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INFORMATION-ANALYTICAL DECISION SUPPORT SYSTEMS FOR INTERNATIONAL INVESTMENT IN THE CONTEXT OF DIGITAL TRANSFORMATION

Olena Liutak
D.Sc. in Economics, Professor of the Department of Economics and International Economic Relations, Lutsk National Technical University, Lutsk, Ukraine;
e-mail: o.liutak@lntu.edu.ua
ORCID: 0000-0002-4293-0586
(Corresponding author)

Olena Baula
Candidate of Economic Sciences, Associate Professor of the Department of Economics and International Economic Relations, Lutsk National Technical University, Lutsk, Ukraine;
ORCID: 0000-0003-2609-0211

Natalia Nebaba
D.Sc. in Economics, Professor of the Department of Economic Modelling, Accounting and Statistics, Oles Honchar Dnipro National University, Dnipro, Ukraine;
ORCID: 0000-0003-1264-106X

Natalia Galaziuk
D.Sc. in Economics, Associate Professor of the Department of Economics and International Economic Relations, Lutsk National Technical University, Lutsk, Ukraine;
ORCID: 0000-0001-7918-4268

Oksana Urban
Candidate of Economic Sciences, Associate Professor of the Department of Economics and International Economic Relations, Lutsk National Technical University, Lutsk, Ukraine;
ORCID: 0000-0002-8804-0546

Olga Zelinska
Candidate of Economic Sciences, Associate Professor of the Department of Economics and International Economic Relations, Lutsk National Technical University, Lutsk, Ukraine;
ORCID: 0000-0001-9103-6460

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ABSTRACT

The article aims to substantiate the role and define the functional capabilities of information-analytical decision support systems in international investment within the context of digital transformation, as well as to systematize the modern digital tools, analytical methods, and information components that facilitate the preparation and making of investment decisions. Achieving this goal involves examining the interrelationships among digital data sources, analytical technologies, forecasting and risk assessment mechanisms, and investment outcomes. The study systematizes modern digital technologies and information resources used in decision support systems for international investment, outlining their functional purposes; analyzes the systems' capabilities regarding data collection and integration, investment attractiveness assessment, market indicator forecasting, risk identification, and the modeling of alternative international investment scenarios; and substantiates a structural-functional model for the information-analytical support of international investment decisions, defining the connections between data sources, analytical tools, digital technologies, and decision outcomes. Furthermore, the article makes a theoretical and practical contribution to enhancing the soundness, timeliness, and adaptability of international investment decisions by integrating modern digital technologies, information resources, and analytical tools into a unified information-analytical decision support system. The scientific novelty of the study lies in the refinement of the functional-structural approach to the information-analytical support of international investment decisions through the systematization of digital technologies and analytical tools based on their roles in data collection, assessment, forecasting, risk analysis, and the formulation of investment alternatives. A structural-functional model of adaptive information-analytical support is proposed, integrating data sources, digital technologies, analytical procedures, investment decision-making mechanisms, and feedback into a single closed-loop system.

Keywords: information-analytical systems, decision support, international investment, digital transformation, artificial intelligence, predictive analytics, investment risks

JEL Classification: G11, G15, O33

INTRODUCTION

In the current era of digital transformation, international investment increasingly relies on the speed of information processing, the quality of analytical support, and the soundness of management decisions. The globalization of financial markets, the growing volume and diversity of data, and the proliferation of artificial intelligence (AI), big data technologies, cloud computing, machine learning, and digital platforms are transforming approaches to identifying, evaluating, and monitoring international investment opportunities. The information environment for investment activity is becoming increasingly complex, as capital allocation decisions must account not only for financial metrics but also for macroeconomic, geopolitical, regulatory, technological, ESG, and other factors. Under these conditions, technological solutions capable of integrating heterogeneous datasets, processing them rapidly, identifying patterns, and establishing an analytical foundation for investment decisions take on particular importance.

In this context, decision support systems (DSS) have the potential to play a significant role in facilitating the digitalization of investment activities. Their functionality is gradually extending beyond traditional data storage and presentation to encompass data integration from diverse sources, the application of predictive analytics and machine learning, scenario modeling, risk assessment, and the formulation of alternative management decisions. This is particularly crucial for international investment, given the highly dynamic nature of global markets, information asymmetry, the multitude of interconnected factors, and the need to compare investment alternatives across different countries and jurisdictions. Accordingly, digital DSS can be viewed not merely as tools for automating specific analytical operations, but as integrated components of investment management that combine information resources, analytical models, and mechanisms to support managerial decision-making.

At the same time, artificial intelligence, Big Data, FinTech, digital platforms, and automated financial analytics represent important technological components of digital transformation in investment activities. This creates a need for a more comprehensive study of how these technologies integrate into information-analytical systems and influence decision-making processes specifically within the realm of international investment. Issues requiring further research include the functional architecture of such systems; the interrelationships between data sources, analytical modules, and management decision outcomes; and the potential for using Decision Support Systems (DSS) to assess investment attractiveness, forecast risks, and model alternative international investment scenarios. Consequently, the scientific challenge lies in the need to systematize and structure modern approaches to developing the information-analytical support required for international investment decisions amidst digital transformation.

The relevance of this issue is heightened by the transformation of the international investment process model itself; wherein digital technologies serve not merely as tools for information processing but also as drivers for creating new capital-raising channels, investment platforms, and interaction mechanisms between investors and investment recipients. In this context, the quality of information-analytical support is directly linked to the ability of international investment stakeholders to timely identify market environment changes, assess risks and opportunities, conduct comparative analyses of investment alternatives, and formulate well-founded decisions. Therefore, it is appropriate to examine information-analytical decision support systems not only from the perspective of technological modernization but also in the context of enhancing the quality and effectiveness of international investment decisions.

LITERATURE REVIEW

A bibliometric study by Li Guan, José M. Merigó, & Ghassan Beydoun (2025) highlights the expansion of the research scope from traditional decision support models to the integration of data analytics, artificial intelligence, and automated decision-making mechanisms. This provides grounds for viewing modern DSS not merely as isolated information systems, but as a complex digital environment that combines data, analytical models, algorithms, and management procedures.

Significant development of this approach is evident in works addressing the application of Big Data and intelligent analytics. Research by Önden (2026) highlights the systemic integration of big data, real-time information processing, and the automation of management processes; this expands the functional role of information systems from supporting isolated operations to facilitating comprehensive managerial decision-making. A similar trend appears in the study by Dimah Hussein Alahmadi & Arwa A. Jamjoom (2022), which views Decision Support Systems (DSS) as tools for navigating the complexity and multifactorial nature of the management environment. However, these studies largely focus on general management or industry-specific scenarios, leaving room for further research into the specific information and analytical support required for international investment decisions.

A distinct area of contemporary research involves the integration of artificial intelligence and machine learning into decision support systems. Sevim & Soyer (2026) developed a machine learning-based investment decision support system that employs an adaptive loss function and sample weighting to improve the quality of startup investment assessments. This work illustrates a shift from traditional analytical models to algorithmic systems capable of adapting to data characteristics and enhancing forecasting accuracy. At the same time, the study's focus on startups limits the direct applicability of the proposed approach to international investment, where the objects of assessment – ranging from countries, regions, and industries to companies, investment projects, and financial assets – exhibit vastly different risk profiles.

Another aspect of machine learning application in DSS is presented in the work of Leoni et al. (2026), which developed and validated a decision support system for evaluating port efficiency. The significance of this study for investment-related issues lies primarily in demonstrating the potential to integrate machine learning with the multi-factor assessment of complex entities. An even broader interpretation of the role of AI-based DSS is offered by Li et al. (2026), who employ a design science approach to create a decision support system for the assessment and planning of carbon stocks. This work

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demonstrates that modern DSS can be structured as adaptive systems in which digital data, artificial intelligence algorithms, and analytical models are integrated directly into the decision-making process.

Research into digital models for investment advisory and decision-making is of particular importance to the investment sector. Wagner (2024), summarizing the results of a systematic review of a vast body of academic literature, shows that digital investment advisory is gradually shifting from simple algorithmic models to more complex solutions utilizing machine learning and artificial intelligence. The author also emphasizes the importance of investor profiles, investment strategies, regulatory requirements, conflicts of interest, and behavioral factors in formulating recommendations. Consequently, the effectiveness of a digital investment decision support system is determined not only by its technological components but also by the quality of data characterizing the investor, the investment asset, and the external environment. An important addition to this approach is the study by Hartmann & Weißenberger (2024), which examines the role of various types of decision support tools and information load in the capital budgeting process. This point is of fundamental importance for international investment, as an increase in the volume of available information does not automatically guarantee higher-quality decisions. Conversely, information overload can complicate the evaluation of alternatives, necessitating appropriate data structuring and analytical procedures. Therefore, an information-analytical system should not merely accumulate the maximum amount of information but must ensure its relevance, structure, comparability, and timely presentation to the decision-maker.

Pahsa (2024) explores the financial-technological aspect of Decision Support Systems (DSS), examining them within the context of FinTech development, digital technologies, and intelligent analytics. In this approach, a DSS emerges as an integrated technological platform that facilitates financial information processing and supports decision-making under conditions of uncertainty. Its evolution is logically linked to the transformation of the financial sector, where digital technologies are gradually reshaping market participant interactions, asset valuation mechanisms, and financial risk management approaches.

Research by Grigoriadi (2025) is of fundamental importance to international investment; it examines artificial intelligence as a strategic driver of foreign direct investment (FDI) flows, using OECD countries as a case study. This approach expands upon the traditional view of AI as merely a tool for operational automation, allowing it to be seen as a factor transforming the investment environment itself. Under this interpretation, artificial intelligence influences not only how investment data is analyzed but also the characteristics of capital-recipient countries, their investment attractiveness, and their capacity to attract international investment flows.

Ukrainian scholars are also actively investigating the digital transformation of the investment and financial landscape. The methodological foundation for contemporary Ukrainian research remains the concept of the digital economy – as presented, for instance, in the work of Kraus et al. (2018) – which views digitalization as a driver of the structural transformation of economic processes. Research by Shkarlet et al. (2019) is also significant for understanding the financial component of this digital transformation, which addresses the essence of FinTech and its role in transforming financial relations. These works establish the conceptual foundation for the modern understanding of digitalization; however, they do not fully encompass the current stage of development of AI-based analytics and intelligent DSS.

Recent Ukrainian research increasingly focuses on the direct interrelationship between digitalization and investment activity. Razumova & Kurnosova (2024) examine risk management in investment activities amidst digital transformation, highlighting shifting approaches to identifying and minimizing investment risks. Kushnerenko (2024) analyzes the impact of digitalization on the efficiency of investment activities across key sectors of the Ukrainian economy, positioning digital technologies as a factor that enhances the effectiveness of the investment process. Kulinich & Sterniuk (2024) focus on the use of artificial intelligence within Ukraine's digital financial environment, underscoring the relevance of AI applications for analyzing financial data and supporting financial decision-making.

Zalizniuk (2025) addresses contemporary challenges in global investment management, linking the digitalization of financial markets to the transformation of the international investment landscape. Dziubanovska & Tsehelnyi (2025) investigate digital tools for ensuring transparency in attracting investment, emphasizing the potential of modern technologies to enhance the informational openness of investment processes. Shpomer, Kironda, & Tereshchuk (2025) analyze the development of digital platforms for attracting investment; this complements digitalization research by highlighting the shift from isolated technological tools to a platform-based model of investment interaction. Parubets O., Vasylchenko & Pchela (2025) examine digital instruments for international financing, thereby broadening the scope of research from domestic digitalization to the international financial context. Kiriienko (2025) links digital transformation to enhancing Ukraine's investment attractiveness and draws on the experience of EU countries to substantiate directions for developing investment potential.

An analysis of scholarly works reveals several interconnected trends in the evolution of modern research. First, Decision Support Systems (DSS) are transforming from mere information-provision tools into sophisticated intelligent systems that leverage Big Data, machine learning, artificial intelligence, and real-time data processing. Second, the investment sector is shifting from the digital representation of information toward the algorithmic generation of investment recommendations, forecasting, and risk assessment. Third, digital platforms and FinTech are expanding the information landscape of international investment, creating new mechanisms for interaction among investors, financial intermediaries, and capital recipients. Fourth, while Ukrainian research increasingly integrates issues related to digitalization, AI, investment activity, and international finance, a significant portion of these studies focuses on specific technologies or isolated aspects of the investment process.

At the same time, an analysis of the existing body of research indicates a lack of systematization regarding the holistic information-analytical architecture for supporting international investment decisions. Insufficient attention has been paid to the interrelationships between data sources and types, analytical modules, forecasting algorithms, risk assessment tools, scenario modeling, and the actual formulation of management alternatives. Most studies examine individual elements of this system, whereas a comprehensive presentation of these elements as interconnected components of an international investment decision support system requires further development.

AIMS AND OBJECTIVES

The purpose of the article is to substantiate the role and determine the functional capabilities of information and analytical decision support systems in international investment in the conditions of digital transformation, as well as the systematization of modern digital tools, analytical methods, and information components that ensure the preparation and making of investment decisions.

In order to achieve the defined goal and ensure the comprehensiveness of the research, it is necessary to focus attention on the key aspects of the functioning of information and analytical decision support systems in the field of international investment. In view of this, within the framework of the study, the solution of the following tasks is provided:

- To systematize modern digital technologies and information resources used in information and analytical decision support systems in international investment, with the definition of their functional purpose.
- To analyze the functionality of information and analytical systems regarding data collection and integration, assessment of investment attractiveness, forecasting of market indicators, identification of risks, and modeling of alternative scenarios of international investment.
- To substantiate the structural and functional model of information and analytical support for international investment decisions with the determination of the relationship between data sources, analytical tools, digital technologies, and the results of investment decision-making.

METHODS

The study employed a conceptual and analytical research design aimed at systematizing the functional capabilities of information-analytical decision support systems (DSS) in international investment and developing a structural-functional model of their application under conditions of digital transformation. The research procedure consisted of four interrelated stages:

1. Analysis of the theoretical foundations and contemporary scholarly approaches to DSS and digital investment technologies.
2. Functional classification of digital technologies and information resources.
3. Decomposition and comparative analysis of the principal functions of information-analytical systems.
4. Structural-functional modeling of the information-analytical support of international investment decisions.

At the first stage, a comparative analysis and critical synthesis of the scholarly literature cited in the article were conducted. The materials included studies addressing the development of DSS, Big Data analytics, artificial intelligence and machine learning, digital investment advisory, FinTech, investment risk management, and the digitalization of investment activities. Particular attention was paid to the relationship between the research focus of each study and its contribution to understanding the information-analytical support of international investment decisions. The comparison made it possible to

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identify the principal technological and analytical dimensions addressed in the literature and to establish the need for their further systematization within an integrated functional framework.

At the second stage, classification, functional decomposition, and generalization were applied to the digital technologies and information resources discussed in the reviewed literature. The technologies were grouped according to their principal functions in the investment decision-making process, including data collection and integration, storage and processing, analytical assessment, forecasting, risk identification, scenario modeling, and transaction support. This procedure provided the basis for the classification presented in Table 1, which relates each technological group to its functional purpose and potential application in international investment. The classification represents an analytical systematization developed by the authors rather than the results of empirical testing of individual technologies.

At the third stage, functional decomposition and comparative-analytical methods were used to examine the relationship between the subject of investment analysis, the corresponding analytical procedures, and their outputs. The analysis focused on six functional blocks: information integration, investment attractiveness assessment, forecasting, risk analytics, scenario and alternative analysis, and recommendation and decision-making support. For each block, the analytical subject, relevant methodological tools, and resulting analytical product were identified. This procedure formed the basis of Table 2 and enabled the functions of DSS to be considered in relation to the specific informational and analytical requirements of international investment decisions.

To illustrate the characteristics of the international investment environment in which such systems may be applied, the study also examined secondary statistical data on foreign direct investment (FDI) flows by major groups of economies and regions for 2023–2025. The data were obtained from UNCTAD publications and information resources cited in the article.

Comparative analysis was used to examine changes in investment flows and differences in their regional distribution. The indicators were interpreted as contextual parameters relevant to the analytical tasks of DSS, including comparative assessment, forecasting, and risk analysis. These statistics were not used to estimate the effectiveness of a particular DSS or to establish causal relationships between digital technologies and investment outcomes.

At the fourth stage, the systems, structural-functional, and logical-analytical approaches were combined with structural modeling and synthesis. The functional blocks identified during the preceding stages were integrated into a conceptual model linking information sources, digital infrastructure, analytical procedures, investment alternatives, decision-making, and monitoring. The relationships between these components were established according to the sequence of information transformation and the feedback mechanisms described in the study. The resulting model, presented in Figure 2, represents the authors' conceptual synthesis of the analytical findings and is intended to explain how the identified components can be organized within a unified framework for supporting international investment decisions.

The application of these methods resulted in the systematization of digital technologies and information resources, the identification of the principal functional blocks of DSS, the contextual interpretation of international FDI dynamics, and the development of a structural-functional model of information-analytical support. The study is conceptual and analytical in nature; it does not involve the construction and empirical validation of a functioning DSS, the estimation of forecasting accuracy, or the experimental comparison of algorithms. Accordingly, the proposed model establishes a theoretical and methodological basis for subsequent empirical research and practical system development.

RESULTS

The digital transformation of international investment does not alter its fundamental objective – making investment decisions – but changes the way these decisions are prepared and supported. Traditionally, decision-making relied on the sequential collection of financial and statistical data, followed by expert analysis and the formulation of conclusions. In contrast, modern information-analytical systems facilitate the integration of diverse data sources, automated processing, forecasting, risk assessment, and scenario modeling, enabling decision-makers to evaluate alternatives more rapidly and on a more comprehensive information basis, including in near real time. Their functional purposes and roles within international investment are systematized in Table 1.

As shown in Table 1, modern digital technologies and information resources perform interconnected functions in the system supporting international investment decisions. They can be consolidated into eight functional and technological groups covering the entire information-processing cycle: from data generation to forecasting, alternative selection, and monitoring of results. Therefore, the effectiveness of DSS is determined not by an individual technology, but by the level of their integration into a unified information and analytical system.

The first group comprises Big Data and data integration, which enable the collection, cleansing, structuring, and consolidation of large volumes of heterogeneous information. Their use makes it possible to build a comprehensive database for assessing countries, companies, and investment projects. At the same time, as shown by Hartmann M. and Weißenberger B. (2024), an increase in the volume of information does not in itself guarantee a better decision, which increases the importance of data filtering and relevance determination.

The second group consists of cloud technologies, which provide scalable storage, data access, and shared use of analytical models. In international investment, such technologies may contribute to more effective interaction among geographically distributed participants and facilitate access to relevant information in a timely manner.

Table 1. Functional classification of digital technologies and information resources for information-analytical systems supporting international investment decisions. *(Source: systematized by the authors based on Li Guan, José M. Merigó, Ghassan Beydoun, 2025; Dimah Hussein Alahmadi, & Arwa A. Jamjoom, 2022; Wagner, 2024; Razumova, & Kurnosova, 2024; Dzyubanovska, & Tsegelny, 2025)*

Major group	Specific technologies/resources	Main functional purpose	Application in international investment
Data acquisition, integration and management	Big Data; APIs; ETL/ELT; Data Warehouses; Data Lakes; data cleansing, validation and standardization tools	Collecting, integrating, validating, structuring and managing heterogeneous data	Creating a consistent information base for assessing countries, companies, sectors and investment projects
Digital infrastructure and data-processing capabilities	Cloud computing; SaaS; PaaS; IaaS; distributed computing; stream processing; real-time data-processing tools	Providing computing capacity, storage, scalability, access and timely processing of information	Enabling geographically distributed users to access analytical resources and supporting timely processing of changing market and investment data
Intelligent analytics and decision-support methods	Artificial intelligence (AI); machine learning (ML); deep learning; natural language processing (NLP); predictive analytics; prescriptive analytics; scenario and optimization models	Identifying patterns, assessing investment conditions, forecasting indicators, analyzing risks and evaluating alternative courses of action	Assessing investment attractiveness; forecasting market indicators and risks; comparing investment alternatives and supporting investment choices
Investment platforms and financial applications	Digital investment platforms; robo-advisory applications; crowdfunding platforms; digital investment and FinTech services	Supporting digital interaction between investors, financial intermediaries and investment recipients, as well as the provision of investment-related services	Searching for international investment opportunities, obtaining digital investment advice, raising capital and facilitating investment-related operations
Transaction integrity, security and automation	Blockchain; distributed ledger technology (DLT); smart contracts; tokenization; cybersecurity tools; identity and access management (IAM); encryption	Supporting transaction traceability, data and access protection, and the automation or verification of specified transaction procedures	Supporting asset tokenization, selected cross-border transactions, the execution of smart-contract provisions and the protection of investment information

The third and fourth groups – artificial intelligence, machine learning, predictive analytics, and prescriptive analytics – directly strengthen the intelligent component of DSS. AI and ML enable pattern detection and forecasting, while predictive and prescriptive models make it possible to move from assessing future events to comparing possible courses of action.

The fifth group – real-time information processing technologies – provides operational monitoring of financial markets, exchange rates, and macroeconomic and geopolitical changes. Their importance lies in reducing the time interval between the emergence of new information and the adjustment of an investment decision.

The sixth group consists of digital platforms and FinTech, which integrate information and analytical processes with transaction processes. They enable the digital search for investment opportunities, consulting, capital raising, and the execution of individual financial operations. As noted by Pahsa A. (2024), FinTech solutions expand the functionality of financial decision support systems, while the study by Shpomer T., Kironda I., and Tereshchuk D. (2025) confirms the growing role of digital platforms in attracting investment.

The seventh group – Blockchain and smart contracts – is aimed at increasing the transparency, traceability, and automation of digital transactions. In international investment, their potential is associated with asset tokenization, the digitalization of settlements, and the automation of the execution of certain investment agreement provisions.

The eighth group consists of information resources that provide the substantive content of DSS. For international investment, it is advisable to combine four main information blocks: financial and market, macroeconomic, non-financial, and external-environment information. This approach makes it possible to take into account not only financial results but also ESG factors, regulatory conditions, and political and geopolitical risks.

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Thus, the modern information and analytical system is moving from simple "information provision" to "intelligent support" for investment decisions.

The next stage of the study is an analysis of the functional capabilities of information and analytical decision support systems in the process of international investment. Modern DSS increasingly integrate analytical processing, forecasting, risk assessment, and decision-support mechanisms to assist investors in evaluating and selecting among alternative investment options (Pahsa, 2024; Solares et al., 2022). Modern DSS increasingly integrate information processing, analytical methods, forecasting, risk assessment, and decision-support mechanisms to assist investors in evaluating and selecting among alternative investment options (Jia et al., 2022; Solares et al., 2022). Given the specifics of international investment, the ability of such systems to simultaneously account for financial, macroeconomic, market, regulatory, ESG, and geopolitical factors is of particular importance.

To deepen the analysis of the functional capabilities of information and analytical systems in international investment, their structural and functional decomposition is proposed with a specific focus on the information requirements of investment decision-making. The decomposition is based on the sequence of analytical tasks performed throughout the investment decision-making process: integration of information from financial, macroeconomic, market, institutional, and project-specific sources; diagnostic analysis of investment conditions and project characteristics; forecasting of relevant market and financial indicators; assessment of investment risks; scenario modelling of alternative investment conditions; and generation of recommendations to support the selection and evaluation of investment alternatives. Thus, the identified functional blocks are not considered as generic DSS components, but as interconnected analytical functions that correspond to specific information and analytical requirements arising at different stages of international investment decision-making. In this context, Table 2 systematizes the functional and methodological architecture of DSS, reflecting the correspondence between the subject of analytical processing, methodological tools, and the resulting analytical product.

In our view, it is appropriate to present the functional structure of a Decision Support System (DSS) for international investment as a sequence of six interconnected blocks. This approach allows the system to be viewed not merely as a collection of discrete digital technologies, but as a mechanism for the sequential transformation of data into analytical products, which in turn serve as the basis for investment choices. A key feature is the distinction between the diagnostic and prognostic blocks: the former characterizes the object's current state and relative investment attractiveness, while the latter focuses on determining its potential future dynamics. The risk analysis block complements these results by assessing uncertainty factors, while the scenario-alternative block enables the assessment of the robustness of potential investment decisions under varying external environmental conditions.

Table 2. Functional decomposition of information and analytical decision support systems in international investment. *(Source: systematized by the authors based on: Önden, 2026; Alahmadi, Jamjoom, 2022; Li, Pan, Tim, & Nguyen, 2026; Hartmann, & Weißenberger, 2024; Pahsa, 2024; Shkarlet, Dubyna, & Zhuk, 2019; Kushnerenko, 2024; Dzyubanovska, Tsegelny, 2025; Shpomer, Kironda, & Tereshchuk, 2025)*

Functional block	Subject of analytical processing	Methodological basis	Resulting analytical product
Investment Information Integration	Heterogeneous data on the investment environment	Systems approach, data integration approach, data quality and validation procedures	Unified structured and validated information array
Investment Diagnostic Analysis	Investment attractiveness of countries, sectors, companies, and projects	Multicriteria analysis, integral assessment, rating models, ML	Assessment and ranking of investment objects
Investment Forecasting	Future dynamics of market and macroeconomic indicators	Econometric modeling, time-series analysis, Predictive Analytics, ML	Forecast values and uncertainty estimates
Investment Risk Assessment	Factors and level of investment risk	Risk Analytics, Risk Scoring, ML, NLP, sensitivity analysis	Risk profile and early warning signals
Investment Scenario Modelling	Possible trajectories of development of the investment environment	Scenario Analysis, What-if Analysis, Monte Carlo Simulation	System of alternative scenarios and assessment of their consequences
Investment Recommendation Generation	Investment behavior alternatives	Prescriptive Analytics, optimization and decision models	Ranking of alternatives and recommendation for investment choice

A logical extension of the structural-functional decomposition presented in Table 2 is the determination of the sequence and interrelationships among the identified functional blocks within a unified information-analytical framework. While Table 2 outlines the functional purpose of individual DSS components, Figure 1 illustrates the dynamics of their interaction during the formulation of an international investment decision, including the feedback loops linking monitoring results, data updates, and the adjustment of analytical models.

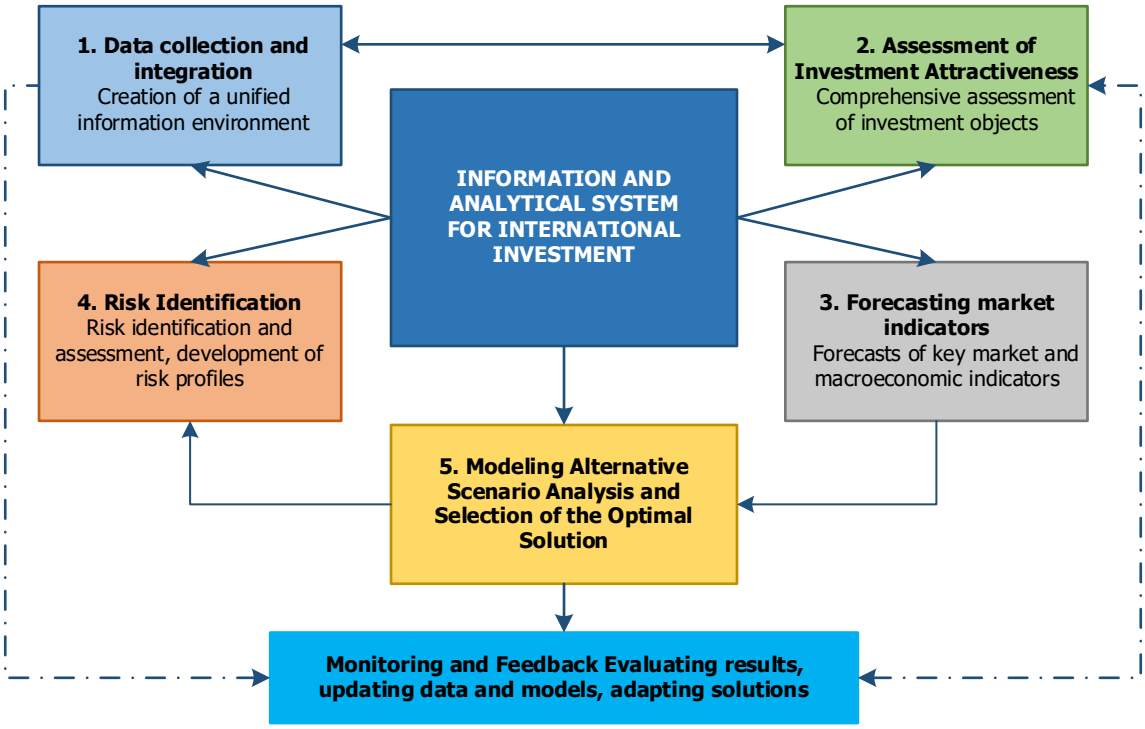

Figure 1. Functional sequence of information processing in the system for international investment decision-making.

To empirically demonstrate the relevance of the proposed information and analytical system to international investment decision-making, Table 3 uses FDI flows as an illustrative information input for DSS. FDI dynamics are particularly relevant for international investment analysis because their volume, regional distribution, and year-to-year changes provide information for comparing investment environments, identifying shifts in capital concentration, assessing volatility, and supporting the forecasting and risk-assessment functions of a DSS. The table therefore does not present a separate investment model; rather, it demonstrates how publicly available international investment data can be transformed into analytical information for different DSS functions.

Table 3. Dynamics and structural characteristics of foreign direct investment flows by major groups of economies and regions, 2023–2025. *(Source: compiled based on data from the site: World Investment Report, 2025; Global investment rises; World Investment Report, 2026)*

Economy group/region	FDI, USD billion			Change 2024/2023, %	Change 2025/2024, %	Share of global flows, 2025, %	Share coefficient, 2025	Analytical significance for DSS
	2023	2024	2025					
World	1 673	1 493	1 596	−10.8	+6.9	100.0	1.000	Baseline level of global monitoring
Developed economies	807	626	695	−22.4	+11.0	43.5	0.435	Capital concentration and monitoring of structural changes
Europe	439	182	290	−58.5	+59.3	18.2	0.182	High volatility; forecasting and risk analysis
North America	280	343	347	+22.5	+1.2	21.7	0.217	Stable high level; assessment of sector prospects
Developing economies	865	867	901	+0.2	+3.9	56.5	0.565	Heterogeneity of the investment environment; comparative analysis
Developing Asia	622	605	644	−2.7	+6.4	40.4	0.404	Largest FDI attraction center; country ranking
Africa	55	97	70	+76.4	−27.8	4.4	0.044	High volatility; scenario analysis and risk assessment
Latin America and the Caribbean	187	164	188	−12.3	+14.6	11.8	0.118	Sensitivity to external and macroeconomic factors

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Analysis of the data in Table 3 demonstrates substantial differentiation of international foreign direct investment flows across groups of economies and regions. In 2024, global FDI flows declined to USD 1,493 billion, accompanied by a particularly significant decrease in investment in developed economies and Europe. At the same time, in 2025 global flows recovered to approximately USD 1.6 trillion, although the pace of recovery was uneven: FDI to developed economies increased by 11%, whereas FDI to developing economies increased by only 2%, reaching USD 901 billion (UNCTAD, 2026).

Regional heterogeneity in investment dynamics requires particular attention in the context of information and analytical support. With USD 644 billion in 2025, developing Asia remained the largest regional recipient of FDI among developing economies, accounting for about 40% of global flows. At the same time, eight of the ten largest recipients among developing economies are located in Asia, indicating substantial intraregional concentration of investment. Latin America and the Caribbean attracted USD 188 billion, 14% more than a year earlier, while Africa received approximately USD 70 billion — below the exceptionally high 2024 figure but about one-third above the 2010–2024 average (UNCTAD, 2026).

From the perspective of the research problem, these differences indicate the need for differentiated information and analytical support for investment decisions. For regions with high capital concentration, comparative analysis, ranking, and monitoring of structural changes are appropriate, whereas for environments with higher volatility, forecasting, risk analysis, and scenario modeling become more important. At the same time, FDI volume alone cannot be regarded as a sufficient indicator of investment attractiveness, since UNCTAD emphasizes the influence of large transactions, corporate restructuring, and flows through global financial centers on aggregate FDI indicators (UNCTAD, 2026).

Another important characteristic of the contemporary international investment environment is the growing concentration of investment. According to UNCTAD, in 2025 the 20 largest recipient economies accounted for more than 80% of global FDI flows, while strategic sectors – including artificial intelligence infrastructure, semiconductors, critical minerals, and energy-transition technologies – accounted for 44% of the global value of new greenfield projects, compared with 16% in 2020. This increases the requirements for DSS, since a modern investment decision must take into account not only the current volume of capital but also its geographic, sectoral, and technological concentration (UNCTAD, 2026).

Thus, the indicators presented in Table 3 confirm that the international investment environment is characterized by uneven dynamics, high spatial concentration, and substantial sensitivity to structural and external factors. For information and analytical systems, this means that data collection and integration functions need to be combined with comparative assessment, forecasting, risk identification, and scenario modeling, which directly corresponds to the structural and functional model of international investment decision support proposed in the study.

The results of the analysis of the functional capabilities of information and analytical systems demonstrate that their effectiveness is determined not by the separate application of digital technologies, but by the systemic interaction of information resources, digital infrastructure, analytical tools, and decision support mechanisms. Accordingly, the next stage of the study is to substantiate a structural and functional model of information and analytical support for international investment decisions, which makes it possible to integrate the identified functional components into a single logically interconnected framework.

For this purpose, a model has been developed that reflects the principles of system construction, data sources, technological infrastructure, the analytical framework, mechanisms for generating investment alternatives, monitoring and feedback, as well as the outputs produced by the system. The proposed structure reflects the sequential transformation of heterogeneous data into analytical information, forecasts, risk profiles, and substantiated investment alternatives, creating an integrated basis for supporting international investment decisions. The structural and logical model of information and analytical support for international investment decisions is presented in Figure 2.

The structural and logical model of information and analytical support for international investment decisions is based on the principle of the sequential transformation of information resources into analytical results and managerial decisions. The model encompasses five interconnected functional blocks: information, technological, analytical, decision-making, and monitoring-adaptive. The starting point is the formation of an information base using financial, macroeconomic, market, regulatory, ESG, and geopolitical data. At the technological level, information is collected, integrated, cleansed, and updated using digital technologies, after which it enters the analytical framework for assessing investment attractiveness, forecasting, risk analysis, and scenario modeling. The analytical results are transformed into a system of comparable investment alternatives, creating an information and analytical basis for substantiating a specific investment decision. An important feature of the proposed model is the monitoring-adaptive block, which provides assessment of actual results, control of key indicators, identification of deviations, and updating of the information and model base. Thus, the system operates not as a linear chain of information processing, but as a closed adaptive loop in which the results of decisions

generate a reverse information flow and are used to adjust subsequent analytical procedures. This increases the adaptability of information and analytical support to dynamic changes in the international investment environment.

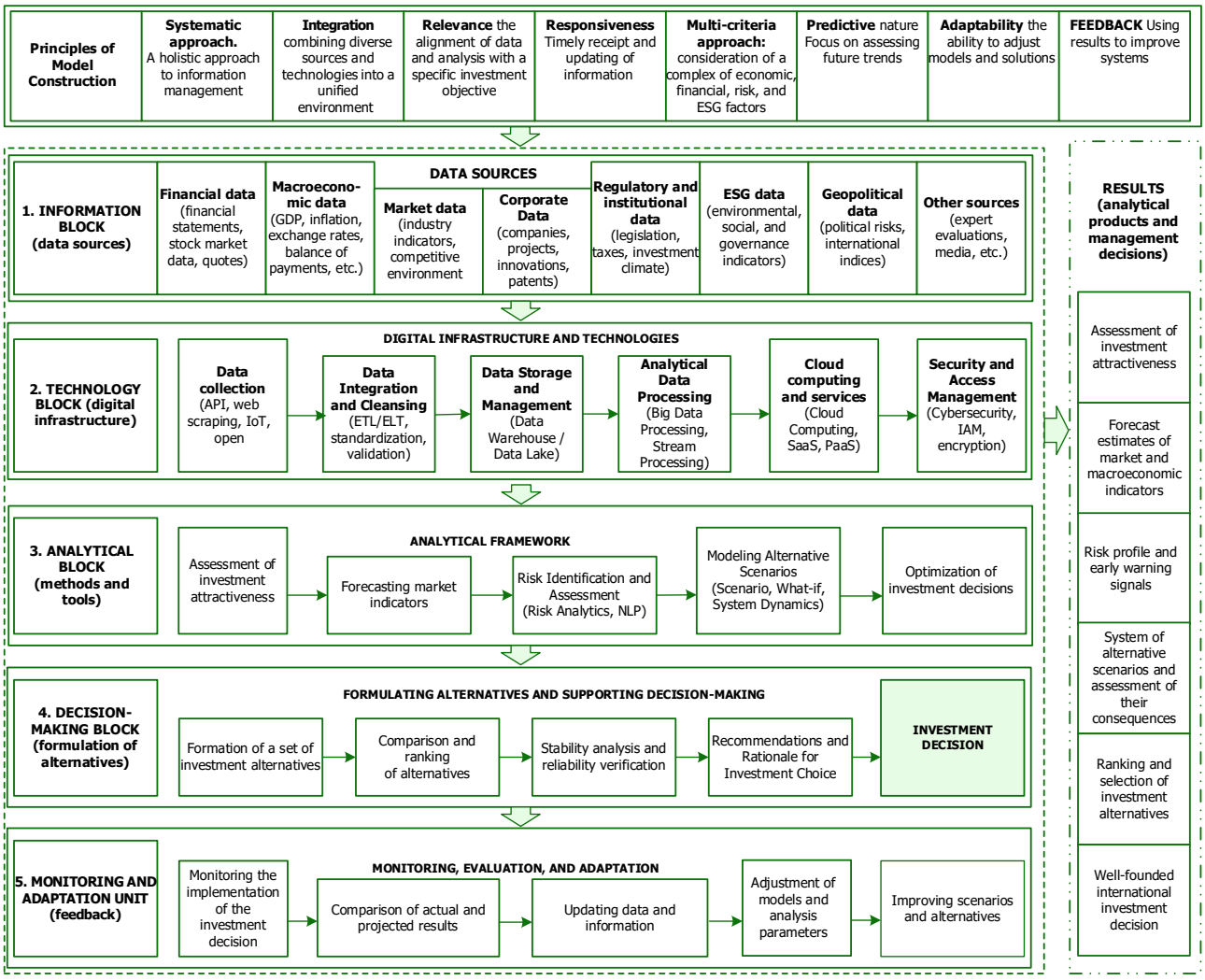

Figure 2. Structural-Logical Model of Information and Analytical Support for International Investment Decision-Making.

The results of structural-functional modeling provide a basis for identifying the key directions for the practical implementation of information-analytical support for international investment decisions. These should be viewed not as isolated digital tools, but as interconnected functional components of a unified analytical system; their sequential operation facilitates the transition from establishing an information base to substantiating and monitoring investment decisions.

The first direction involves the integration of diverse information resources into a unified digital environment. Its functional purpose is to ensure the systematic intake, structuring, validation, and updating of financial, macroeconomic, market, ESG, regulatory, and geopolitical data. Such integration establishes an information base for further analytical processing and mitigates the risk of making decisions based on fragmented or unsynchronized data (Bogatyrov et al., 2021).

A second area of focus is the development of multi-criteria assessment methods for the investment attractiveness of countries, sectors, companies, and individual projects. The proposed approach advocates for the simultaneous consideration of both financial and non-financial characteristics of the investment object, including indicators of profitability, risk, macroeconomic stability, the institutional environment, digital development, and ESG factors.

A third area involves combining forecasting with risk analysis. The use of econometric methods, time-series analysis, machine learning, and risk analytics tools makes it possible to assess not only the current state of the investment environment but also the probable dynamics of its key parameters. Furthermore, integrating forecasting with early warning mechanisms enables the timely detection of changes in the risk profile and enhances the adaptability of the investment strategy.

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The fourth area of development involves the system's scenario-simulation component. The application of scenario analysis, "what-if" analysis, and Monte Carlo simulation enables the assessment of consequences resulting from alternative changes in macroeconomic, market, currency, regulatory, and other factors. Unlike single-factor forecasting, the scenario-based approach allows for evaluating the resilience of an investment decision across various external environment scenarios – a capability that is particularly crucial given the high level of uncertainty in international markets.

The fifth area entails establishing a recommendation and decision-making loop that transforms the results of analytical processing into comparable investment alternatives and recommendations. Utilizing prescriptive analytics and optimization models makes it possible to identify the most suitable investment strategies based on predefined criteria and constraints. At the same time, it is advisable to maintain a "human-in-the-loop" approach, wherein the digital system provides analytical and advisory support, while the final investment decision is made by an authorized decision-maker, taking into account contextual and strategic factors.

An important element of the proposed model is the monitoring and adaptive loop, which establishes a feedback mechanism between the outcomes of the investment decision's implementation and the information-analytical system. Actual results, new market data, and identified deviations should be used to update the information base, model parameters, and forecast estimates (Liutak, Baula, & Tkachuk, 2023).

Thus, the proposed implementation pathways reveal the practical mechanism by which the structural-logical model operates. Their comprehensive application facilitates a transition from the traditional information support of the investment process to adaptive information-analytical support, aimed at enhancing the soundness, timeliness, and resilience of international investment decisions.

DISCUSSION

Research findings regarding the functional capabilities of information-analytical decision support systems in international investment – combined with a critical review of studies by Guan et al. (2025), Hartmann & Weißenberger (2024), Pahsa (2024), Wagner (2024), Sevim & Soyer (2026), and Grigoriadi (2025) indicate that digital transformation is reshaping approaches to the information support of investment decisions. Modern decision support systems increasingly rely on the integration of heterogeneous data, Big Data analytics, artificial intelligence, machine learning, and predictive and scenario-based analytics. Crucially, the effectiveness of such systems is determined not by any single technological tool, but by a coordinated combination of information resources, analytical procedures, and mechanisms for generating investment alternatives.

The study confirms the findings of Li Guan et al. (2025) regarding the growing role of Big Data, predictive modeling, and computational methods in the development of decision support systems. At the same time, the results of Hartmann M. and Weißenberger (2024) indicate that an increase in the volume of available information does not in itself guarantee better decision quality, as it can complicate the processing stage. This underscores the need for the functional structuring of information flows, their analytical filtering, and their presentation in a format suitable for comparing investment alternatives. The findings of Sevim & Soyer (2026) further validate the utility of machine learning and explainable analytics tools in supporting investment choices.

However, a review of existing research reveals a gap: a significant portion of contemporary studies focuses on specific digital technologies or particular functions of decision support systems. For instance, Pahsa (2024) examines the integration of Big Data, machine learning, and artificial intelligence in FinTech solutions, whereas Wagner F. (2024) focuses on the factors determining investment recommendations in both traditional and digital advisory services. This highlights the need for a systemic integration of functions – including data collection and integration, investment attractiveness assessment, forecasting, risk analysis, and scenario modeling – within a unified information-analytical framework. A solution to the identified problem is proposed through the development of a structural-functional model for the information-analytical support of international investment decisions; this model facilitates the systematic transformation of information resources into analytical outputs and investment alternatives. The model's practical value lies in the ability to adapt the set of indicators, assessment methods, forecasting models, and risk parameters based on the specific characteristics of the country, sector, company, or investment project. This approach aligns with modern trends in the digitalization of investment activities and establishes a foundation for making more well-founded international investment decisions.

At the same time, the study's findings have certain limitations regarding their direct practical application. The proposed structural-functional model is conceptual and has not been tested on actual international investment projects; therefore,

its effectiveness and the accuracy of the resulting analytical outputs require further empirical validation. The systematization of digital technologies and analytical tools is based primarily on a review of academic literature and does not involve an experimental comparison of specific algorithms, forecasting models, or artificial intelligence systems. The application of the proposed approach also depends on the availability, quality, currency, and comparability of financial, macroeconomic, regulatory, ESG, and geopolitical data, which can vary significantly across countries and jurisdictions. Furthermore, the study's results do not allow for a direct assessment of the causal impact of digital technologies on the return or risk of international investments, as the cited FDI indicators serve merely as a contextual information base to demonstrate the functional capabilities of the DSS. The practical effectiveness of specific functional modules may also depend on the characteristics of the investment target, the industry, the country, the regulatory environment, and the criteria defined by the specific investor. Consequently, the proposed findings should be viewed primarily as a methodological framework for developing and subsequently empirically validating adaptive information-analytical systems to support international investment decisions.

CONCLUSIONS

The study confirms that digital transformation is fundamentally altering the functional role of information-analytical systems in international investment – shifting from traditional information provision to intelligent support for the investment decision-making process. A systematization of modern digital technologies reveals that Big Data, cloud technologies, artificial intelligence, machine learning, predictive and prescriptive analytics, digital platforms, FinTech, and real-time data processing technologies form an interconnected technological ecosystem. Crucially, their practical value stems not from isolated application but from their ability to integrate diverse information resources, accelerate analytical processing, and establish a relevant information base for international investment choices.

An analysis of the functional capabilities of these systems identifies their core functions as data collection and integration, investment attractiveness assessment, market indicator forecasting, risk identification, and alternative scenario modeling. The study establishes that combining multi-criteria assessment, econometric modeling, machine learning, risk analytics, and scenario analysis facilitates a transition from descriptive analytics to predictive and prescriptive decision support. The proposed approach entails a sequential transformation of information following the logic of "data → analytics → assessment → forecasting → risk analysis → scenarios → investment alternatives", thereby enhancing the soundness of decisions amidst the dynamic and uncertain nature of the international investment environment.

Based on the study's findings, a structural-functional model for the information-analytical support of international investment decisions has been substantiated; this model integrates data sources, digital technologies, analytical tools, and investment selection outcomes into a unified adaptive framework. A key feature of the model is the combination of analytical and decision-making components with a monitoring and feedback mechanism, ensuring the continuous updating of the information base, model parameters, and forecasts in response to actual changes in the investment environment.

Practical implementation of the proposed model entails developing an integrated information environment, multi-criteria assessment capabilities, forecasting-risk and scenario-simulation modules, and a recommendation-and-decision loop. This allows the information-analytical system to be viewed as an adaptive digital mechanism for supporting international investment decisions, aimed at enhancing their soundness, timeliness, and resilience.

Further research on this topic should focus on empirically validating the proposed model using specific international investment projects and markets, as well as on developing integrated indicators to assess the effectiveness of the information-analytical support system. Future studies could also explore the use of artificial intelligence and machine learning techniques to enhance the accuracy of forecasting, risk assessment, and the formulation of investment scenarios.

Future research prospects involve the quantitative assessment of the proposed model's effectiveness using real-world data on international investment flows and a comparative analysis of the performance of various forecasting and risk assessment algorithms. A distinct avenue for future research is the development and empirical validation of an integrated decision support system (DSS) platform utilizing artificial intelligence, machine learning, and scenario modeling to facilitate international investment decisions.

AI-based language tools were used solely for language editing, translation refinement, and grammatical correction of the English-language version of the manuscript. They were not used to generate the scientific content, research results, analysis, conclusions, or references. The authors are fully responsible for the content and accuracy of the manuscript.

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ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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Лютак О., Баула О., Небаба Н., Галазюк Н., Урбан О., Зелінська О.

ІНФОРМАЦІЙНО-АНАЛІТИЧНІ СИСТЕМИ ПІДТРИМКИ ПРИЙНЯТТЯ РІШЕНЬ У МІЖНАРОДНОМУ ІНВЕСТУВАННІ В УМОВАХ ЦИФРОВОЇ ТРАНСФОРМАЦІЇ

Метою статті є обґрунтування ролі та визначення функціональних можливостей інформаційно-аналітичних систем підтримки прийняття рішень у міжнародному інвестуванні в умовах цифрової трансформації, а також систематизація сучасних цифрових інструментів, методів аналітики та інформаційних компонентів, які забезпечують підготовку й прийняття інвестиційних рішень. Досягнення поставленої мети передбачає дослідження взаємозв'язку між цифровими джерелами даних, аналітичними технологіями, механізмами прогнозування та оцінювання ризиків і результатами інвестиційного вибору. У роботі впорядковано сучасні цифрові технології та інформаційні ресурси, що використовуються в інформаційно-аналітичних системах підтримки прийняття рішень у міжнародному інвестуванні, з визначенням їх функціонального призначення; проаналізовано діючі можливості інформаційно-аналітичних систем щодо збору та інтеграції даних, оцінювання інвестиційної привабливості, прогнозування ринкових показників, ідентифікації ризиків та моделювання альтернативних сценаріїв міжнародного інвестування; обґрунтовано структурно-функціональну модель інформаційно-аналітичної підтримки міжнародних капіталовкладень із визначенням взаємозв'язку між джерелами даних, аналітичними інструментами, цифровими технологіями та результатами прийняття інвестиційних рішень. Крім того, стаття здійснює теоретичний і практичний внесок у вирішенні проблеми підвищення обґрунтованості, оперативності та адаптивності міжнародних інвестиційних рішень шляхом інтеграції сучасних цифрових технологій, інформаційних ресурсів та аналітичних інструментів у єдину інформаційно-аналітичну систему підтримки прийняття рішень. Наукова новизна дослідження полягає в удосконаленні функціонально-структурного підходу до інформаційно-аналітичної підтримки міжнародних інвестиційних рішень шляхом систематизації

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цифрових технологій та аналітичних інструментів за їх роллю в процесах збору даних, оцінювання, прогнозування, ризик-аналізу та формування інвестиційних альтернатив. Запропоновано структурно-функціональну модель адаптивної інформаційно-аналітичної підтримки, яка інтегрує джерела даних, цифрові технології, аналітичні процедури, механізми формування інвестиційних рішень та зворотний зв'язок у єдиний замкнений контур.

Ключові слова: інформаційно-аналітичні системи, підтримка прийняття рішень, міжнародне інвестування, цифрова трансформація, штучний інтелект, прогнозна аналітика, інвестиційні ризики

JEL Класифікація: G11, G15, O33