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DIGITAL BUSINESS ANALYTICS TOOLS AS A MEANS OF ENSURING BUSINESS TRANSPARENCY AND SUSTAINABLE DEVELOPMENT

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Abstract. *The article discusses the role of digital business analytics tools as a key factor in ensuring operational transparency and implementing the concept of sustainable development. The advantages and functional capabilities of modern analytical platforms, such as Microsoft Excel, Google Sheets, Tableau, and Power BI, are analyzed in the context of forming a multi-level data processing ecosystem. The study emphasizes the importance of integrating non-financial indicators into digital models for assessing the long-term sustainability of businesses. In addition, the paper suggests ways to use business analytics tools to improve business competitiveness.*

Keywords: *business analytics, financial analysis, sustainable development, digitalization, shadow economy reduction.*

Introduction. The relevance of the study is determined by the objective need to transform analytical processes at enterprises in the context of the rapid digitalization of the global economy. In modern conditions, data are becoming a strategic asset; however, their effective use is impossible without the implementation of advanced Business Intelligence tools. The use of digital instruments makes it possible to move from fragmented information processing to the creation of an integrated ecosystem for managerial decision-making based on the principles of objectivity and efficiency.

This issue becomes especially important in the context of European integration processes and the need to reduce the shadow economy, where the automation of analytical procedures serves as an effective mechanism for ensuring financial transparency and minimizing corruption risks by reducing the influence of the subjective human factor. At the same time, the integration of digital technologies into management is directly connected with the implementation of the sustainable development (ESG) concept, since modern BI systems provide opportunities for comprehensive monitoring not only of financial results, but also of environmental and social indicators of enterprise activity.

During the period of overcoming the consequences of global crises and wartime challenges, the ability of businesses to adapt quickly and maintain public accountability becomes a key condition for preserving resilience and increasing investment attractiveness. Therefore, the study of practical aspects of using business analytics software is important for the development of a transparent, socially responsible, and competitive corporate sector capable of functioning effectively under conditions of constant global transformation.

Analysis of recent research and publications. The practical aspects of using digital business analytics tools have been studied in the works of domestic and foreign researchers.

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In particular, Balaniuk I., Bezsmertna Yu., Hunko S., Zamlynska O., Zamlynskyi V., Ivanochko B., Kvita H., Liba N., Liashenko O., Melnyk I., Stavytskyi O., Talakh V., Talakh T., Shelenko D., Shikovets K., and Shchurovska A. examine the specific features of using various digital tools in business analytics in their studies. At the same time, Almashi V., Behun S., Dziubanovska N., Proskura V., Chernychko T., and Tsehelnyi I. study digital tools as a factor of sustainable development. Foreign researchers also make a significant contribution to the research of this topic.

The purpose of the article. The purpose of the article is to provide a theoretical justification and examine the practical aspects of using digital business analytics tools as a factor in ensuring operational transparency and implementing the concept of sustainable development under conditions of global economic challenges.

Results and discussion. The implementation of specialized software makes it possible to integrate environmental and social characteristics into the overall financial model, transforming abstract sustainable development goals into specific and measurable indicators that can be continuously monitored. In the context of modern global challenges, such as energy instability and the need for rapid adaptation to changing market conditions, digital business analytics tools serve as the foundation of enterprise resilience.

In the modern architecture of business analysis, the use of such tools as Microsoft Excel, Google Sheets, Tableau and Power BI forms a multi-level data processing ecosystem in which cloud services ensure flexibility and continuity of operational data collection, while BI systems provide intelligent visualization and the integration of complex indicators. The organization of analytical processes based on digital algorithms automatically creates a transparent environment in which hidden data manipulation becomes almost impossible, making it an effective tool for reducing shadow financial flows.

Spreadsheet processors in business analysis are programs that allow users to process, analyze, and visualize data in the form of tables, formulas, charts, and reports. The most widely used among them are Microsoft Excel and Google Sheets. Microsoft Excel is used to create, edit, and analyze spreadsheets, perform mathematical, financial, and statistical calculations, as well as build charts, models, and reports.

An integral part of any research is the statistical analysis of empirical data, since its results make it possible to provide scientific support for the hypotheses proposed at the beginning of the study, identify relationships, and reveal patterns and trends in the phenomena and processes under investigation. The tools of Microsoft Excel that enable statistical data analysis can be divided into three levels: user formulas, statistical functions, and the Data Analysis add-in (Analysis ToolPak) [1].

Digital technologies provided by Microsoft Excel offer opportunities not only for recording and systematizing financial and economic indicators, but also for their in-depth analysis, forecasting, and clear visualization, which is important for timely and well-grounded managerial decision-making. Although automated accounting systems and ERP solutions have advantages in the context of regulated accounting and comprehensive integration of business processes, Microsoft Excel remains indispensable for small enterprises, individual entrepreneurs, and users who require flexible and adaptive analytical tools [2].

One of the most powerful tools of Microsoft Excel is Pivot Tables. They allow users to summarize, filter, and organize data efficiently. Based on a single data source, it is possible to create numerous different views, reports, and charts. A created Pivot Table can be easily modified by adding or removing data, columns, and rows, or by changing summary types without affecting the original data source [3].

It is important to consider that achieving maximum accuracy and efficiency in economic

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analytics also depends on several additional factors, including the quality of input data, the correct use of Excel functions, error control, and result verification. Microsoft Excel may be prone to errors when processing large volumes of data, and incorrect use of functions can lead to inaccurate results [4].

As noted by Liashenko O.S., although the use of the spreadsheet processor Microsoft Excel makes it possible not only to create correlation and regression models, but also to forecast general indicators of economic processes and determine future enterprise development, it is not fully adapted for solving more complex analytical tasks. Several difficulties arise during modeling, including challenges in determining trend lines, while the assessment of model reliability and the calculation of interval estimates for forecasted values are not automated [5].

Google Sheets is an online spreadsheet processor that allows users to work with spreadsheets directly in a web browser. Its main functions include creating and editing spreadsheets online, real-time collaboration, automatic saving, built-in functions and formulas, and script support [6].

Google Sheets makes it possible to easily obtain information from various sources, including databases and CRM systems; use built-in tools such as filters, sorting, formulas, and charts for in-depth data analysis; create graphs and diagrams for a better understanding of trends in indicator changes; and allow several users to work simultaneously on the same document, which contributes to effective team analysis.

The advantages of using spreadsheet processors in business analysis include accessibility and convenience, automation of calculations, data visualization, and flexibility in building custom models. Their disadvantages include difficulties when working with large amounts of data, the lack of automatic import from accounting systems without integration, and the risk of human error.

Regression analysis is one of the most powerful tools in statistics and economics, allowing researchers to study relationships between variables and predict future outcomes. In modern conditions, the use of specialized software for multiple regression calculations is becoming increasingly important. Such software enables analysts and researchers to process large datasets efficiently, consider the influence of several factors simultaneously, and obtain more accurate forecasts of financial results.

Software suitable for multiple regression analysis includes the following tools [7]:

– R is free open-source software that provides accessibility for a wide range of users. It supports a large number of packages for statistical analysis, data processing and visualization, as well as machine learning, including ggplot2, dplyr, caret, and others.

– Python (together with libraries such as scikit-learn) is another free open-source tool. Python is widely used in data analysis due to libraries such as pandas, numpy, matplotlib, and scikit-learn.

– SPSS is user-friendly software designed for statistical analysis. The program includes advanced functions for regression, factor, and other types of statistical analysis.

– SAS is a powerful analytical platform for working with large volumes of data. It ensures accuracy and reliability of results and supports regression analysis, forecasting, and other statistical methods.

– Stata is known for its convenient and intuitive interface, which makes it easy to use even for beginners. The program provides a wide range of functions for statistical analysis, including regression analysis.

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– Microsoft Excel (with add-ins such as Analysis ToolPak) is one of the most widely used tools for data processing and is available on almost every computer. It is user-friendly and allows users to perform basic statistical calculations quickly.

One of the most effective mechanisms is the use of Business Intelligence (BI) tools, which make it possible to improve the quality of data collection, consolidation of information, and analytical research. Business analytics systems help automate reporting processes in different company departments and enable data analysis from various perspectives [8].

Tableau and Power BI are data visualization tools that are widely used in financial analysis because they allow users to build interactive dashboards based on financial indicators. Tableau makes it possible to create interactive graphs, charts, and dashboards based on large volumes of data. It does not require programming knowledge and supports databases, Microsoft Excel, Google Sheets, cloud services, and other sources.

Power BI is software that allows users to create interactive reports, dashboards, and analytical models from various data sources. Its main capabilities include connections to multiple data sources (Excel, SQL Server, cloud services, websites, APIs, and others); interactive visualizations such as charts, diagrams, maps, and matrices; report creation using drag-and-drop tools; regular automatic data updates; and the built-in DAX (Data Analysis Expressions) language for complex calculations.

By using Power BI for business analysis, enterprises gain the ability to monitor real-time events and processes. Specialists can regularly compare planned and achieved performance indicators online. As a result, enterprise efficiency and responsiveness to changing market conditions are improved [9].

Thus, Power BI plays an important role in business analysis because it allows users to transform raw data into clear interactive reports and visualize analytical results, helping managers better understand business situations and make informed decisions.

A key factor in the successful digital transformation of Ukraine is close cooperation with international experts and organizations. Through partnerships with leading global technology hubs, consulting firms, and institutions such as the European Union and the World Bank, Ukrainian projects gain opportunities to adapt advanced international experience to national conditions. Knowledge exchange, integration of modern technologies such as blockchain, machine learning algorithms, and analytical tools, as well as optimization of management processes, are important aspects of this cooperation. Through such partnerships, Ukraine not only strengthens transparency and efficiency in the use of investment resources, but also creates a favorable environment for innovation and long-term economic growth during the post-war recovery process [10].

Digital transformation brings numerous environmental benefits to businesses. Through process automation and improved logistics, companies can significantly reduce carbon dioxide emissions. Digital solutions make it possible to optimize delivery routes, reduce fuel consumption, and decrease environmental pollution. Technologies such as blockchain ensure transparency in supply chains, helping companies comply with environmental standards and report their environmental performance indicators. This increases responsibility and promotes environmentally sustainable business practices [11].

Globally dispersed supply chains are a reality for many MNCs today and appear to offer both considerable risk and opportunity in equal measure. Supply chain transparency across the supply chain is vital to the efficient, flexible, resilient, and sustainable operation of today's global companies. Technology plays a central and growing role in the creation of global supply chain transparency [12].

In the context of globalization, it is important to recognize the significant role of digitalization in creating business competitive advantages. Savytska N. and Polevych A.

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propose an integrative conceptual model that combines strategic, technological, behavioral, and environmental aspects of business digital transformation based on the principles of sustainable development and the circular economy. The model serves as a methodological basis for assessing the effects of implementing digital tools such as ERP, CRM, artificial intelligence, Big Data, IoT, cloud services, ESG, and others at the enterprise level [13].

We support the opinion of Behun S.I. that in the conditions of the digital economy, digital forecasting tools acquire system-forming importance, as they ensure the combination of technological capabilities with the tasks of socio-economic stability and sustainable development of enterprises. This, in turn, creates the conditions for the formation of adaptive, socially responsible, and competitive business models capable of ensuring long-term efficiency in a dynamic global environment [14].

Enterprises, researchers, and policymakers can use AI technologies to support competitiveness and innovation without harming sustainable development. Properly implemented AI-based analytics can become an effective tool for achieving long-term resilience, ethical management, and sustainable growth in the business economy [15].

Data analytics integrated into the core of sustainability strategies will remain highly essential in organizations in today's increasingly complicated global business world seeking to reduce their environmental impacts while increasing efficiency in operations. Companies can have a more critical view of their sustainability metrics through the use of descriptive, predictive, and prescriptive analytics to make informed decisions toward desired environmental outcomes [16].

The stages of implementing sustainable development factors into the business financial model using software are shown in Fig. 1.

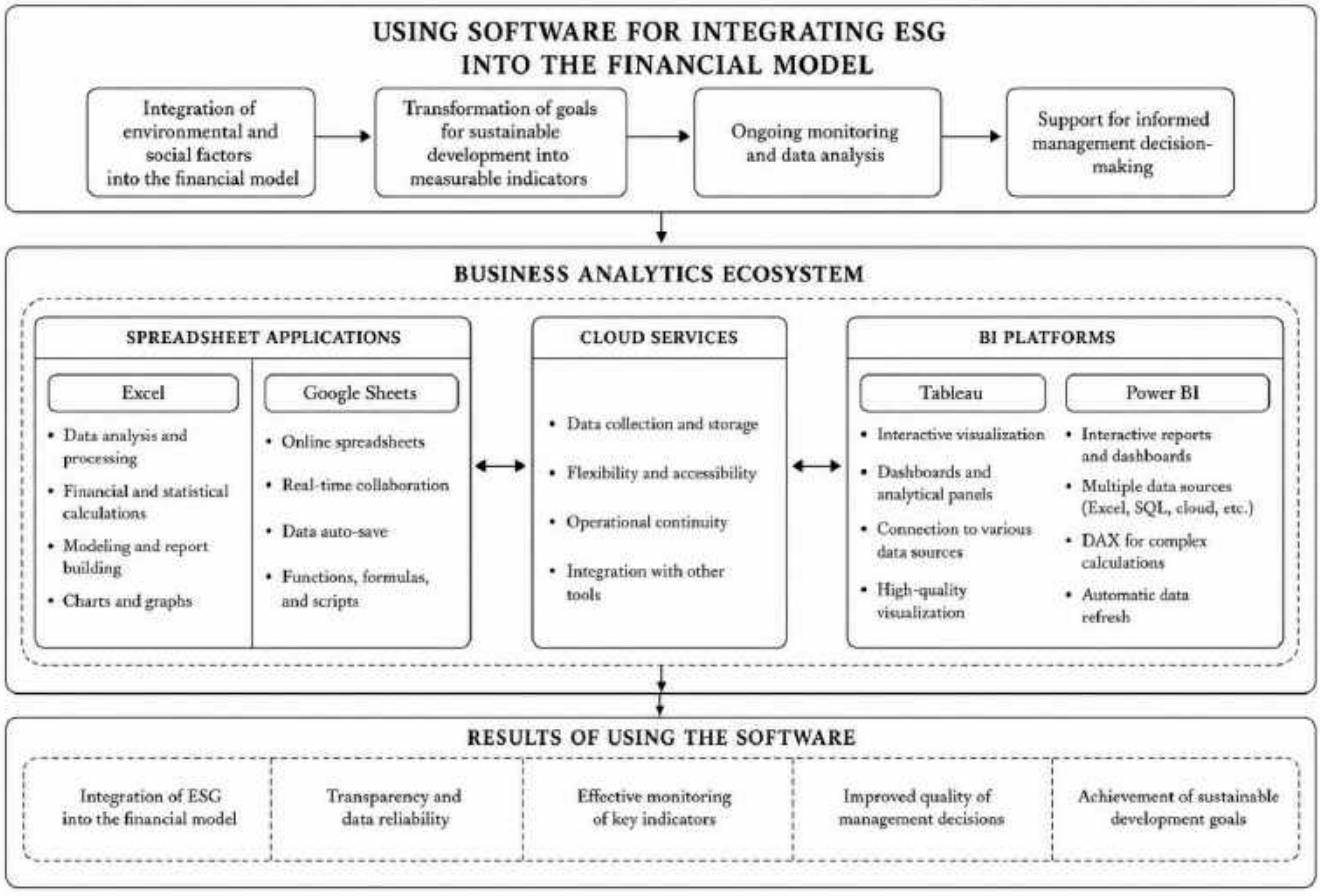

Fig. 1. Business analytics ecosystem for the integration of ESG approaches into the financial model of an enterprise

Source: based on [6, 13, 16]

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Fig. 1 summarizes the process of using software to integrate ESG factors into the financial model of an enterprise. This process involves transforming environmental and social indicators into a system of measurable analytical data to support managerial decision-making. The scheme illustrates the interaction of spreadsheet processors, cloud services, and BI platforms within a unified business analytics ecosystem that ensures data collection, processing, visualization, and monitoring, while also contributing to greater transparency, management efficiency, and the achievement of sustainable development goals.

Conclusions. The use of digital business analytics tools in modern conditions is becoming a fundamental factor in ensuring operational transparency and implementing sustainable development strategies. The organization of analytical processes based on digital algorithms creates an open environment that minimizes opportunities for hidden data manipulation and contributes to the reduction of shadow financial flows.

An ecosystem that combines spreadsheet processors such as Microsoft Excel and Google Sheets with powerful BI systems such as Power BI and Tableau makes it possible to transform abstract economic, environmental, and social goals into specific measurable indicators. This increases management efficiency and improves responsiveness to market changes. It should be noted that each software product has its own advantages and features that are suitable for different tasks and levels of user expertise.

At the same time, socio-economic stability is not limited only to financial sustainability, but also includes a combination of economic, social, innovative, and environmental characteristics of enterprise development. Therefore, an important component of digital forecasting is the inclusion of non-financial indicators that were previously not considered in traditional evaluation approaches. In particular, it is important to consider indicators of social trust, environmental responsibility, innovation potential, adaptability of organizational structure, and inclusiveness of business processes. The integration of such parameters into digital analytical models makes it possible to determine more accurately the long-term stability of a business model and the potential for sustainable development.

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