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INSTRUMENTAL DATA ANALYSIS METHODS IN THE DIGITAL ECONOMY

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In modern conditions, the digital economy is characterized by the active use of information technologies, data arrays, and analytical platforms. Economic processes are becoming so complex and multifactorial that classical analysis methods no longer provide the required accuracy and speed of information processing. That is why instrumental data analysis methods are gaining decisive importance, as they combine mathematical, statistical, econometric, and informational approaches, enabling deep, rapid, and adaptive analytics.

When considering economic and mathematical modeling, it is worth noting that it makes it possible to formalize economic processes using equations, matrix models, and systems of dynamic analysis. In addition, this method is used to forecast macroeconomic indicators, optimize resources, and assess risks. The study of mathematical models allows for a deeper understanding of the properties and patterns of functioning of real economic objects and systems. In general terms, a mathematical model reflects the set of possible states of a system and defines the rules of transition between them, that is, it describes the fundamental regularities of its functioning [1].

Overall, economic and mathematical models are divided into major types, which are classified according to specific criteria depending on their purpose and field of application. Such models are used to analyze individual functional components of the economy – production and technological, social, or territorial structures – as well as to study its individual subsystems. In particular, researchers distinguish models that cover the economy as a whole, specific sectors, industries, or regions, as well as complex models that describe production and consumption processes, the formation and distribution of income, the use of labor resources, pricing mechanisms, and financial

interactions between economic agents. It should be noted that depending on their intended purpose, economic and mathematical models are divided into two main types (Table 1) [1].

Table 1– Main types of economic and mathematical objectives

Main types of economic and mathematical objectives	
The first type	theoretical and analytical models, designed to study the general patterns and characteristics of the functioning of economic processes. They allow for a deeper understanding of the principles of economic system development. A classic example of this approach is the Keynesian model.
The second type	applied models, which have a practical orientation and are used to solve specific tasks in the field of economics, in particular for analysis, trend forecasting, and making effective managerial decisions.

Source: Compiled by the author based on the source [1]

Econometric methods are also extremely important, as they are used to test hypotheses, establish relationships between economic variables, and more. Accordingly, without the use of econometric tools, it is impossible today to conduct modern, scientifically grounded macro- and microeconomic analysis. Thanks to econometrics, it is now possible not only to identify cause-and-effect relationships between indicators, but also to quantitatively assess the strength of influence that individual factors have on economic processes, adjust existing management strategies, and develop new models of economic agents' behavior. Moreover, econometric methods make it possible to adapt analytical models to real-world conditions, taking into account uncertainty, stochastic fluctuations, and structural changes characteristic of the modern digital economy. This ensures higher forecast accuracy, which is critically important for risk management, production planning, investment optimization, and the formation of budgetary policy [2].

In the modern era of digital transformation, economic processes and managerial decision-making are undergoing profound changes influenced by the development of information technologies, the automation of business processes, and the implementation of digital platforms across all areas of economic activity. At the same time, the growing volume of data, its complexity, and rapid renewal create new challenges for enterprises in terms of making timely and well-grounded managerial decisions. Consequently, traditional econometric methods, which were developed for analyzing limited datasets, often prove insufficiently effective under conditions of large-scale and rapidly changing information. This leads to decreased forecast accuracy, increased uncertainty, and heightened risks in business management [3].

On the other hand, digitalization necessitates the integration of econometric models with modern digital systems – big data platforms, business intelligence analytical tools, and artificial intelligence technologies. However, in practice, many enterprises face difficulties in adapting traditional econometric approaches to these new technologies, which often leads to inefficient resource allocation and ineffective managerial decision-making. The central issue in this context is the need to develop and improve econometric methods capable of working with large volumes of information in real time and supporting effective decision-making [3].

Another important task is the integration of such models into the overall enterprise management system, which would allow the creation of a unified analytical environment for optimizing business processes and minimizing operational risks. Thus, econometric methods and models occupy a key position among the tools that ensure effective managerial decision-making, especially in the context of digital transformation, which significantly changes market structures and approaches to analyzing economic data. In combination with digital technologies, econometrics becomes more flexible and powerful, enabling work with large datasets in real time and expanding the capabilities of next-generation analytical platforms [3].

As mentioned earlier, in the digital economy enterprises deal with enormous volumes of structured and unstructured data. Accordingly, one of the key technologies underlying the digital transformation of the economy is big data and its analytics. Its implementation in production processes ensures improved product quality, reduced energy consumption, optimized equipment maintenance, and enhanced management and production systems. In the public sector, the use of big data is regarded as an effective tool for creating a safer society, increasing the efficiency of administrative functions, forecasting socio-economic processes, and reducing government expenditures [4].

Overall, big data analytics enables businesses to make more accurate, faster, and well-grounded decisions using information that was previously inaccessible or lacked practical application. Moreover, the use of modern analytical methods such as text analysis, machine learning, predictive analytics, data mining, statistical models, and natural language processing allows enterprises to efficiently process new sources of information both independently and in combination with existing corporate databases. This contributes to gaining new analytical insights and making more effective managerial decisions [4].

The importance of big data analytics is substantial, as its integration into production processes not only improves product quality and reduces energy costs but also significantly enhances the maintenance of production equipment and management systems, ensuring increased operational efficiency of enterprises in the digital era. Overall, it should be noted that big data opens entirely new opportunities for businesses, as it enables accurate demand forecasting, optimization of production processes, risk detection, improvement of product quality, and the automation of management [4].

Artificial intelligence and machine learning tools are also highly important, as they enable greater prediction accuracy and the automation of decision-making processes. In the modern context, AI provides most enterprises with automated decision-making, product personalization, the development of self-updating models, and high-precision forecasts under conditions of uncertainty. Furthermore, the application of AI allows businesses to quickly adapt [5].

In summary, it can be concluded that instrumental data analysis methods play a key role in the development of the digital economy, as they enable the efficient processing of large volumes of information, improve forecasting accuracy, and support scientifically grounded managerial decision-making. Economic and mathematical as well as econometric models allow for the formalization of complex economic processes, the identification of patterns in their functioning, and the forecasting of

economic system behavior in a dynamic digital environment. The integration of big data technologies, machine learning, and artificial intelligence creates new opportunities for businesses and public administration, contributing to increased production efficiency, resource optimization, and risk reduction. In the current context of digital transformation, the combination of mathematical tools with advanced information technologies becomes a decisive factor in competitiveness and sustainable economic development. Thus, the implementation of instrumental data analysis methods is not only a relevant trend but also a necessary condition for the development of innovative approaches to management in the digital era.

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INTEGRATION OF PAYMENT SYSTEMS INTO THE E-COMMERCE ECOSYSTEM

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Introduction: In recent years, in connection with the development of money as a means of payment in the financial world, electronic payment systems have taken a firm place. Online currency is as important as banknotes, and in modern conditions, the presence of an electronic wallet makes life easier. Thanks to electronic payment