adjustments for flight delays and weather conditions that cause routes to change
Value	Value. Data alone means nothing, but it can be used to draw profound conclusions and make informed management decisions. For example, to analyze traffic congestion throughout the year and understand how best to build routes for public transport

A separate area of defining the essence of Big Data may be understanding the degree of its structuredness, and as a result, the need for further work aimed at processing, sorting, and structuring data. Thus, Big Data can be

- structured - that is, already labelled according to certain parameters. This can include data on a company's basic financial performance, sales, stock exchange trading volumes, etc. (Pawełoszek et al., 2021);
- partially structured, for example, files of various formats with records of conversations with customers, requests for the purchase of goods in online stores, and data on the supply of stocks to warehouses (Riggs et al., 2023);
- unstructured, such as photos, music, and messages of all social media users (Yang et al., 2019).

In general, Big Data is structured or unstructured data sets of large volumes. They are processed with the help of special automated tools to be used for statistics, analysis, forecasts, and decision-making.

Today, most of the world's leading audit, analytical and consulting companies (e.g., Deloitte, Ernst & Young and Standard & Poor's) use Big Data in their work and obtain results based on it that are used in the process of forming business ideas (Dey et al., 2019; Becker et al., 2023). In the era of digital technologies and social media, the amount of information generated is growing exponentially. If a company has a website, a smartphone app, or receives customer requests and feedback via email or messengers, it already has data that can be used for analysis. However, businesses need to decide how this data can benefit the company.

The question of the feasibility of developing processes for analyzing large amounts of data arose almost immediately after the possibility of collecting such data was realized. For example, in 2015, only 17% of companies worldwide used big data in their operations (Bluhm et al., 2022). Companies from the IT, banking, and telecommunications industries were the pioneers in the implementation of Big Data. This is not surprising. These sectors accumulate the largest amount of data: banks - through transactions, telecommunications companies - through geodata, search engines - through query histories. Most large companies are currently using big data analytics. In the United States, more than 55% of companies in various industries use this technology. In Europe and Asia, the demand for Big Data is slightly lower - about 53% (Bowen et al., 2023; Mattick et al., 2020). It turns out that over the past five years, businesses have started using Big Data three times more.

The growth of business interest in Big Data can be explained quite simply. Companies that ignore big data technologies have begun to notice lost profits.

Global statistics on the use of Big Data reflect a steady increase in the amount of information that can be used for analysis, as well as the market for Big Data analytics - Figure 1. At the same time, Figure 1 also shows statistics on the use of the Internet of Things, which is closely related to Big Data, as it allows to systematize data and accumulate it for further analysis.

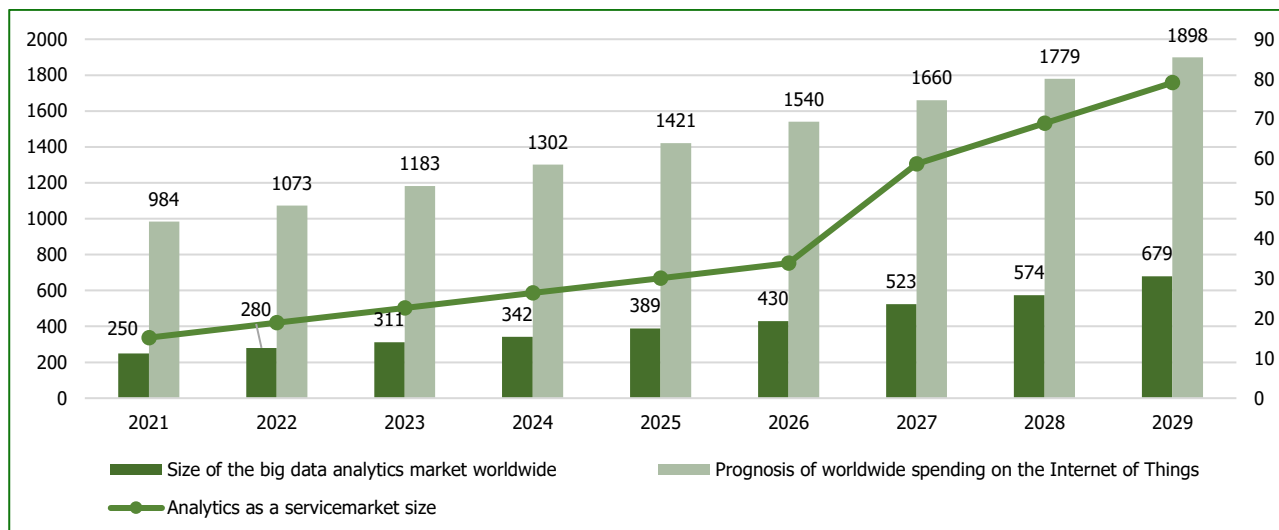


Figure 1. The main components of statistics on the emergence and use of Big Data in the world with a forecast until 2029 (in USD billion). (Source: *Big data - statistics & facts, 2023*)

In fact, the process of accumulating information in the world is growing at a tremendous pace (Figure 2), which is the result of the digitalization of most life processes and access to user data by social networks, search engines, and other Internet services.

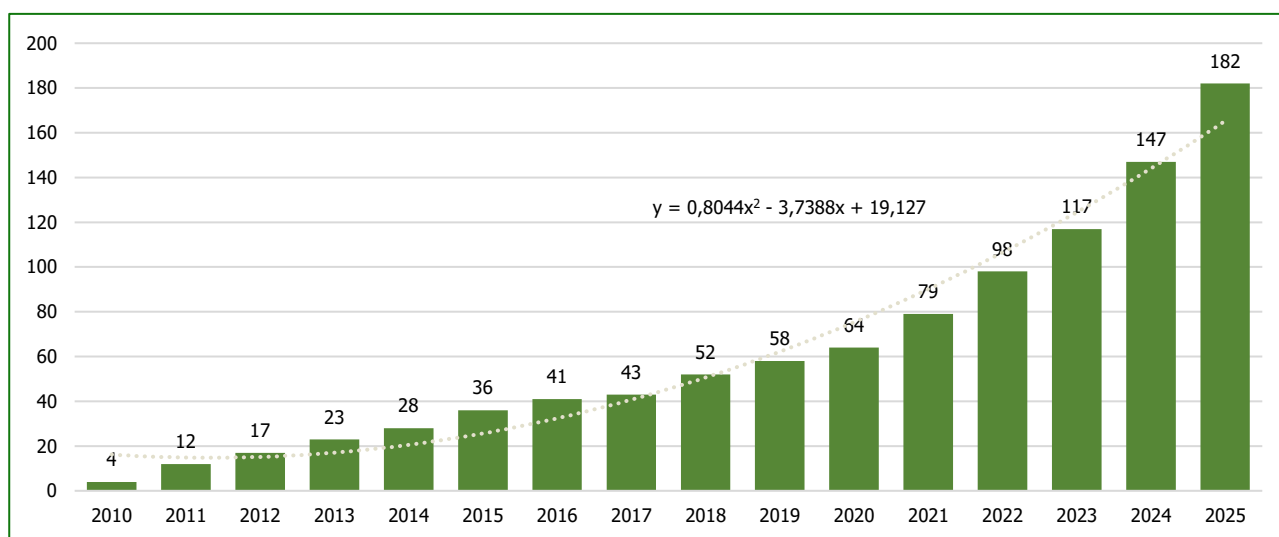


Figure 2. The volume of data/information created, captured, copied, and consumed worldwide from 2010 to 2020, with forecasts from 2021 to 2025 (in zettabytes). (Source: *Big data - statistics & facts, 2023*)

The expenditures of companies and government agencies on Big Data tools in the world reached USD 162.6 billion in 2022, according to analysts at Markets and Markets (Data Centers Market Research Reports, 2023). Working with big data requires special infrastructure and competencies, which are primarily available to IT and telecom companies. In 2021, the global big data and business intelligence (BDA) market was worth USD 215.7 billion, up 10.1% from 2020. Three industries accounted for approximately one-third of big data and business intelligence spending in 2021: banking, discrete manufacturing, and professional services. The next three segments in terms of BDA investments are continuous manufacturing, telecommunications, and government. It was the use of Big Data in this area that ensured the growth of revenue by these markets at USD 47 billion in 2021. The fastest-growing expenditures in the coming years are expected among telecommunications operators (Data Centers Market Research Reports, 2023). According to analysts, the largest developers of Big Data solutions in 2021 include the following companies: IBM (USA); Google (USA); Oracle (USA); Microsoft (USA); SAS (USA).

The market of software development for big business is one of the largest consumers of Big Data. Accordingly, Table 2 shows the growth of financial indicators of the largest software development companies that use Big Data in their work.

Table 2. Growth of financial indicators of the largest software development companies that use Big Data in their work. (Source: Data Centers Market Research Reports, 2023)

Vendor	Revenue (\$M)			Market Share (%)			Growth (%)	
	2019	2020	2021	2019	2020	2021	2019-2020	2020-2021
Oracle	6 956.7	7 420.0	7 993.2	14.2	13.7	13.2	6.7	7.7
Microsoft	4 771.2	5 755.0	7 112.8	9.8	10.7	11.7	20.6	23.6
SAP	5 464.7	5 882.7	6 318.5	11.2	10.9	10.4	7.3	7.4

For the most part, we observe both an increase in the market share of the analysed companies and an increase in their revenue, which is a clear indication of the potential for further development of the Big Data analysis sector.

It is quite logical that companies, as the backbone of any country's economic systems, have become interested in the processes of information accumulation and have begun to focus on the possibilities of using various types of analytical materials that can be obtained as a result of Big Data processing. Today, businesses already have experience in analyzing Big Data, and it is becoming possible to specify the benefits of using Big Data in business management, Table 3.

Table 3. Advantages of using Big Data to manage a company as an economic system at the micro level. (Source: author's own development)

Advantage	Description
1. Helps improve decision-making efficiency	The big data platform has the function of collecting data resources in real-time and can obtain key information based on the rapid processing and analysis of massive data, which can meet the urgent needs of enterprises
1.1. Impact on the decision-making environment	The big data environment based on cloud computing has a great impact on the process of collecting information for enterprise decision-making, making plans, monitoring their implementation, and evaluating plans, which has led to significant changes in the decision-making environment. At the same time, enterprise management solutions from a big data perspective demonstrate clear data-driven functions, i.e., data-driven business development, providing an active and reliable guide for business improvement and innovation
1.2. Impact on the participants of management decision-making	The advancement and application of big data completely undermine the traditional empirical decision-making model, and the bulk of the decision-making process is extended from senior management to direct employees. Decision-makers can flexibly use technologies such as machine learning, statistical analysis, and distributed processing to extract valuable insights from massive data
1.3. Influence on the management decision-making process of the organization	The participation of all employees in the decision-making process leads to a redistribution of decision-making authority in the enterprise, and the change in authority will ultimately affect the organizational structure of corporate governance and the culture of decision-making. In the process of analyzing Big Data-related data, the main problem that the organizational structure must solve is how to distribute decision-making authority and choose the right method of using Big Data for the development of the company
1.4. Impact on management decision-making technologies	Most of the information in Big Data is presented in the form of streaming data that needs to be structured and systematized. It is necessary to use intelligent analysis technology to explore the potential relationship between data fragments and obtain real information. Therefore, enterprises need to accelerate technological innovation and use the latest technologies to support the management decision-making process.
2. Promote more and more diverse decision-making tools	In the process of analyzing Big Data and evaluating management decisions made with its help, it becomes possible to form an optimal data processing mechanism and identify areas of alternative use of data for the company's development
3. Increases the credibility and quality of decisions, as they are based on a large statistical base of initial information, which significantly strengthens the credibility of decision-making schemes	The validity of decisions based on the use of Big Data analysis is beyond doubt since large data sets exclude errors caused by a small sample or errors in the selection of input information. At the same time, the use of Big Data does not exclude the use of inappropriate analysis tools or incorrect interpretation of the data obtained
4. Big data technologies also guide the company's operational strategy	The formation of strategic directions for the company's development can become much more reasonable if analytical procedures are applied and supported by data on the state of the environment, which can be ensured by the use of Big Data

Speaking about the impact of big data on the economic efficiency of a company or institution at the macro level, there is no doubt that in many areas of technology application, big data can help increase productivity, create additional value, and expand revenue streams. As big data has the potential to increase efficiency and effectiveness, companies can not only produce more products at lower costs but also increase the added value of products and services.

In general, it is worth noting that for most stakeholders, Big Data is becoming an opportunity to obtain useful information that can be used in the development of business or government agencies and to support management decision-making using a powerful information base.

DISCUSSION

When studying the extent of the impact of big data on the level of economic efficiency of a company or other economic system, it is important that management decisions are aimed at achieving several mandatory benchmarks, including preventing the growth of data warehouses when the data is not useful, as well as taking into account the ethical issue and not using data that has not been consented to.

Big Data technologies are a way to understand the customer by studying all his or her preferences. In addition, today's customers are very different from those who were on the market ten years ago. The growth of big data allows them to research products, understand consumption volume, and explore their consumer preferences before buying them. By using big data, the relationship between producers and consumers can be personalized, thereby producing consumer-driven products and providing customer-centric services. And based on the data, social and business forms can be found that are suitable for the enterprise development environment, but such developments can only be carried out if users consent to the use of such information (Prokopenko, 2022; Woloszko, 2020).

With the help of big data technologies, companies can collect and analyze information about the receipt and use of resources, specific conditions, and the distribution of reserves required in the enterprise's operating mode to form a map of resource allocation at the enterprise level. However, sometimes the use of sophisticated Big Data analytics can be unreasonably expensive for solving problems of this nature. Big Data analytics can be used to plan production technologies. Big data not only changes the way data is combined but also affects the production and delivery of corporate products and services. By using data to plan production architecture and processes, it can not only help them discover methods of combining values that are not known in traditional data but also provide appropriate, customized solutions to detailed problems of combining different types and sources of information. The big data virtualization function significantly reduces the business risks of the enterprise, allows the enterprise to provide appropriate deterministic answers before starting production or service, and even allows it to focus on personalizing production and service.

Thanks to the correlation analysis of big data, according to the intersection and coincidence of data from different brand markets, the direction of the company's work method will become intuitive and easily identifiable, and it will be more confident in brand promotion and the choice of strategic development direction. However, it should be borne in mind that Big Data analysis systems are still quite new, and it is quite risky to formulate a development strategy for the entire company solely on the basis of Big Data analysis results. Big Data creates differentiated advantages that are mainly reflected at the strategic level of the business model. Big data can help companies improve their strategic decision-making capabilities. By analyzing data, companies can quickly formulate strategic plans that are relevant to the market. However, it should be borne in mind that it can currently only be a supplement to other sources of information and should be used in conjunction with other types of data and information.

CONCLUSIONS

For both business representatives and representatives of the government and government agencies, it is becoming clear that modern digital tools and processes of digitalization of society and the economy open up new opportunities for active development and efficient use of increasingly limited resources.

Over the past ten years, Big Data has become a powerful tool for obtaining information about the patterns of development of certain systems or processes, and, accordingly, it is becoming an additional source of information for making management decisions at the macro-, meso-, and microeconomic levels.

The paper analyzes statistical material that proves that the use of Big Data in the world is gaining momentum and requires companies to apply modern data processing algorithms. At the same time, the rational use of the results of Big Data analysis can form the basis for making managerial decisions and forming an information base on which further formation and changes in the strategic directions of business development will be based. Therefore, it can be noted that Big Data can be useful not only at the stage of making tactical management decisions but also at the level of forming and developing the strategy of the entire business.

REFERENCES

1. Abou-Foul, M., Ruiz-Alba, J. L., & Soares, A. (2021). The impact of digitalization and servitization on the financial performance of a firm: an empirical analysis. *Production Planning & Control*, 32(12), 975-989. <http://www.rioxn.net/licenses/all-rights-reserved>
2. Afonasova, M.A., Panfilova, E.E., Galichkina, M.A., & Lusarczyk, B. (2019). Digitalization in economy and innovation: the effect on social and economic processes. *Polish J Manag Stud*, 19, 22-32. <http://doi.org/10.17512/pjms.2019.19.2.02>
3. Akhter, A., Islam, K. M. A., Karim, Md. M., & Latif, W. B. (2022). Examining determinants of digital entrepreneurial intention: A case of graduate students. *Problems and Perspectives in Management*, 20(3), 153-163. [https://doi.org/10.21511/ppm.20\(3\).2022.13](https://doi.org/10.21511/ppm.20(3).2022.13)
4. Aleksieienko, I., Poltinina, O., & Leliuk, S. (2020, May 3-5). Information support of the management process of the economic entity. Modern science: problems and innovations: II Intern. scientific-practical. conf. (3-5 May 2020, Stockholm). Stockholm. <http://repository.hneu.edu.ua/bitstream/123456789/26133/1/15.pdf>
5. AlNuaimi, B.K., Khan, M., & Ajmal, M.M. (2021). The role of big data analytics capabilities in greening e-procurement: a higher order PLS-SEM analysis. *Technological Forecasting and Social Change*, 169, 120-138. <https://ideas.repec.org/a/eee/tefoso/v169y2021ics0040162521002407.html>
6. Al-Sai, Z.A., Husin, M.H., Syed-Mohamad, S.M., Abidin, R.M.S., Damer, N., Abualigah, L., & Gandomi, A.H. (2022). Explore Big Data Analytics Applications and Opportunities: A Review. *Big Data Cogn. Comput*, 6, 157-162. <https://doi.org/10.3390/bdcc6040157>
7. Andersson, S., Svensson, G., Molina-Castillo, F.J., Otero-Neira, C., Lindgren, J., Karlsson, N.P.E., and Laurell, H. (2022). Sustainable development—direct and indirect effects between economic, social, and environmental dimensions in business practices. *Corporate Social Responsibility and Environmental Management*, 4, 89-127 <https://onlinelibrary.wiley.com/doi/pdf/10.1002/csr.2261>
8. Ardito, L., Raby, S., Albino, V., & Bertoldi, B. (2021). The duality of digital and environmental orientations in the context of SMEs: Implications for innovation performance. *Journal of Business Research*, 123, 44-56. <https://ideas.repec.org/a/eee/jbrese/v123y2021icp44-56.html>
9. Arslanalp, S., Marini, M., & Tumbarello, P. (2019). Big Data on Vessel Traffic: Nowcasting Trade Flows in Real Time. *IMF Working Paper*, 19, 275-289. <https://www.imf.org/~e/media/Files/Publications/WP/2019/wp19275-print.pdf.ashx>
10. Atif, M., & Rosenthal, H. (2016). Introduction: Big Data in Political Economy. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 2(7), 1-10. <https://doi.org/10.7758/rsf.2016.2.7.01>
11. Austin, P., Marini, M., Sanchez, A., Simpson-Bell, C., & Tebrake, J. (2021). Using the Google Places API and Google Trends Data to Develop High Frequency Indicators of Economic Activity. *IMF*, 21, 247-295. <https://www.elibrary.imf.org/view/journals/001/2021/295/001.2021.issue-295-en.xml>
12. Bag, S., & Rahman, M.S. (2023). The role of capabilities in shaping sustainable supply chain flexibility and enhancing circular economy-target performance: an empirical study. *Supply Chain Management: An International Journal*, 28, 162-178. <https://doi.org/10.1108/SCM-05-2021-0246>
13. Bamel, N., & Bamel, U. (2021). Big data analytics based enablers of supply chain capabilities and firm competitiveness: a fuzzy-TISM approach. *Journal of Enterprise Information Management*, 34 (1), 559-577. <https://www.emerald.com/insight/content/doi/10.1108/JEIM-03-2022-0074/full/html>
14. Bannikov, V., Zalialetdzinau, K., Siasiev, A., Ivanenko, R., & Saveliev, D., (2022). Computer Science Trends and Innovations in Computer Engineering against the Backdrop of Russian Armed Aggression. *IJCSNS International Journal of Computer Science and Network Security*, 22, 465-470. http://paper.ijcsns.org/07_book/202209/20220960.pdf
15. Barbaglia, L., Frattarolo, L., Onorante, L., Pericoli, F. M., Ratto, M., & Tiozzo Pezzoli, L. (2022). Testing big data in a big crisis: Nowcasting under COVID-19. *European Commission, Ispra*, 17, 89-107. <https://joint-research-centre.ec.europa.eu/system/files/2022-08/JRC129073.pdf>
16. Becker, J., Cheah, J., Gholamzade, R., Ringle, C.M., & Sarstedt, M. (2023). PLS-SEM's most wanted guidance. *International Journal of Contemporary Hospitality Management*, 35, 321-346. <https://doi.org/10.1108/IJCHM-04-2022-0474>
17. Data Centers Market Research Reports (2023). Research and Markets. <https://www.researchandmarkets.com/categories/data-centers#hmc>
18. Big data - statistics & facts (2023). Statista. <https://www.statista.com/topics/1464/big-data/#topicOverview>
19. Bluhm, B., & Cutura, J. A. (2022). Econometrics at Scale: Spark up Big Data in Economics. *Journal of*

- Data Science*, 20(3), 413-436.
<https://doi.org/10.6339/22-JDS1035>
20. Bowen, C. M., & Grosskopf, M. J. (2023). Editorial: Symposium on Data Science and Statistics 2022. *Journal of Data Science*, 21(2), 173-176.
<https://doi.org/10.6339/23-JDS212EDI>
 21. Cherniaieva, O., Orlenko, O., & Ashcheulova, O. (2023). The infrastructure of the Internet services market of the future: analysis of formation problems. *Futurity Economics&Law*, 3(1), 4-16.
<https://doi.org/10.57125/FEL.2023.03.25.01>
 22. Cong, L. W., Li, B., and Zhang, Q. T. (2021). Alternative data in fintech and business intelligence. In *The Palgrave Handbook of FinTech and Blockchain*, 4, 217-242. https://link.springer.com/chapter/10.1007/978-3-030-66433-6_9
 23. Del Giudice, M., Chierici, R., Mazzucchelli, A., and Fi-ano, F. (2021). Supply chain management in the era of circular economy: the moderating effect of big data. *The International Journal of Logistics Management*, 32, 337-356. <https://www.emerald.com/insight/content/doi/10.1108/IJLM-03-2020-0119/full/html>
 24. Dey, B. L., Yen, D., & Samuel, L. (2019). Digital consumer culture and digital acculturation. *International Journal of Information Management*, 7, 102-157.
<https://doi.org/10.1016/j.ijinfomgt.2019.102057>
 25. Du, Jun, HAN, & Zihui, JIAO (2019). Yuanyuan. Research on the Evolution of profit model and Realization path of Internet financial services: A case study of JINGdong Supply Chain Finance. *Management review*, 31(8), 277-294. <https://doi.org/10.14120/j.car-olc.arrolnkc11-5057/f2019.08.024>
 26. Dykan, V., Pakharenko, O., Saienko, V., Skomovskiy, A., & Neskuba, T. (2021). Evaluating the efficiency of the synergistic effect in the business network. *Journal of Eastern European and Central Asian Research*, 8(1), 51-61. <https://doi.org/10.15549/jee-car.v8i1.646>
 27. Girard, M. (2019). Standards for the Digital Economy: Creating an Architecture for Data Collection, Access and Analytics. Centre for International Governance Innovation. <https://www.jstor.org/stable/resrep21061>
 28. Hammond-Errey, M. (2022). Big data and national security: A guide for Australian policymakers. Lowy Institute for International Policy. <https://www.jstor.org/stable/resrep39703>
 29. Holwerda, Jacob A. (2021). Big data? Big deal: Searching for big data's performance effects in HR. *Business Horizons*, 64(4), 391-399. https://econpa-pers.repec.org/article/eeebushor/v_3a64_3ay_3a2021_3ai_3a4_3ap_3a391-399.htm
 30. Hrynchyshyn, Y. (2021). The infrastructure of the Internet services market of the future: analysis of the problems of formation. *Futurity Economics&Law*, 1(2), 12-16.
<https://doi.org/10.57125/FEL.2021.06.25.2>
 31. Huan, Yu, Ru, Zhang, & Cheonshik, Kim. (2023). Intelligent analysis system of college students' employment and entrepreneurship situation: Big data and artificial intelligence-driven approach. *Computers and Electrical Engineering*, 110, 45-79.
<https://doi.org/10.1016/j.compeleceng.2023.108823>
 32. Hughes-Cromwick, E., & Coronado, J. (2019). The Value of US Government Data to US Business Decisions. *The Journal of Economic Perspectives*, 33(1), 131-146. <https://www.jstor.org/stable/26566980>
 33. Kateryna Onopriienko, Kornélia Lovciová, Martina Mateášová, Anzhela Kuznyetsova, and Tetiana Vasy-lieva (2023). Economic policy to support lifelong learning system development & SDG4 achievement: Bibliometric analysis. *Knowledge and Performance Management*, 7(1), 15-28.
[https://doi.org/10.21511/kpm.07\(1\).2023.02](https://doi.org/10.21511/kpm.07(1).2023.02)
 34. Kitchin, R. (2014). The data revolution: Big data, open data, data infrastructures & their consequences. SAGE Publications Ltd.
<https://doi.org/10.4135/9781473909472>
 35. Kuznyetsova, A., Sydorchenko, T., Zadvorna, O., Niconenko, U., & Khalina, O. (2021). Assessment of aspects of the COVID-19 crisis in the context of ensuring economic security. *International Journal of Safety and Security Engineering*, 11(6), 615-622.
<https://doi.org/10.18280/ijss.110601>
 36. Kuznyetsova, A., Kozmuk, N., Klipkova, O., & Stet-sevich, A. (2021). Structural paradigm of innovative and investment partnership. *Financial and Credit Activity Problems of Theory and Practice*, 2(37), 351-361. <https://doi.org/10.18371/fcaptop.v2i37.230303>
 37. Langworthy, S. (2019). Potential Of Big Data. In *Power Dynamics in an Era of Big Data*, 8, 6-8.
<http://www.jstor.org/stable/resrep45170.4>
 38. Lucato, W. C., Pacchini, A. P. T., Facchini, F., & Mummolo, G. (2019). Model to evaluate the Industry 4.0 readiness degree in Industrial Companies. *IFAC-PapersOnLine*, 52(13), 1808-1813.
<https://doi.org/10.1016/j.ifacol.2019.11.464>
 39. Martin, A., Mikołajczak, G., Baekkeskov, E., & Hart-ley, K. (2022). Political stability, trust and support for public policies: a survey experiment examining source effects for COVID-19 interventions in Australia and Hong Kong. *International Journal of Public Opinion Research*, 34(3), 24-43.
<https://doi.org/10.1093/ijpor/edac024>

40. Oneshko, S., & Pashchuk, L. (2021). Industry 4.0 and creative economy (globalization challenges of the time). *Futurity Economics&Law*, 1(4), 4–11. <https://doi.org/10.57125/FEL.2021.12.25.01>
41. Ostropolska, Y. (2021). Problems and prospects of development of SMART economy in the Post-Socialist States (challenges of the future). *Futurity Economics&Law*, 1(3), 4–16. <https://doi.org/10.57125/FEL.2021.09.25.01>
42. Pawełoszek, I., Kumar, N., & Solanki, U. (2022). Artificial intelligence, digital technologies and the future of law. *Futurity Economics&Law*, 2(2), 22–32. <https://doi.org/10.57125/FEL.2022.06.25.03>
43. Prokopenko, O. (2022). Some aspects of the state information policy of the modern state: definitions of the future. *Futurity Economics&Law*, 2(4), 60–72. <https://doi.org/10.57125/FEL.2022.12.25.08>
44. Riggs, R., Roldán, J.L., Real, J.C., & Felipe, C.M. (2023), Opening the black box of big data sustainable value creation: the mediating role of supply chain management capabilities and circular economy practices. *International Journal of Physical Distribution & Logistics Management*, 7, 89-93. <https://doi.org/10.1108/IJPDLM-03-2022-0098>
45. Scopsi, M. (2019). The Expansion of Big Data Companies in the Financial Services Industry, and EU Regulation. *Istituto Affari Internazionali*, 7, 217-231. <http://www.jstor.org/stable/resrep19656>
46. Wang, S., HU, L., & Sun, J. (2020). Research and practice on the training mode of outstanding talents in big data -- based on the perspective of "new Finance and Economics" and the application direction of financial big data case teaching as an example. *Journal of hebei university of economy and trade (comprehensive edition)*, 20 (4), 79–83. <https://doi.org/10.14178/j.carolcarrollnkiissn1673-1573.2020.04.013>
47. Woloszko, N., (2020). Tracking activity in real time with Google Trends. *OECD Economics Department Working Paper*, 1634, 314-387. https://www.oecd-ilibrary.org/economics/tracking-activity-in-real-time-with-google-trends_6b9c7518-en
48. Deng, Y., Zheng, H., & Yan, J. (2022). Applications of big data in economic information analysis and decision-making under the background of wireless communication networks. *Wireless Communications and Mobile Computing*, 2022, 1–7. <https://doi.org/10.1155/2022/7084969>
49. Yang, Q., Wang, Y., & Ren, Y. (2019). Research on financial risk management model of internet supply chain based on data science. *Cognitive Systems Research*, 56, 50–55. <https://doi.org/10.1016/j.cogsys.2019.02.001>
50. Zhu, C. (2019). Big data as a governance mechanism. *The Review of Financial Studies*, 32 (5), 2021–2061. <https://academic.oup.com/rfs/article-abstract/32/5/2021/5427775?redirectedFrom=fulltext&login=false>

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ВИКОРИСТАННЯ BIG DATA ДЛЯ ОПТИМІЗАЦІЇ ЕКОНОМІЧНИХ ПРОЦЕСІВ У ЦИФРОВУ ЕПОХУ

Великі дані за останні роки стали джерелом інформації про стан розвитку економічних процесів і систем. За умови належного аналізу та інтерпретації великі дані можна використовувати для підтримки ухвалення управлінських рішень і розробки стратегії компанії або організації. Для поглибленого вивчення обраної теми було досліджено понад 40 джерел наукової літератури, що дало змогу оцінити й теоретичні аспекти розвитку Big Data, і практичні можливості впровадження Big Data в розвиток сучасного бізнесу. З огляду на це, метою дослідження є визначення особливостей використання Big Data для оптимізації економічних процесів в епоху цифрових технологій з урахуванням потенційних можливостей аналізу великих масивів даних. Для досягнення мети використані й загальнонаукові методи (аналіз, синтез, індукція, дедукція), і спеціальні методи статистичного аналізу даних і прогнозування з використанням вбудованих алгоритмів Microsoft Excel. У результаті проведених досліджень та аналізу статистичних матеріалів було доведено, що значимість Big Data з часом зростатиме, а перед компаніями відкриються нові можливості для використання цього виду інформації. Наукова новизна роботи полягає у визначенні широкого спектру можливостей та передумов використання Big Data для підтримки ухвалених управлінських рішень для тактичного та стратегічного розвитку бізнесу. Отже, використання Big Data створить передумови для більш активного та стабільного розвитку бізнесу, оскільки дозволить більш системно й збалансовано підходити до аналізу різних типів даних про стан зовнішнього та внутрішнього середовища бізнесу, визначити потенційні можливості розвитку та напрями стратегічного просування на ринку.

Ключові слова: цифрові дані, обробка даних, економічна статистика, обґрунтування економічних рішень, цифрова економіка, промисловий розвиток

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