UDC 338.242.2

DOI: https://doi.org/10.32782/2304-0920/3-101-7

Biloblovskyi Sviatoslav
Educational and Scientific Institute of Management, Economics and Business
Private Joint-Stock Company "Higher education institution
"Interregional Academy of Personnel Management"
ORCID: https://orcid.org/0000-0003-1635-8093

DATA MANAGEMENT AND THE CONCEPT OF BIG DATA IN SUSTAINABILITY REPORTING

Summary
This article explores the interdependence between management control systems, sustainable development integration, and financial reporting. It highlights the necessity of incorporating Big Data and Big Data Analytics to enhance informed decision-making, especially in the context of sustainability reporting. The study emphasizes the benefits of Big Data, including improved efficiency, risk reduction, and competitive advantages, while also addressing the challenges such as data fragmentation and the difficulty of interpreting unstructured data. Recommendations include investing in education and training to develop necessary skills and fostering data partnerships to achieve sustainability goals. The research provides practical insights and empirical evidence on the successful integration of Big Data into management systems for enhanced organizational performance and sustainable development.
Keywords: Big Data, Big Data Analytics, management information system, data management system, sustainable reporting.

Statement of the problem. In the world of today, where information is becoming an increasingly valuable asset, the issue of effective data management and analytics is becoming particularly relevant. This also applies to management reporting, where the use of Big Data and Big Data Analytics tools is becoming a key factor in making informed management decisions.

This need is especially acute in the context of the ever-growing challenges of sustainability reporting. Organisations are forced not only to compile relevant reports, but also to demonstrate their impact on the environment, social sphere and corporate governance.

Traditional data processing methods cannot always cope with the large amounts of information generated by sustainability reporting. Big Data and Big Data Analytics tools allow collecting, analysing and visualising data from various sources, providing organisations with valuable insights into their operations and their impact on stakeholders.

This study focuses on the issues of applying Big Data and Big Data Analytics in the context of building a management reporting information system for organisations seeking to report effectively on sustainable development.

Analysis of recent research and publications. The research on the chosen topic is based on the scientific works of leading scientists, experts and scholars who deal with the issue of defining the nature of the concept of Big Data and the problems of data processing and management.

Thus, in the context of developing a data management system, an important aspect is to define the root concept of such a system as Big Data. According to the study by De Mauro A. et al. [1], the following definition of this term is proposed: "Big Data is an information asset characterised by such a large volume, velocity and variety that it requires special technologies and analytical methods to transform it into value". As defined by Zikopoulos P. and Eaton C. [2], Big Data is a large set of data that traditional DBMS (database management system) tools are unable to process.

The analysis of literature sources shows numerous definitions of Big Data, but according to Elia G. et al. [3], the peculiarity of this concept is the lack of a common theoretical framework in the disciplines of management and a high level of interdisciplinarity.

Goran J. et al. [4] points out that cultural aspects are one of the main barriers to data analytics implementation in business, emphasising the importance of executive support and a favourable corporate culture for the successful integration of data into decision-making processes. Executives must be proactive in shaping and assessing culture, approaching it with the same rigour and discipline they approach operational transformation.

Bean R. [5] notes that problems with the human factor and organisational change significantly complicate the transition to a data-centric organisation. In particular, he emphasises the need to invest in education and training of employees to develop the necessary skills.

Goasduff L. [6] emphasises that technological issues are often not the main obstacles; instead, organisations should focus on change management, communication and developing a data-centric culture. Most executives recognise that their organisations are not managing their information assets properly, resulting in missed business opportunities and excessive costs. As part of creating a data-centric culture, data leaders must be responsible for changing the culture to drive transformation. But they can't just tell people to change their culture – they must inspire people to believe that change is necessary.

As Akerkar R. [7] points out, the main difficulties of big data are data, process, and governance challenges.

However, the dynamic nature of the evolving digital technologies and their continuously growing impact on the transformation processes both in society as a whole and on the activities of organisations require further in-depth research in this area. One of the key areas that require further study is the use of the Big Data concept in the context of building a management decision-making system and the challenges of reporting on sustainable development.

Highlighting previously unresolved parts of the overall problem. This study highlights several unresolved issues in integrating Big Data into management systems for sustainability reporting. Key challenges include data fragmentation, which complicates achieving a unified data view, and difficulties in

interpreting unstructured data. Additionally, many organisations struggle with real-time data analytics and face significant cultural and organizational barriers to adopting Big Data technologies. The shortage of skilled professionals further hampers effective use, while ensuring data quality remains a critical concern. Establishing effective data partnerships, integrating management systems, and managing the high costs and evolving sustainability reporting requirements also present ongoing challenges. Addressing these issues is essential for organisations to make informed, data-driven decisions and achieve sustainability goals.

Objectives of the article. The objective of the article is to study and systematise knowledge on the use of Big Data and Big Data Analytics tools in the context of building a management reporting system for organisations aiming to effectively report on sustainable development. The research goal is to determine the peculiarities of using Big Data and Big Data Analytics in the management reporting information system for reporting purposes in general and sustainable development in particular. For this purpose, the challenges and opportunities associated with the implementation of Big Data and Big Data Analytics in this area were identified and analysed.

The expected results are a scientific justification of the feasibility of using Big Data and Big Data Analytics for sustainability reporting, development of recommendations for their implementation to facilitate the reporting process. In addition, the practical experience of using Big Data and data management systems for reporting was systematised and the prospective directions of Big Data and Big Data Analytics development in the context of management accounting and reporting management information systems were analysed.

Summary of the main material. A management accounting information system is not only an information system but also a management control system. The main characteristics of an information system are data entry, sorting and processing, as well as generation and output of information, while a management control system is a system designed to achieve specific organisational objectives [8].

Management accounting is one of the pillars of the organisation's accounting work. In the context of the development of Big Data, the acceleration of the combination of information technology and management accounting contributes to the efficiency of the overall management of the enterprise and ensures the rationality and effectiveness of the formulation of the overall strategic goals of the enterprise. The management accounting information system includes several modules. The budget management and cost management modules help to simplify the work of management accounting. At the same time, this set of information systems can also provide a theoretical basis for decision-making and management for managers of various business units. The development of a new enterprise management accounting information system deeply integrates the operations of the organisation with current big data and realises the transformation and modernisation of the financial work of the organisation.

Financial integration means the timely exchange of data sources such as business flows, capital flows and information flows between business and finance departments through information technology and tools, and joint management activities such as planning, decision-making, controlling and evaluating based on value objectives to ensure the realisation of the enterprise value creation process. The enterprise value creation process consists of value-adding activities. These value-added strategies constitute the enterprise value chain, including the core activities, i.e. the main production and operational links, such as preparation, production, sales, etc., as well as personnel, procurement, and so on. Technology development and other supporting activities are the main nodes in the enterprise value chain; they provide the starting point for an enterprise to realise the integration of production and finance. The integration of production and finance should overcome the limitations of each link, reduce the cost of each link, realise the synergy of each link, focus on the overall strategic plan of the enterprise, and complete the value creation of the enterprise.

Internal enterprise data mainly comes from business activities and is transferred to the finance department for processing. Through the integration of production and finance, the automatic interconnection and linking between the business system and the financial system is ensured, which improves the timeliness of information and feedback, ensures the synchronisation of business processes, capital flows and data circulation, and then guarantees the quality of the underlying data and the logical consistency between business and financial data from the original source.

By using data collection technology, the huge amounts of data generated in the dimensional business can be efficiently processed by building a data collection model and data warehouse, thereby reducing the measurement error of the business to the standard range and improving the efficiency of business valuation [9].

Three characteristics are crucial for the concept of Big Data: volume, variety and velocity (the so-called 3 Vs), one of the first to formalise them was Laney D. [10]. Below is a brief description of each of the characteristics, based on the analysis of research in the field of data management:

– *Volume*: Big Data refers to data sets that are so large that they are difficult to process using traditional methods. The amount of data stored today is growing rapidly, and the quantitative measurement of the volume is not constant, but this characteristic captures the essence of the concept of Big Data.

– *Variety:* Big Data includes data from different sources and in different formats, such as structured, unstructured and semi-structured. Structured data is organised in tables, like in databases, unstructured data has no clear structure (e.g. text, images, video), and semi-structured data has a certain structure, but not a rigidly defined one (e.g. XML, JSON). In fact, it is data that is a combination of both of the previous types, i.e. it cannot be categorised in the conventional way.

– *Velocity:* Big Data is generated and collected very fast, which requires appropriate processing and analysis. It can be a real-time data stream or data that is updated very frequently.

In some cases, the defining characteristics also include such categories as:

– *Veracity*: The "truth" or accuracy of data and information assets, which often determines trust at the executive level;

– *Value*: the most important characteristic from a business perspective – the value of Big Data usually lies in identifying information and recognising patterns, which leads to increased efficiency

of operations, stronger customer relationships and other clear and quantifiable business benefits;

– *Variability*: The changing nature of the data that organisations are attempting to collect, manage and analyse – for example, in sentiment or text analysis, changes in the meaning of keywords or phrases.

It is important to understand that Big Data is not just about large amounts of information. It is about new opportunities that open up through the analytics of this data. Big data is not a homogeneous entity but can have a number of manifestations or levels of aggregation, for example, in terms of scale (e.g., through the use of the concept of samples as opposed to complete data sets), coverage (e.g., geospatial, time series, or cross-sectional), and level of analysis (e.g., individual-level data or aggregated data).

Based on the defined characteristics of the concept of Big Data, the key aspects of value creation include the ability of an organisation to collect, store and analyse a large amount of complex data generated in real or near real time with the support of advanced analytics [11]. As the term Big Data implies, organisations are faced with huge amounts of data. Consequently, organisations that do not know how to manage this data find themselves overwhelmed by it.

In a study conducted by Capgemini [12] on the impact of the Big Data category on the management decision-making process, the following problems were reported by respondents:

– *Unstructured data is difficult to process on a large scale.* Forty-two per cent of respondents say unstructured content is too difficult to interpret. Forty per cent of respondents believe they have too much unstructured data to support decision-making.

– *Fragmentation is a significant obstacle.* Fifty-six per cent of respondents across all sectors believe that organisational silos are the biggest barrier to effective decision-making using big data.

– *Efficiency needs to be balanced with effectiveness in "processing" big data.* Eighty-five per cent of respondents believe that the main problem is the lack of effective ability to analyse and act on data in real time.

Eventually, the issue of Big Data's impact on organisations' activities, both in the strategic and even operational perspectives, began to be closely linked to a new challenge of the time – artificial intelligence (AI).

According to a survey conducted by Wavestone, a consulting company, on the state of data and artificial intelligence in the world's leading companies in 2024 [13], the following results were obtained. Data quality remains a challenge – only 37% of respondents say they have improved it, meaning that data quality remains a problem for two-thirds of organisations. The role of the CDO/CDAO (Chief Data Officer/Chief Data and Analytics Officer) is still considered "new and evolving/struggling to cope with turnover" by 43% of respondents. Human factors – culture/people/processes/organisation – remain a barrier to data adoption for 78% of respondents. And while data ethics is seen as a top priority by 74% of respondent organisations, only 42% have the necessary policies and practices in place, and only 16% believe the tech industry has done enough to address data ethics and AI.

We can generally conclude that the key barriers to data-centricity in organisations are culture, people, process change and organisational harmonisation, rather than technological limitations.

Recent research shows that AI is more potentially transformative than any other technology in this generation, and it is seen as a top organisational priority for the near future. However, it's also worth noting that most organisations are not yet benefiting significantly from generative AI. Only 5% have implemented generative AI on a large scale in their companies. Only half of them have the necessary specialists to successfully implement generative AI. Almost all – 99% – of respondents believe that generative AI requires precautions, but only 63% have already implemented them. Recent surveys clearly show a dramatic improvement in the progress of data and analytics initiatives.

Big data has enormous potential, but its limitations must be recognised. Understanding that data is "processed" rather than pure, and addressing issues such as speed, noise and interpretation bias are important for responsible use of big data. By increasing information literacy and transparency, big data can be used to generate valuable insights without giving in to illusions of a perfect "truth of last resort".

According to Fawcett S. and Waller M. [14], there are five prospective areas in the field of Big-data analytics (BDA), such as predictive analytics, value-added manufacturing, unmanned vehicles, borderless supply chains, and material science. Predictive analytics provides valuable information, but management must be aware of its limitations. Using information literacy, a hybrid approach and new artificial intelligence tools, we can navigate this paradigm shift and make data-driven decisions based on correlation and an understanding of root cause and effect. While this is not always possible, understanding the "why" strengthens predictions and builds trust in data. Focusing on substantive issues allows for a transformation to clear, practical actions for managers, which are expressed in substantive "what to do" questions. Currently, the most effective approach is a hybrid approach, which combines predictive analytics with causal analysis (when possible) to gain a deeper understanding of the relationships and mechanisms of system behaviour. In turn, new AI technologies aim to explain the reasons underlying forecasts, bridging the gap between the "why" and "what" questions.

Recent studies conducted by Berardino D. and Vona S. [15] highlighted such practical aspects of Big Data application as organisational benefits gained through the use of Big Data/Big Data Analytics (BDA) and the relationship between BD/BDA and the decision-making process. In the context of assessing the role of BD and BDA in supporting strategic decisions, the study found a large number of developments that use the potential of Big Data to improve decision-making. Many research papers discuss the relationship between these technologies and decision-making under uncertainty. While earlier works have made theoretical contributions to the study of the causal relationship between BD, BDA and good decision making, recent developments have explored this relationship empirically, using qualitative research methods with the participation of business executives or IT managers. The main findings of such studies indicate the existence of inertia and cognitive overload of individual executives caused by an excessive amount of data. The solution to this problem can be either the creation of internal competencies or the use of external service providers

in the field of consulting and business intelligence. As a rule, organisations go from engaging external experts at the initial levels of maturity to creating relevant structures and functions internally, which are part of their own organisational structure.

There are many correlated factors that influence the quality of decision making. According to Janssen M, et al. [16], the conceptualisation of BD and BDA as a single process managed by a single data analyst is too simplistic. The diversity of data sources and characteristics affects the methods of data processing and the use of Big Data analytics to deliver value to the organisation in terms of increasing its total value. The quality of decision-making depends on many factors that need to be managed simultaneously. Key factors include process transformation and integration, skills development, retention of competencies and human resources, data quality, flexible systems, collaboration, knowledge sharing, decision-maker competence, trust building, and relationship management.

According to the analysis of many studies, the main challenge is not just working with a large amount of data, but the ability to interpret it and use BDA to create value. Accordingly, there is a need to take into account the diversity, speed of data flow, truthfulness and reliability of data. Thus, to work effectively with Big Data, it is necessary to have appropriate processes and a systematic approach.

Meanwhile, the quality of decision-making depends not only on BD and BDA, but also on the ability to manage the entire chain of work with Big Data. Thus, we can conclude that it is necessary to develop mechanisms for managing the collection and processing of data sets. The management system should provide access to sources, understanding of the quality of such data, as well as an understanding of the value and limitations of Big Data.

With sustainable development issues becoming increasingly important, the practical implementation of big data processing methods is becoming more and more in demand.

Data Partnerships for Sustainable Development (DPSD) are collaborative efforts of various stakeholders aimed at sharing and using data resources to achieve the Sustainable Development Goals (SDGs). The Sustainable Development Goals are a universal set of 17 interrelated goals developed by the United Nations to address global challenges such as poverty, inequality, climate change, environmental degradation, peace and justice. They were adopted in September 2015 as part of the 2030 Agenda for Sustainable Development (Agenda 2030) [17]. These partnerships play a crucial role in overcoming information challenges and accelerating progress towards a more sustainable future. A key message that characterises the structure and achievability of these goals is the emphasis on the importance of baseline data, noting that high-quality, accessible, timely and reliable disaggregated data will be essential to assess progress and ensure that no one is left behind.

Data partnerships vary from "open" to "closed" initiatives, which affects how they can legitimise themselves. Open initiatives typically provide for free access to data and results, which promotes transparency and broad collaboration. Conversely, closed initiatives restrict access to data and results, often for reasons of confidentiality, proprietary interests, or security. The degree of openness of a partnership characterises its legitimacy, affecting transparency, trust and the perceived value of cooperation.

In particular, open data initiatives can legitimise themselves through transparency, building trust between stakeholders, and the widespread use and verification of data. They often receive support from the public and other organisations because their open nature is consistent with the principles of openness and inclusiveness. Closed data initiatives, on the other hand, are characterised by the ability to protect sensitive information, retain control over data use, and create value through unique information or secure technologies. They can legitimise themselves through data security guarantees, competitive advantage or regulatory compliance.

The balance between openness and closure in information partnerships requires careful analysis of the trade-offs between accessibility, security, privacy and the potential for innovation.

As Rasche A. et al. argue in their study [18], partnerships in data for sustainable development are leading to a change in approaches to the collection, analysis and distribution of development-related data. At the same time, it should be borne in mind that while partnerships can provide many useful insights into sustainable development issues, these insights may not be effective in creating outcomes that benefit people or the environment. On the other hand, partnerships may produce viable ideas, but international organisations or national governments may not use these ideas (e.g. because they do not trust big data as a source of expertise), or because they may not use them.

For the purposes of specific organisations in generating relevant and useful information to measure the achievement of their objectives and plans, the question of considering the type of data partnerships falls into the category of management judgement and strategic choice. Given the fact that there is currently no clear-cut advantage to a particular type of partnership, it is natural to consider a trade-off between the benefits and disadvantages of both types of partnerships – open and closed.

The research team of Rakesh D. et al. [19] conducted a comprehensive analysis of the factors contributing to sustainable business development using big data analysis in the context of developing countries. The data was collected from manufacturing companies that have implemented sustainable practices. It was found that big data analytics (BDA) capabilities provide a sustainable internal business process for embedding sustainability goals in an organisation, which in turn contributes to the achievement of long-term sustainability goals by manufacturing companies. Top management involvement is an integral factor for better business performance. The top management of an organisation should be focused on long-term economic sustainability.

From a managerial perspective, there is evidence that for effective business model development, companies should develop such important organisation-wide tools as Big Data Analytics Capabilities (BDAC) by hiring and training qualified staff, implementing organisational learning and knowledge sharing practices, and promoting a data and evidence-based corporate culture Mikalef P. et al. [20].

According to Ciampi F. et al.'s [21] study of the impact of big data analytics capabilities on business model innovation, it was demonstrated that a significant part of the impact of BDAC on business model innovation occurs through top management,

and therefore, top managers should take measures to better use BDAC in the context of entrepreneurial initiatives. For example, introducing monetary or non-monetary incentives for employees who engage in creative experimentation and research based on Big Data can encourage internal collaboration on joint data-driven innovation projects that require high risk and responsibility.

As noted by Hofmann N. et al. in their study [22], enhancing financial analysis is essential for strengthening an organisation's financial management, improving governance, creating greater economic value and better social value. The quality and effectiveness of Business Performance Management (BPM) are directly related to the perfection of application tools, in particular management systems, of which SAP SE's SAP S/4HANA is a representative. The key characteristics of this tool were identified as follows:

– built-in analytical capabilities that allow users to obtain information about business performance in real time;

– flexible architecture that allows organisations to easily adapt the system to their needs;

– ease of use – a simple and intuitive user interface makes it more accessible to users with different levels of expertise;

– increased productivity, which is a basic prerequisite for effective work with large amounts of data.

It should be noted that there are many other competitors that offer similar or even better features. Among the most prominent competitors to SAP S/4HANA is Oracle Cloud E-Business Suite, which offers a wide range of features including analytics, planning and budgeting, performance management, and monitoring. Oracle Cloud E-Business Suite also has strong integration with other Oracle products, such as Oracle ERP. IBM Cognos Analytics: This solution provides analytics and reporting tools and capabilities, as well as planning, budgeting and consolidation capabilities. IBM Cognos Analytics is well integrated with other IBM products, such as IBM ERP. Microsoft Dynamics product line – offers a wide range of analytics and reporting tools, as well as planning, budgeting and consolidation capabilities. Microsoft Dynamics creates a unified data management environment with other Microsoft products.

Based on the analysis of the capabilities and characteristics of key data management systems, the following common characteristics can be identified:

1. *AI analytics:* there is a strong trend towards integrating AI capabilities into the software and operational environment of organisations, which can help automate data research, identify hidden trends and generate recommendations and forecasts.

2. *Collaboration:* Integrated data management systems allow real-time collaboration on data with other users. This helps to improve collaboration and coordination of efforts and to make more informed and balanced decisions.

3. *Security:* Modern data analytics and processing systems offer an adequate level of security and access control to keep data safe. This factor is critical when dealing with sensitive data and, given the strict regulatory environment, in terms of personal data protection (for example, the requirements of the GDPR in the EU).

4. *Flexibility:* The systems are modular platforms that can be customised to meet specific needs and conditions. This means that you can choose exactly the features you need and avoid wasting resources on features that are not relevant.

5. *Scalability:* Data management systems have the ability to scale to meet the needs of small, medium and large businesses. It determines the ability of the system to handle growing volumes of data and support more users without compromising performance.

6. *Cost:* Systems are highly flexible in terms of pricing and typically offer a range of pricing plans and models to meet the needs of organisations of all kinds and sizes.

7. *Support:* The level of support can affect how the system can be used and administered. Typically, a multi-level support model is used, both at the level of a global network of partners and experts and local offices.

When making managerial decisions on the choice of such systems, the following factors should be taken into account: complexity of implementation and high cost of new integrated management systems. It is obvious that without substantial initial investments, both monetary and human resources, which are part of the competence set, it is impossible to achieve an acceptable level of implementation of management systems.

This issue is extremely relevant, especially in the context of the modern business environment, which is characterised by rapid technological development, including AI. In this context, several key aspects should be considered in terms of critical analysis of the system selection process, which should be divided into such blocks as implementation issues, cost and reporting requirements.

Complexity of implementation

– Technical aspects: Implementing Big Data Analytics and ERP systems requires a sophisticated infrastructure, including powerful servers, networking equipment and specialised software. It also requires integration with an organisation's existing systems, which can be technically challenging and carry business continuity risks.

– Organisational changes: Implementing new systems often requires significant changes to the organisational structure and business processes. This can cause resistance from staff who are used to the old ways of working.

– Staff training: For a successful implementation, staff must be trained to use the new systems, which requires additional resources and time.

High cost

– Financial investments: As experience shows, the cost of implementing Big Data Analytics and ERP systems can be very high, and the budgeting process may not take into account all the costs that will be required to complete the process. This includes the cost of hardware, software licences, consulting services and staff training.

– Time investment: Implementation of such systems can take considerable time, which can affect an organisation's productivity in the short term.

Need for sustainability reporting

– Environmental and social reports: Nowadays, organisations are increasingly required to report on their sustainability performance, and the reporting requirements are constantly changing and becoming more complex. Big Data Analytics systems can help collect and analyse the data required for such reports.

– Transparency and accountability: ERP systems can provide greater transparency and accountability in the management of organisations'

resources, which is essential for meeting sustainability standards.

The implementation of Big Data Analytics and ERP systems is a complex and high-cost process that requires significant upfront investment. However, considering the rapid development of technology, including the extremely rapid progress in the field of AI, these systems can provide significant benefits for organisations, such as improved analytics, business process automation and increased efficiency of corporate management. Given the need for comprehensive and multidimensional sustainability reporting, the implementation of such systems becomes even more important. It is obvious that AI plays a key role in this process, providing new opportunities for data analysis and decision-making.

Conclusions from the study. The study addressed and emphasised the issues of complex interdependence between management control systems, integration of sustainable development and financial reporting. As practice shows, the focus should be on the necessity to integrate internal systems, in particular management accounting, financial reporting and sustainability reporting. The use of Big Data and Big Data Analytics is becoming a key factor in making sound management decisions, especially in the context of sustainability reporting.

The main obstacles to the implementation of Big Data include data fragmentation, the difficulty of interpreting unstructured data, and the lack of effective real-time data analytics. Considering the rapid expansion of AI, there is a clear need to invest in education and training to develop the necessary skills to work with Big Data and the appropriate analytical tools.

The study shows that the use of Big Data and Big Data Analytics is an important vehicle for data management and sustainability reporting. The main challenges include cultural and organisational barriers, which can be overcome with appropriate technological and managerial approaches. Data partnerships also play an important role in sustainability by providing opportunities for data sharing and analysis.

The study emphasises the importance of integrating Big Data into management systems to improve the efficiency and competitiveness of organisations. In particular, successful integration requires technological solutions, management approaches and cultural changes within organisations.

References:

1. De Mauro A., Greco M., Grimaldi M. (2016) A formal definition of Big Data based on its essential features. *Library Review*, vol. 65, no. 3, pp. 122–135. DOI: https://doi.org/10.1108/LR-06-2015-0061
2. Zikopoulos P., Eaton C. (2011) *Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data*. McGraw-Hill Osborne Media.
3. Elia G., Polimeno G., Solazzo G., Passiante G. (2020) A multi-dimension framework for value creation through big data. *Industrial Marketing Management*, vol. 90, pp. 617–632. DOI: https://doi.org/10.1016/j.indmarman.2019.08.004
4. Goran J., LaBerge L., Srinivasan R. (2016) Culture for a digital age. Available at: https://www.mckinsey.com/business-functions/organization/our-insights/culture-for-a-digital-age (accessed July 14, 2024).
5. Bean R. (2021) Why Is It So Hard to Become a Data-Driven Company? *Harvard Business Review*. Available at: https://hbr.org/2021/02/why-is-it-so-hard-to-become-a-data-driven-company (accessed July 14, 2024).
6. Goasduff L. (2019) Create a Data-Driven Culture by Influencing 3 Areas. Available at: https://www.gartner.com/smarterwithgartner/create-a-data-driven-culture-by-influencing-3-areas (accessed July 14, 2024).
7. Akerkar R. (Ed.). (2013). *Big data computing*. CRC Press.
8. Wenying Bian, Wenmin Bian (2022) Construction of Application Model of Accounting Framework Platform for Industry-Finance Integration Management under the Background of Multimedia Technology. *Mobile Information Systems*, vol. 2022. DOI: https://doi.org/10.1155/2022/1151226
9. Enderle G. (2018) How can business ethics strengthen the social cohesion of a society? *Journal of Business Ethics*, vol. 150, no. 3, pp. 619–629. DOI: https://doi.org/10.1007/s10551-016-3196-5
10. Laney D. (2001) 3D Data Management: Controlling Data Volume, Velocity, and Variety. *META Group Research Note*, vol. 6. Available at: https://studylib.net/doc/8647594/3d-data-management--controlling-data-volume--velocity--an (accessed July 7, 2024).
11. Yesudas M., Menon G., Ramamurthy V. (2014) Intelligent operational dashboards for smarter commerce using big data. *IBM Journal of Research and Development*, vol. 58, no. 5/6, pp. 13:1–13:10. DOI: https://doi.org/10.1147/JRD.2014.2346131
12. Capgemini (2012) The deciding factor: Big data & decision making. Available at: https://www.capgemini.com/wp-content/uploads/2017/07/The_Deciding_Factor__Big_Data___Decision_Making.pdf (accessed July 7, 2024)
13. Wavestone (2024) Data and AI Executive Leadership Survey 2024. Available at: https://wwa.wavestone.com/app/uploads/2023/12/DataAI-ExecutiveLeadershipSurveyFinalAsset.pdf (accessed July 14, 2024).
14. Fawcett S., Waller M. (2014) Supply chain game changers – mega, nano, and virtual trends and forces that impede supply chain design (i.e., building a winning team). *Journal of Business Logistics*, vol. 35, no. 3, pp. 157–164.
15. Berardino D., Vona S. (2023) Big Data and Decision-Making: A Structured Literature Review. *European Scientific Journal*, vol. 17, p. 374. DOI: https://doi.org/10.19044/esipreprint.5.2023.p374
16. Janssen M., van der Voort H., Wahyudi A. (2017) Factors influencing big data decision-making quality. *Journal of business research*, vol. 70, pp. 338–345. DOI: https://doi.org/10.1016/j.jbusres.2016.08.007
17. United Nations. (2015) Transforming our world: The 2030 agenda for sustainable development. United Nations. Available at: https://sustainabledevelopment.un.org/post2015/transformingourworld/publication (accessed July 14, 2024).
18. Rasche A., Morsing M., Wetter E. (2021) Assessing the Legitimacy of "Open" and "Closed" Data Partnerships for Sustainable Development. *Business & Society*, vol. 60, no. 3, pp. 547–581. DOI: https://doi.org/10.1177/0007650319825876
19. Raut R., Mangla S., Narwane V., Gardas B., Priyadarshinee, P., Narkhede B. (2019) Linking big data analytics and operational sustainability practices for sustainable business management. *Journal of Cleaner Production*, vol. 224, pp. 10–24. DOI: https://doi.org/10.1016/j.jclepro.2019.03.181
20. Mikalef P., Boura M., Lekakos G., Krogstie J. (2019) Big Data analytics capabilities and innovation: The mediating role of dynamic capabilities and moderating effect of the environment. *British Journal of Management*, vol. 30, no. 2, pp. 272–298. DOI: https://doi.org/10.1111/1467-8551.12343
21. Ciampi F., Demi S., Magrini A., Marzi G., Papa A. (2020) Exploring the impact of big data analytics capabilities on business model innovation: The mediating role of entrepreneurial orientation. *Journal of Business Research*, vol. 123, pp. 1–13. DOI: https://doi.org/10.1016/j.jbusres.2020.09.023
22. Hofmann N., Linsner R., Poschadel F. (2017) SAP S/4 HANA: Revolution or evolution in business performance management? *Journal of Cost Management*, vol. 31, no. 4, pp. 7–19.

Білобловський С. В.
Навчально-науковий Інститут управління, економіки та бізнесу
Приватного акціонерного товариства
"Вищий навчальний заклад "Міжрегіональна Академія управління персоналом"

УПРАВЛІННЯ ДАНИМИ ТА КОНЦЕПЦІЯ BIG DATA В СФЕРІ ЗВІТУВАННЯ ЗІ СТАЛОГО РОЗВИТКУ

У статті досліджується взаємодія між системами управлінського контролю, інтеграцією сталого розвитку та фінансовою звітністю на рівні організації. Емпіричний аналіз підкреслює необхідність цілісної інтеграції управлінського обліку, фінансової звітності та сталого розвитку. Дослідження розглядає Big Data та інструменти Big Data Analytics як ключові фактори для прийняття обґрунтованих управлінських рішень, особливо у контексті звітності зі сталого розвитку. Аналізуються виклики та переваги впровадження принципів сталого розвитку в управлінські системи, включаючи підвищення ефективності, зменшення ризиків та аналіз конкурентного середовища. Наразі, традиційні методи обробки даних не здатні впоратися з великими обсягами інформації, що генеруються та запитуються в рамках процесу звітування зі сталого розвитку. Big Data та інструменти Big Data Analytics дозволяють збирати, аналізувати та візуалізувати дані з різних джерел, надаючи організаціям структуровану інформацію про їх діяльність та її вплив на стейкхолдерів. Дослідження фокусується на проблематиці використання Big Data та Big Data Analytics в контексті побудови інформаційної системи управлінського обліку для організацій, які прагнуть враховувати виклики ефективного звітування щодо сталого розвитку. Впровадження Big Data пов'язано з низкою проблем, таких як фрагментація даних, складність інтерпретації неструктурованих даних та відсутність можливості аналізу даних в режимі реального часу. Культурні та організаційні бар'єри також ускладнюють впровадження Big Data, що потребує інвестицій в освіту та навчання співробітників для розвитку необхідних навичок та компетенцій. Зокрема, організації повинні створювати внутрішні компетенції або звертатися до зовнішніх надавачів послуг у сфері консалтингу та бізнес-аналітики для ефективного використання Big Data. Партнерства у сфері даних для сталого розвитку (Data Partnerships for Sustainable Development) стають все більш важливими для подолання інформаційних викликів в контексті жорстких та всеосяжних вимог до звітності. Таким чином, використання Big Data та Big Data Analytics є важливим інструментом для управління даними та звітування зі сталого розвитку. Основні виклики можна подолати за допомогою відповідних технологічних та управлінських підходів, а також культурних змін всередині організацій, а інтеграція Big Data в управлінські системи підвищує ефективність та конкурентоспроможність організацій.

Ключові слова: великі дані, аналітика великих даних, система управління даними, управлінська інформаційна система, звітність зі сталого розвитку.