



### ECONOMICS AND MANAGEMENT OF ENTERPRISE

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#### DEVELOPMENT OF A PROACTIVE APPROACH TO DETERMINING THE TRANSFORMATION OF ORGANIZATIONAL STRUCTURES OF ENTERPRISES

pages 6–13

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The object of research is the process of transforming the configurations of structures. It is known that the timeliness of making a decision on the transformation of the configuration depends on the type of external environment, which is determined according to the level of influence of its main characteristics on the enterprise, while each type of environment corresponds to a specific configuration. Untimely determination of trends in the change of the influence of the external environment leads to untimely transformation of the enterprise and the negative consequences associated with it. This is the problem that was solved in the work. The study is aimed at developing a proactive approach to the transformation of the configurations of structures, which takes into account the assessment of the rate of change in the influence of external factors on organizations and is a sequence in the implementation of structural transformation. The issue of proper structuring concerns enterprises operating in various sectors of the economy, including industry, agriculture, utilities, etc. The article presents a developed matrix for determining the directions of structural transformation and the main stages of a proactive approach to the transformation of structures. The value of the study lies in the fact that a proactive approach allows to identify possible structural problems in advance, make changes, and prevent the decline of a company at any stage of its life cycle. According to the results of the analysis, taking into account the change in the influence of external factors, only 3 percent of enterprises experienced decline within five years of existence (compared to those that did not change the management structure, this figure is 45 percent). The proactive approach can be applied regardless of the age of the organization, industry, geographical location, or market.

**Keywords:** enterprise, transformation, configuration, structure, environment, approach, derivative, speed, proactivity, development.

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**ENSURING THE ENTERPRISE FUNCTIONING UNDER CONDITIONS OF UNCERTAINTY: PARAMETRIC ASSESSMENT**

pages 14–21

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The study substantiates the importance of enterprise awareness of its environment for making managerial decisions under conditions of uncertainty. The object of the study is information and its asymmetry in the enterprise awareness of its environment when making decisions under conditions of uncertainty. Making management decisions in conditions of uncertainty requires a high-quality information base, which necessitates the need to improve approaches to assessing the impact of challenges on the enterprise functioning. The SPOD (Strengths, Problems, Opportunities, Definite) matrix is used to analyze enterprise challenges. It is emphasized that the classical SPOD matrix has a static nature and does not account for informational influences; therefore, it is proposed to extend it with a component U (Uncertainty) to reflect the dynamics of uncertainty. The entropic nature of economic processes is identified, revealing that increasing entropy reduces the resilience of economic systems and necessitates adaptive management. The proposed approach, based on the entropic measurement of uncertainty, enables a quantitative assessment of the degree of unpredictability of challenges. The variability of the enterprise environment under uncertainty imposes certain limitations on the applicability of the research results, particularly those related to the integration of non-formalized factors – socio-psychological, reputational, communicative – which are difficult to represent quantitatively. Ensuring the relevance of data is required to prevent overloading the matrix with excessive variables. The combining the SPOD/U method with an entropic assessment establishes a methodological foundation for evaluating environmental uncertainty of enterprise functioning. The research findings are particularly relevant for enterprises operating in the field of electronic communications.

**Keywords:** information asymmetry, entropy, risk analysis, security, SPOD/U matrix, parametric uncertainty assessment, electronic communications.

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## ECONOMIC CYBERNETICS

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### IDENTIFYING FACTORS IMPACT ON INVESTMENT IN FINANCIAL SERVICES UNDER DIGITAL FINANCIAL ECOSYSTEM TRANSFORMATION

pages 22–30

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The object of research is global investment processes in the financial services sector. The problem is the gaps in the development of analytical tools for assessing and forecasting the volume of global investments in the financial services sector when the role of financial institutions changes in the digital transformation of the financial ecosystem.

Correlation-regression analysis methods serve as the methodological basis of this research, implemented on the basis of Oxford Economics statistical data. A theoretical analysis of scientific approaches has been conducted to identify potential key factors influencing investments in financial services. A sample of statistical data on the dynamics of the international capital market has been formulated, characterizing changes in indicators of the financial services sector for the period 2004–2024. A correlation analysis has been conducted to identify multicollinearity of the identified factors and the resulting indicator – investments in financial services to assess their density and direction of the relationship. As a result of modeling, a regression equation with high reliability has been obtained. The model showed that gross output ( $X_1$ ) acts as a dominant positive driver of investment activity. In turn, the most significant result is the detection of a statistically significant negative impact of the share of the financial sector in GDP ( $X_4$ ) on total investment in the sector. The main forecast scenarios of the dynamics of global investments in financial services are formulated. The multidirectional impact on the dynamics of investment processes is determined – scale and structural balance within the integrated model. The practical result of its implementation is the application of the proposed toolkit for making investment and regulatory decisions in the medium term by investment funds, fintech companies and financial market regulators.

**Keywords:** finance, financial ecosystem, financial services, investments, financial technologies, digital transformation, modeling.

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## CIRCULAR-ORIENTED ECONOMIC ASSESSMENT OF INNOVATIONS USING DIGITAL TWIN TECHNOLOGY FOR AN AIRCRAFT HYDRAULIC SYSTEM

pages 31–45

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The object of this research is the set of processes involved in the economic evaluation of innovative technologies under circular-economy conditions. The subject concerns the methods and models used to assess their economic efficiency. This is illustrated through the digital twin of an aircraft hydraulic system. The research substantiates a system of techno-economic indicators for evaluating an innovative technology. It also prepares the initial scenario data needed for modelling its development under different levels of circular-practice implementation. Three scenarios – pessimistic, baseline, and optimistic – are modelled. This is followed by an analysis of cash flows and discounted efficiency indicators (NCF, payback period, NPV, IRR, PI) and a comparative assessment of techno-environmental parameters. The sensitivity of the results was analysed using the derivative-based method to determine the influence of the key factors.

The modelling of indicators with circular practices showed that even in the pessimistic scenario the technology project is still attractive for investments. For example, when *CAPEX* = 1.59 million USD, the project makes *NCF* = 808.7 thousand USD. The efficiency indicators (*NPV* = 2.34 million USD, *IRR* = 42%, *PI* = 2.47) confirmed that the project is good to do. The baseline and optimistic scenarios demonstrated that *NPV* can reach 2.75–2.95 million USD, *IRR* can be 43–48%, and *PI* can be 2.59–3.10. In this situation, the payback period becomes almost 1.57 years. Using circularity factors makes the discounted cumulative cash flow positive from year 2–3. Without circularity, it becomes positive only at the end of year 3.

The sensitivity analysis proved how strong the circularity influence is. When *NCF* goes down by 20%, *NPV* becomes 1.35 million USD and *IRR* becomes 25%. When *NCF* goes up by 20%, *NPV* grows to 4.15 million USD and *IRR* grows to 56%.

An analysis of *NPV* derivatives was also done. The results showed that the marginal effect of early cash flows is almost two times bigger than the effect of later cash flows, with the *CAPEX* gradient being negative (-1). This allowed to say that fast income creation is very important in the early stages of the project.

**Keywords:** circular economy, investment attractiveness, capital-intensive innovations, financial sustainability of innovations, strategic investment.

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## DEVELOPMENT OF AN INTEGRATED QUALITY MANAGEMENT MODEL IN THE CONTEXT OF DIGITAL TRANSFORMATION: PUBLIC ADMINISTRATION, EDUCATION, ECONOMY

pages 46–61

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The object of research is the processes of ensuring the quality of electronic services and developing human capital competencies in public administration, education and economic systems in the context of digital transformation.

The problem being solved is the operational gap between the strategic goals of digital modernization and their practical implementation. This gap is manifested in the fragmentation of processes, the lack of effective tools for monitoring the quality of electronic services, and the inconsistency of educational programs with the real needs of the digital economy.

To solve the problem, an integrated model of electronic service quality management and a comprehensive matrix of key performance indicators for educational outcomes and service provision were developed. This model was empirically tested on the case of "Issuing a certificate".

The testing revealed significant discrepancies between target and actual indicators. This is explained by "bottlenecks" at the "input" of the process: mostly e-identification errors and an incomplete set of documents.

The scientific novelty lies in the architectural integration of quality engineering and risk management tools in the organization of public e-services. This creates a single measurable "language" for managers, IT specialists and financiers, which allows solving the problem of operational fragmentation.

The research results can be used to form policies for digital inclusion and modernization of educational programs. In the field of economics, they should ensure the improvement of business conditions and increase its competitiveness by harmonizing educational standards with market needs, improving the quality of public electronic services for state entities. The developed model is designed to assess the quality of various types of electronic services and various regions.

**Keywords:** digital competencies, electronic public services, integrated quality management model, matrix of key performance indicators, modernization of the economy, ensuring sustainable development.

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## DEVELOPMENT OF PRODUCTIVE FORCES AND REGIONAL ECONOMY

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### SYSTEMATIZATION OF APPROACHES TO STATE ECONOMIC SECURITY USING BIBLIOMETRIC METHODS

pages 62–73

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The object of research is the economic security of the state as the basis for protecting the national economy from threats in conditions of crises, martial law and integration transformations. It covers historical and modern aspects of the formation of this concept, starting from the "New Deal" of 1934 in the USA to modern Ukrainian realities.

The lack of a single definition of the economic security of the state and the plurality of theoretical approaches complicate the formation of effective state policy. The problem lies in the need to systematize approaches to the concept, take into account the impact of crises, martial law and external threats, as well as identify key factors for ensuring economic security in conditions of European integration.

Using bibliometric analysis of Scopus and Web of Science data, a retrospective analysis of indexed sources on economic security was conducted. Based on this, 10 classification approaches were identified: growth capacity, economic system balance, threat resistance, resource-functional approach, protective approach, investment-innovation approach, economic-legal approach, sustainable development security, pandemic-economic approach and military-economic security. The author's definition of the economic security of the state was proposed, which takes into account its interdisciplinary nature and modern challenges.

Three broad clusters of 256 keywords were formed in Scopus; five narrower clusters of 146 words (45% less) were formed in Web of Science. A wider thematic coverage was found in Scopus and a more specialized one in Web of Science, reflecting different research emphases.

The results are recommended for developing a state policy of economic security, improving anti-crisis management, planning economic development and harmonization with European standards. They can be used to forecast risks, assess the stability of the economic system and support sustainable development in conditions of martial law and post-war recovery.

**Keywords:** economic security, state policy, economic system, economic development, crisis, sustainable development.

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**DIRECTIONS FOR IMPROVING THE REGULATION  
OF THE INNOVATION CIRCULATION IN THE  
EUROPEAN UNION THROUGH THE PRISM OF THE  
IMPLEMENTATION OF THE EUROPEAN INNOVATION  
ACT (EIA)**

pages 74–81

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The object of the research is the system of measures and methods of regulatory influence on the processes of innovation circulation in the European Union, through the prism of the prospective agreement EUROPEAN INNOVATION ACT (EIA). The current methods of identifying innovation circulation in the EU are studied, as well as the prospects for development within the framework of the implementation of EIA. The research found that the process of regulating innovation circulation in the EU is not unified. It is proven that the existing regulatory model of state influence in the EU is not focused on simplifying and stimulating its circulation. The main task is to intensify and scale the number of innovations within the EU economic system. It was determined that within the EU there is a need to improve the regulatory approach to determining the rules for the functioning of innovation circulation in the EU. A study of the areas of regulatory influence within the framework of the prospective EUROPEAN INNOVATION ACT was conducted. The results of a public discussion of its possible content were analyzed. Proposals were formulated for making changes to its text. The need to introduce a single definition of innovation, the formation of a preferential tax regime is substantiated. The need to change the object of regulation and its focus on the system of economic relations Innovation Life Cycle is proven.

The research is aimed at formulating proposals for improving the regulatory processes of innovation circulation in the EU. The results of this research can be used to improve the official rules of innovation circulation in the EU, as well as at the level of national systems of EU member states. They can also be used to form strategic public management decisions, state policy on innovation circulation and they can serve as the basis for further scientific research on these issues.

**Keywords:** regulatory documents, innovation circulation, international agreements, EU innovations, public relations.

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**FORMATION OF AN ENVIRONMENTAL AND ECONOMIC MECHANISM FOR BALANCED DEVELOPMENT OF RURAL TERRITORIES OF UKRAINE ACCORDING TO THE PRINCIPLES OF EUROPEAN INTEGRATION PROCESSES**

**pages 82–93**

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The object of research is the theoretical and methodological aspects and practical levers of forming an ecological and economic mechanism for the balanced development of rural areas of Ukraine.

The research used general scientific and special research methods. Methods of analysis and synthesis were used to systematize theoretical provisions, the statistical method for data analysis, the comparison method for studying the dynamics of ecological and economic indicators, and the graphical method for visual presentation of the research results. Induction and deduction methods were also used for theoretical generalization of the material and formulation of conclusions regarding the development of rural territorial communities, which are aimed at implementing the principles of balanced development in the context of decentralization.

The research results consist in identifying and qualitatively substantiating the structural potential for increasing the efficiency of management of the balanced development of rural areas, in particular:

- directions of institutional synergy (consolidation of efforts of local governments and state institutions in a single planning format);
- regulatory harmonization levers (by adapting EU environmental incentive instruments into Ukrainian legislation);
- areas of motivational coherence in the context of the interaction of environmental and economic requirements, which will contribute to attracting private investment in the balanced development of rural areas.

The expected effect of the implementation of the proposed environmental and economic mechanism is the result of its systemic action and harmonization, which will ensure synergy between three key foundations, such as:

– implementation of the principles of European integration, which forms a specific regulatory and methodological framework that directs the activities of entities to achieve established standards of balanced development;

– interaction of economic incentives with environmental restrictions, which will create direct motivation for local communities and businesses for the rational use of natural resources;

– a course towards decentralization and strengthening of the resource potential of local self-government bodies, which will ensure not only consideration of the specifics of the territories, but also increase responsibility for the results. This together transforms the mechanism from a theoretical concept into an effective tool for the restoration and balanced development of rural areas.

**Keywords:** rural areas, balanced development, decentralization, ecological and economic mechanism, management, local communities, urbanization.

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## PROBLEMS OF MACROECONOMICS AND SOCIO-ECONOMIC DEVELOPMENT

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### DEVELOPMENT OF A METHODOLOGICAL FRAMEWORK FOR ASSESSING THE RESILIENCE OF SOCIO-ECONOMIC SYSTEMS IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

pages 94–101

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The object of research is the methodological foundations for assessing the level of resilience of the socio-economic system in the context of sustainable development management. The main problem focused on in the research is determining the economy's ability to adapt to external and internal shocks in order to minimise their impact and ensure sustainable development. The proposed macroeconomic resilience index (MRI) is constructed using content analysis, systemic, index and quantitative approaches. The developed system for assessing the macroeconomic resilience index covers 18 indicators, which are grouped into four dimensions of resilience: economic, environmental, social and institutional. A sub-index is calculated for each dimension, which allows for a decomposition analysis of the adaptive potential of each area of management. The proposed four-level scale for assessing the resilience of the socio-economic system allows for a quantitative assessment of its state and the identification of vulnerable areas of management. The scale defines a specific state of the system: critical vulnerability; fragile adaptability; moderate; adaptive, and systemic resilience. The use of the macroeconomic resilience index (MRI) methodology allows assessing the ability of the socio-economic system to adapt, recover and maintain viability in crisis conditions. Applying the proposed methodology to assess Ukraine's case in the period 2019–2023, it was found that the socio-economic system on the resilience scale ranges from a state of vulnerability  $MRI = 0.26$  to adaptive resilience  $MRI = 0.68$ . It has been established that the social and environmental spheres are critically vulnerable areas for the recovery of the socio-economic system. Meanwhile, the economic and institutional spheres formed the foundation of the resilience of the Ukrainian macroeconomy. The proposed assessment system provides a basis for developing practical recommendations for strengthening adaptive capacity and supporting the resilience and sustainability of socio-economic systems.

**Keywords:** macroeconomic resilience index (MRI), socio-economic inequality, resilience of socio-economic systems, resilience scale, sustainable development.

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## DETERMINATION OF TRENDS OF LABOR MIGRATION IN THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOAL

pages 102–108

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In the context of sustainable development of labor resources, the processes of labor migration are becoming increasingly widespread across the world, influencing the implementation of Sustainable Development Goal No. 8: Decent Work and Economic Growth. The object of the study is the bibliometric framework of scientific works by authors who research labor migration processes in the context of the implementation of the Sustainable Development Goals.

The problem addressed in the study lies in the insufficient examination of labor migration issues with a specific focus on the implementation of the Sustainable Development Goals, as well as the need to identify current trends in scientific thought regarding labor migration processes within the framework of achieving the Sustainable Development Goals No. 8: Decent Work and Economic Growth. This problem was addressed through the analysis of scholarly works by authors studying labor migration processes, with particular attention to research directions categorized by specific bibliometric indicators.

The study of factors influencing the implementation of Sustainable Development Goal No. 8: Decent Work and Economic Growth – such as the outflow of migrants from countries with a low living index and the increase in the inflow of labor migrants to countries with a higher living index – justifies the selection of this particular Goal for research.

The essence of the results obtained is to determine labor migration trends within the framework of implementing the Sustainable Development Goal, which includes the substantiation of labor migration through the use of bibliometric metrics: by authors (by documents – 1; link strength range 1–7), by keywords (event range 5–103; link strength range 49–209), by citation of scientific works (link range 6–13; citation range 1–262), and by the geographical factor of scientific schools (link strength range 9–67; citation range 78–3140). This explains the formation of a bibliometric field of scientific thought regarding labor migration within the implementation of Sustainable Development Goal No. 8: Decent Work and Economic Growth.

Regarding the practical implementation of the obtained research results, they can be applied in the formation of modern topics in the field of labor migration when developing project proposals for scientific, educational, and international grants.

**Keywords:** bibliometrics, labor migration processes, sustainable development goals, method, assessment.

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