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Oleksii Zakharkin

D.Sc. in Economics, Professor of the Department of Finance and Entrepreneurship, Sumy State University, Sumy, Ukraine;
 e-mail: o.zakharkin@biem.sumdu.edu.ua
 ORCID: [0000-0001-9317-252X](https://orcid.org/0000-0001-9317-252X)
 (Corresponding author)

Iuliia Myroshnychenko

PhD in Economics, Associate Professor of the Faculty of Business Administration and Economics, Paderborn University, Paderborn, Germany;
 ORCID: [0000-0002-0463-0347](https://orcid.org/0000-0002-0463-0347)

Volodymyr Novikov

PhD Student of the Department of Finance and Entrepreneurship, Sumy State University, Sumy, Ukraine;
 e-mail: vlad.nov.1996@gmail.com
 ORCID: [0000-0002-8266-9300](https://orcid.org/0000-0002-8266-9300)

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SCENARIO FORECAST OF THE IMPLEMENTATION OF THE DIGITAL MULTILEVEL MODEL OF TRANSPARENCY OF FINANCIAL RELATIONS

ABSTRACT

The study aims to develop and evaluate scenarios for implementing a digital multi-level financial and economic relations transparency model, which covers public, corporate, and personal finances. The study aims to identify key factors affecting the level of transparency, assess the consequences of implementing the model, and develop strategic recommendations to improve the efficiency of financial resource management and strengthen trust between market participants.

The study's main results include the definition of three model development scenarios: optimistic, pessimistic, and realistic. Each scenario considers the specifics of public, corporate, and personal finance and reflects different levels of influence of key factors such as technological readiness, government support, and market participants' adaptation to changes. The implications of each scenario were assessed, including the potential benefits, risks, and challenges associated with implementing the model at different levels of finance.

The study's main conclusions confirm that the digital multi-level model of transparency is an effective tool for increasing the transparency of financial and economic relations, reducing risks, and improving management efficiency. Implementing the model contributes to increasing trust in state institutions, improving corporate governance, and protecting the rights of consumers of financial services. Scenario forecasting makes it possible to adapt the model's implementation strategies to the changing conditions of the external environment, which contributes to its stability and successful integration into the financial system.

The study also identifies directions for further research, including assessing the impact of individual digital technologies, developing new methods for monitoring transparency, and exploring barriers and incentives for implementing the model across industries and regions.

Keywords: financial relations, transparency, digitalization, public finance, corporate finance, personal finance, transparency model, scenario forecasting

JEL Classification: G38, H83, M48, O33

INTRODUCTION

In the conditions of globalization and digitalization, the issue of transparency becomes a key factor for ensuring trust between market participants and improving the efficiency of economic processes. The growth of data volumes, the speed of their distribution and availability to the general public create new challenges and opportunities for financial and economic relations at all levels - public, corporate and personal finance. The modern development of digital technologies, such as blockchain, big data, artificial intelligence and automated reporting systems, significantly changes approaches to the implementation of the principles of transparency and allows for ensuring a high level of openness and transparency of financial and economic relations.

However, despite the significant progress in the technological field, the problem of ensuring the appropriate level of transparency remains relevant. Insufficient transparency

in financial and economic relations can lead to a number of negative consequences, such as a decrease in investor confidence, an increase in corruption risks, inefficient use of resources and a threat to economic stability. This is especially critical in the conditions when states and companies seek to attract investments, ensure financial stability and maintain competitiveness in international markets.

The study of transparency at different levels of finance requires a comprehensive approach that takes into account the specifics of public, corporate and personal finance. Public finances face challenges regarding the openness of public administration and the accountability of spending budget funds. Corporate finance focuses on ensuring transparency in financial reporting, management decisions, and communication with investors. Personal finance requires protection of consumer rights, increased financial literacy and access to clear information about financial services.

This article examines the scenario forecasting of the implementation of a digital multi-level model of transparency of financial and economic relations, which covers the integration of digital technologies to increase transparency at all levels of financial relations. The relevance of this topic is due to the need to improve the management of financial flows, reduce information asymmetry and increase the accountability of market participants. The proposed approaches are aimed at creating an integrated model that will ensure a high level of transparency, reduce risks and increase trust among participants in financial and economic relations.

Thus, the article aims to consider various scenarios for the implementation of the transparency model, assess the potential consequences for public, corporate and personal finances, as well as provide practical recommendations for the implementation of this model in modern conditions. This study will contribute to the understanding of the key factors affecting the transparency of financial and economic relations and will help determine ways to improve them through the implementation of innovative digital solutions.

LITERATURE REVIEW

To analyze the latest research and publications on the topic of the article, it is worth focusing on key scientific works that consider aspects of transparency in finance, digitalization, the interaction between different levels of financial relations, as well as the use of modern analytical and control technologies. At the level of public finances, the issue of ensuring the principles of transparency is considered by Bisogno, M., & Cuadrado-Ballesteros, B. [1], Montes, G. C., & Luna, P. H. [2], Puron-Cid, G., & Bolivar, M. P. R. [3]. Based on world experience, they analyze the relationship between budget and fiscal transparency, the quality of public governance, and human development. The issues of transparency and publicity of local finances are addressed by the works of Krah, R. D. Y., & Mertens, G. [4], Waheduzzaman, W., & Khandaker, S. [5], Baldissera, J. F., Dall'Asta, D., Casagrande, L. F., & Oliveira, A. M. B. d. [6], Zakharkina, L., Oliinyk, V., & Chukhno, R. [7]. Their research shows that information technology to increase transparency has become popular among local governments and is spreading in various areas of local finance.

Modern scientists pay considerable attention to the issue of transparency of corporate finances. Thus, in Nguyen, T. T. H., Wong, W. K., Phan, G. Q., Tran, D. T. M., & Moslehpour, M. [8], Oncioiu, I., Popescu, D. M., Aviana, A. E., Șerban, A., Rotaru, F., Petrescu, M., & Marin-Pantelescu, A. [9], Mason, M. [10] authors emphasize the importance of corporate governance and financial transparency for the effectiveness of companies in the modern business environment. They determine how the disclosure of environmental, social, and governance (ESG) information affects the financial transparency of companies in different economic sectors, taking into account the orientation of stakeholders. The authors Zadorozhnyi, Z.-M., Ometsinska, I., & Muravskiy, V. [11], Salehi, M., Ammar Ajel, R. and Zimon, G. [12] emphasize the need to increase transparency of financial relations at the level of corporate finance by improving financial reporting and overcoming communication barriers. Gong, Q., Ban, M., & Zhang, Y. highlight the role of blockchain-based digital supply chain finance in increasing the transparency of financial relationships [13].

The information component of digital transparency at the level of personal finance is considered in the works of Belen Saglam, R., Nurse, J. R. C., & Hodges, D. [14], Cullen, Z. [15], where the authors summarize approaches to the interpretation of personal information among key stakeholders, emphasizing the existing disagreements and social consequences of new technologies.

These studies and publications cover various aspects of transparency at public, corporate, and personal finance levels and demonstrate the role of digital technologies in increasing the efficiency and transparency of these relationships.

AIMS AND OBJECTIVES

This study aims to develop and evaluate scenarios for implementing a digital multi-level model of transparency of financial and economic relations covering public, corporate, and personal finances. The research aims to identify critical factors affecting the level of openness, assess the impact of the model's implementation on financial and economic processes, and develop strategic recommendations to improve efficiency and trust between market participants. The model should ensure the integration of modern digital technologies to improve transparency, reduce information asymmetry, and increase accountability at all levels of financial relations.

The tasks of the research are:

- to analyze the current state of transparency of financial and economic relations at the levels of public, corporate, and personal finances;
- to analyze possible scenarios for the implementation of a digital multi-level model of transparency, including optimistic, pessimistic, and realistic options;
- to assess the impact of each scenario on transparency, efficiency, and trust in financial and economic relations;
- to develop strategic recommendations for successful implementation of the model and risk minimization;
- to determine directions for further research to improve the transparency model.

METHODS

Several scientific methods were used to achieve the goal of the research and to fulfil the set tasks, which allow to comprehensively evaluate the implementation of the digital multi-level model of transparency of financial and economic relations.

The analysis of literature and secondary data allowed us to collect and summarize the available data and research on the transparency of financial and economic relations and the impact of digital technologies. A systematic review of the literature, including scientific articles, reports of international organizations and analytical materials, was conducted to identify the main trends, challenges and opportunities in the field. The main focus was on issues of transparency in public, corporate and personal finances. Scientific databases were used to search for relevant sources such as Scopus, WoS, Google Scholar and other academic resources. The collected information was used to form the theoretical basis of the study.

In order to determine the possible ways of development of the digital multi-level model of transparency under different conditions of the external environment, scenario forecasting was used. Three scenarios (optimistic, pessimistic, realistic) have been developed, which reflect different options for the development of events taking into account technological, economic and political dynamics. For each scenario, the potential consequences for public, corporate and personal finances were assessed. The scenarios were built based on the analysis of key factors, such as the level of government support, the degree of adoption of digital technologies, and the readiness of the market and the public for change. The main scenarios were formed with the help of the scenario matrix, which made it possible to structure possible options for the development of events.

For each scenario, an analysis of the impact on public, corporate and personal finances was carried out. Potential benefits, risks and challenges were assessed, including the impact on transparency, governance efficiency and the level of confidence among market participants. The evaluation was carried out using quantitative and qualitative indicators, including an analysis of possible economic consequences, social impact and potential benefits of increased transparency.

RESULTS

Transparency in financial and economic relations means the degree of openness and availability of information, which is necessary for market participants to make informed decisions. It includes:

- financial transparency – providing access to financial reports, data on operations, performance results;
- transparency of management processes – the openness of decision-making processes, use of resources and responsibility of management;
- technological support – using digital tools, such as blockchain, artificial intelligence, and electronic reporting platforms, which automate processes and verify data in real time.

The digital multi-level model of transparency provides integration and interaction between public, corporate, and personal finances, creating a single information field (Figure 1).

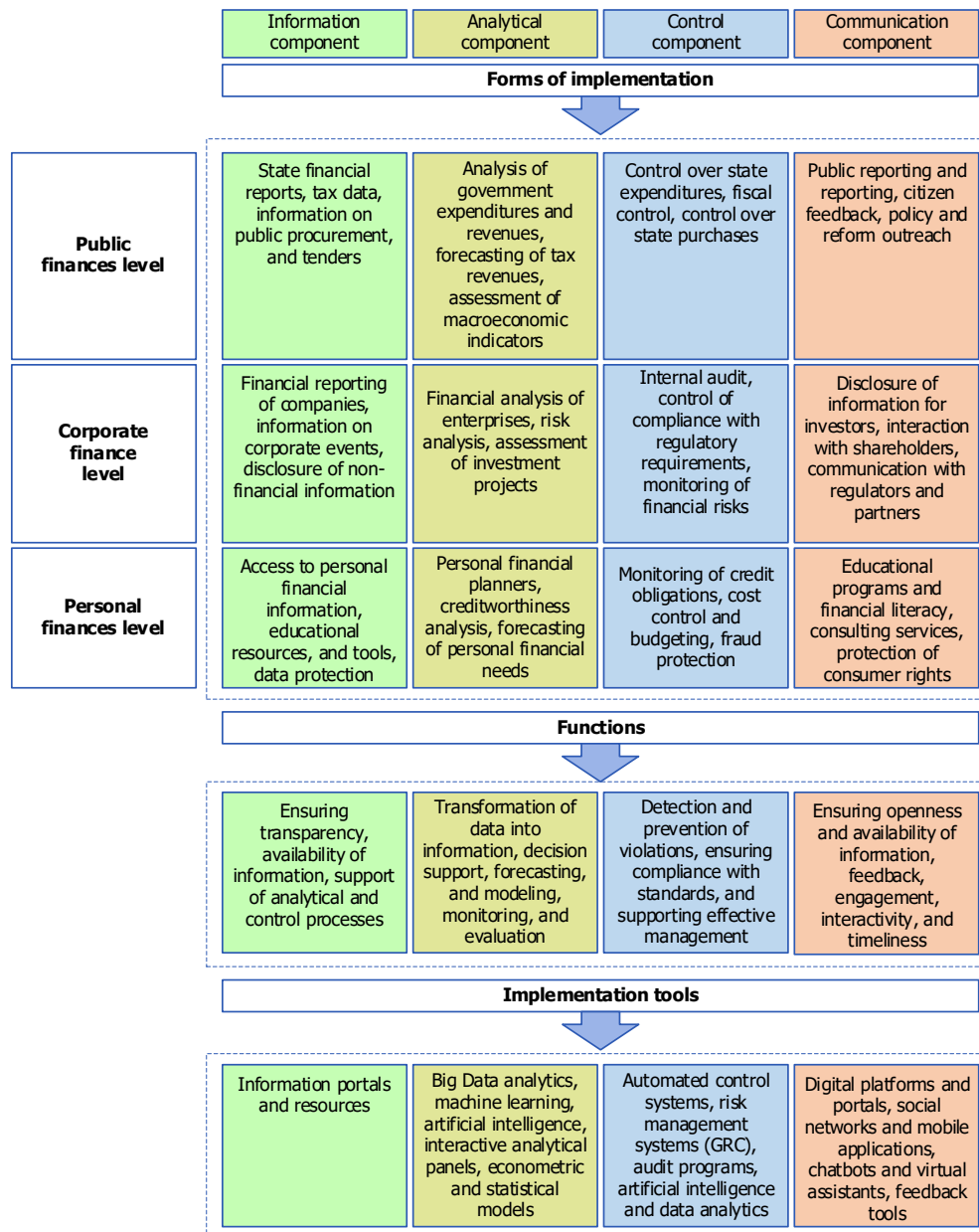


Figure 1. Digital multi-level model of transparency of financial relations.

The information component of the model includes collecting and publishing data from all levels – from state financial and budget data to corporate financial reporting and personal financial data. This component provides essential transparency through open access to relevant information. The information component of the digital multi-level model of transparency is the critical part that includes collection, processing, and access to data from different levels of finance - public, corporate, and personal.

At the level of public finances, the information component includes the publication of state budgets, reports on revenues and expenditures, and data on public debt. These documents ensure the transparency of state funds management. The tool for implementing such openness is the state web portal of the budget for citizens, «Open budget» (<https://openbudget.gov.ua/>), the single web portal for the use of public funds, «Spending» (<https://spending.gov.ua/>), and the IFIs projects register portal (<https://proifi.gov.ua/>). In tax policy, it is necessary to provide open access to data on tax revenues, tax benefits, and discounts, which helps citizens and businesses understand the state's tax policy. The transparency of information about public procurement and tenders is essential, which is implemented using the platforms

Prozorro (<https://prozorro.gov.ua/>), Dozorro (<https://dozorro.org/>), which allow citizens and businesses to track tenders, and purchases, which increases the transparency of the use of public funds.

The information component at the level of corporate finance includes the publication of financial statements, such as balance sheets, statements of financial results, and statements of cash flows. This provides investors, creditors, and other interested parties with access to companies' financial information. Information platforms such as SMIDA (<https://smida.gov.ua/>) also provide information on corporate events, mergers, acquisitions, changes in management, and other important events that may affect the company's financial condition. It is also important to disclose non-financial information, namely the publication of sustainability reports and information on corporate social responsibility, which helps to assess non-financial risks.

The information component at the level of personal finance is implemented through access to personal financial information through platforms that allow users to see their bank accounts, investments, loans, and other economic data in one place, which increases the convenience and control of personal finances. Websites, apps, and other resources provide information about managing personal finances, budgeting, investing, and other financial services. Ensuring the confidentiality and security of personal financial data is implemented through modern encryption and information protection technologies.

The main function of the information component is to ensure the openness of data at all finance levels, allowing market participants, citizens, and investors to make more informed decisions. Quick and convenient access to up-to-date information through digital platforms contributes to more effective financial management at all levels. The data collected at the information level is the basis for further analysis and control, ensuring a complete cycle of transparency in financial and economic relations.

The analytical component uses analytical tools to process and interpret data from different levels. For example, analysis of budget expenditures at the macro level, assessment of companies' financial stability at the meso level, and recommendations for managing personal finances at the micro level. The analytical component of the digital multi-level model of financial and economic relations transparency plays a crucial role in transforming the collected data into useful information for decision-making. This component includes modern analytical tools and methods that allow in-depth analysis of financial data at various levels - public, corporate, and personal.

At the level of public finances, the use of analytical tools to assess the effectiveness of the use of budget funds includes the analysis of costs for various programs, optimization of resource allocation, and monitoring of the implementation of the state budget. Using econometric models and machine learning for forecasting tax revenues allows the state to plan the budget better and manage the public debt. Modelling the impact of state policy on macroeconomic indicators, such as GDP, inflation, and unemployment rate, helps the state make informed decisions in economic policy.

The analytical component of the transparency model at the corporate finance level consists of using financial reporting indicators, such as profitability, liquidity, and solvency, to assess the economic condition of companies. This allows investors and lenders to make more informed decisions about investing or lending. Modelling financial risks, such as currency, credit, and operational risks, using Value at Risk (VaR), stress testing and scenario analysis allows companies to manage their risks more effectively. Cash flow discounting methods, investment return analysis, and internal rate of return are used to assess the effectiveness of investment projects.

The analytical component at the personal finance level consists of using tools that help users plan their budget, manage income and expenses, and calculate savings and investments. This includes recommendations for cost optimization and planning for future financial goals. Using algorithms to assess individuals' credit ratings allows financial institutions to evaluate risks better when granting loans. Using forecasting models to estimate future financial needs based on current income, expenses, and savings helps users effectively plan for their financial future.

The analytical component ensures the processing of large volumes of data, turning them into understandable and practically applicable insights, as a result of which analysts provide the basis for making informed decisions at all levels - from public policy to personal financial planning. The analytical component uses predictive models to assess possible development scenarios and their impact on financial and economic relations. Constant monitoring and evaluation of financial indicators allow timely detection of deviations from plans or undesirable trends that require correction.

The analytical component is a key element of the digital multi-level transparency model, which provides deep data analysis necessary to improve the efficiency of financial resource management at all levels. It contributes to transforming data into valuable information that helps the state, businesses, and citizens make informed decisions and respond to the challenges of the modern economic environment.

The control component of the digital multi-level model of transparency of financial and economic relations uses technologies to monitor and control compliance with standards and norms at each level of finance. This includes automated systems for monitoring the execution of budgets, compliance with financial regulations by companies, and protection of consumer rights in personal finance. The control component is critical in ensuring compliance with standards, regulatory requirements, and internal rules at the public, corporate, and personal finance levels. This component includes monitoring, evaluating, and controlling financial processes, contributing to increased responsibility and transparency in financial relations.

At the level of public finances, the control component of the transparency model involves using automated systems for monitoring and evaluating the use of budget funds. This includes the audit of public expenditures, control over compliance of expenditures with approved budgets, and identification of misuse of funds and corruption risks. Apply fiscal regulations and tools that ensure compliance with tax laws and regulations. It includes checking the correctness of calculations of taxes, fees, and other mandatory payments to the state budget. Monitoring of tendering and procurement procedures to ensure transparency and prevent corruption. This includes evaluating the transparency of tender procedures, monitoring the performance of contracts, and auditing procurement.

The control component at the level of corporate finance consists of the application of digital technologies that contribute to increasing transparency during regular internal audits of financial reporting, operations, and management processes to identify deviations, errors, or fraudulent actions, monitoring compliance with companies' activities with national and international financial reporting standards (IFRS, GAAP) and other regulatory requirements. This ensures transparency for investors and the protection of shareholders' rights. Using automated systems to identify and assess financial risks, including credit, currency, and operational risks, allows companies to quickly respond to changes and take corrective measures.

A control component of the transparency model in personal finance is the use of automated systems that help individuals monitor their loans and repayment schedules, interest rates, and credit terms to avoid late payments and fines. Using financial apps and tools helps users control their spending, plan a budget, and stick to financial goals. This includes expense tracking, budget overrun alerts, and cost optimization recommendations. Real-time financial transaction monitoring technologies detect suspicious activity and protect users from fraud. This includes detecting unauthorized transactions and ensuring the security of personal data.

The control component allows timely detection of violations, errors, and fraudulent actions, contributing to their prompt elimination and prevention in the future. Control helps ensure compliance with regulatory requirements, internal policies, and standards at all finance levels, increasing transparency and trust among market participants. Regular control and monitoring make it possible to improve the management of financial resources, optimize processes, and reduce financial risks. The control component contributes to increasing the responsibility of subjects in financial and economic relations because they know that their activities are constantly monitored and evaluated.

The communication component of the digital multi-level model of transparency of financial and economic relations is an important element that ensures effective information exchange and interaction between all financial system participants.

At the public finance level, online platforms and social networks communicate with the public and receive their feedback and suggestions on public finance management. This may include surveys, consultations, and participation in decision-making. Active communication regarding changes in fiscal policy, tax reforms, and government programs occurs through press releases, briefings, webinars, and other forms of interaction.

The communication component of corporate finance consists of interaction with shareholders, holding general meetings, webcasts, newsletters, and other communication activities to ensure shareholders' access to key information about the company's activities. There is also a constant exchange of information with regulatory authorities, auditors, suppliers, and other partners to ensure compliance with regulatory requirements and support transparent business processes.

The communication component of personal finance is implemented by providing access to financial advice through online platforms, chatbots, and mobile applications that help users make decisions about personal finance—communicating with users about their rights and terms of use of financial services, as well as informing about opportunities for protection against fraud and unforeseen expenses.

The communication component contributes to the dissemination of financial information among a wide range of participants, which increases the level of awareness and involvement in financial processes. Regular and clear information to all stakeholders contributes to the formation of trust in the financial management system and reduces the risks of misinformation. Feedback channels allow participants to voice their opinions, ask questions, and participate in decision-making, increasing engagement and accountability. Modern digital tools like mobile applications, chatbots, and social networks allow you to maintain fast and convenient communication in real time.

The communication component of the model is a key element for ensuring effective interaction between participants in financial and economic relations at all levels. It supports transparency, accountability, and engagement, which contributes to greater trust and efficiency in managing financial resources in the conditions of the modern digital economy.

Scenario forecasting of a digital multi-level model of transparency of financial and economic relations is an important tool for evaluating possible ways of developing this model under different conditions. It allows you to identify key factors that can influence the implementation of the model and predict how changes in the political, economic, technological, or social environment can affect the implementation of this model. Scenario forecasting involves creating several possible scenarios, such as optimistic, pessimistic, and realistic, which helps prepare for future situations.

The main purpose of scenario forecasting is to identify possible options for implementing the model and to assess their impact on public, corporate, and personal finances. This includes analyzing the potential benefits and risks for each level of finance, assessing likely outcomes, and developing recommendations to improve efficiency and minimize negative consequences. Scenario forecasting also facilitates the preparation of strategies for adaptation to changing conditions, allowing market participants to develop action plans that increase the sustainability of the transparency model. Thus, it is a key tool to support strategic decision-making that contributes to the long-term sustainability and efficiency of financial and economic relations in a dynamic environment.

As a result, scenario forecasting helps identify the most effective ways to implement digital solutions to increase transparency at all levels of finance, as well as prepare for possible challenges and barriers that may arise during the implementation of this model. This, in turn, contributes to increasing the overall stability of the financial system and strengthening trust between participants in financial and economic relations.

The scenario forecasting algorithm of the digital multi-level transparency model of financial and economic relations is shown in Figure 2.

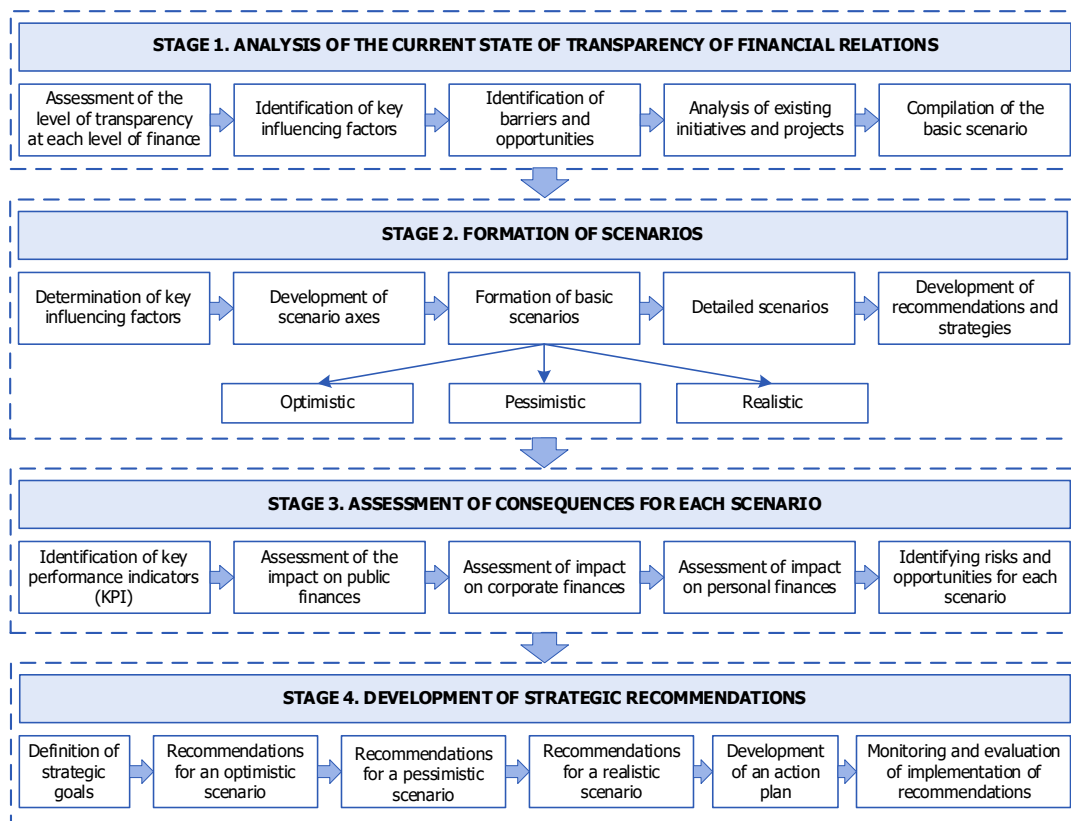


Figure 2. Algorithm of scenario forecasting of the digital multi-level model of transparency of financial and economic relations.

The stage «Analysis of the current state of transparency» is the first and extremely important step in the process of scenario forecasting of a digital multi-level model of transparency of financial and economic relations. This stage involves a comprehensive assessment of the current situation in the field of transparency at the levels of public, corporate, and personal finances. The purpose of analyzing the current state of transparency is to identify strengths and weaknesses,

opportunities and threats, as well as to identify key factors affecting the level of transparency and the effectiveness of financial relations.

At the same time, at the level of public finances, the level of transparency in the public sector is analyzed, including the availability and accuracy of budget information, the efficiency of tax systems, the level of accountability of public bodies, as well as the quality and frequency of publication of public financial reports. At the level of corporate finance, the level of information disclosure by companies, the compliance of reporting with international standards, the transparency of management processes, and the availability of information for investors and shareholders are considered. At the level of personal finances, citizens' access to information about managing personal finances, the level of financial literacy of the population, the availability of financial services, and the level of consumer protection are assessed.

The identification of key influencing factors involves the study of public policy on transparency, in particular, regulatory initiatives aimed at increasing transparency and accountability. It analyzes to what extent political will and support of public authorities contribute to the implementation of digital tools to increase transparency. An assessment is made of economic conditions that may affect transparency, including the level of economic development, access to capital, the competitive environment, as well as economic stability, which may facilitate or hinder the implementation of the model. Technological readiness is analyzed, including the availability of infrastructure to support digitization, the level of adoption of the latest technologies such as blockchain, big data, and artificial intelligence, and their availability for public, corporate, and personal finance. The level of financial literacy, the readiness of citizens and organizations to accept changes, and the level of trust in financial institutions and state bodies are assessed.

At this stage of scenario forecasting, the main obstacles to increasing transparency are identified, such as regulatory restrictions, resistance from stakeholders, insufficient technological infrastructure, or low level of digital literacy. It also identifies potential opportunities that can be used to improve transparency, such as the presence of successful practices in other countries, support from international organizations, innovative technological solutions, or a growing demand for transparency from society.

It is important to analyze existing initiatives and projects aimed at increasing transparency, such as implementing electronic government, automation of financial reporting, and digital platforms for interaction with the public. Analyzing the effectiveness of these initiatives, identifying best practices, and identifying areas that require additional efforts or adjustments.

Based on the analysis, a baseline scenario is formed that reflects the current level of transparency without the introduction of new changes. This scenario serves as a starting point for comparison with other projected scenarios.

Analyzing the current state is critical because it provides a clear picture of the current level of transparency and allows you to determine where changes are needed and where efforts should be focused. The results of this analysis serve as a basis for developing further development scenarios that consider possible ways to improve transparency through implementing a digital multi-level model. Thus, this stage provides a deep understanding of the current situation and helps in planning effective strategies to achieve the goals of the financial and economic relations transparency model.

The «Formation of scenarios» stage is key in the scenario forecasting of the digital multi-level model of transparency of financial and economic relations. At this stage, possible ways of developing the model are determined, considering various external and internal factors that can affect its implementation. Scenario generation helps identify how changing conditions may affect the implementation of the model and what actions need to be taken to achieve optimal results.

First, there are the main factors that can significantly affect the implementation of the transparency model, such as technological innovations, changes in legislation, political will, economic stability, social trends, and the level of financial literacy. At the same time, factors that have a high level of uncertainty and can significantly change the situation are evaluated. For example, uncertainty about economic growth, political stability, or the adoption of new regulatory requirements.

Next is the development of scenario axes, that is, the selection of two or three main factors with a high level of influence and uncertainty, which will be used to build scenarios. These axes form a matrix that determines possible directions of development. Create combinations of selected axes, allowing for multiple possible scenarios. For example, axes may include the level of government support (high/low) and the speed of technological adaptation (fast/slow).

Based on the selected scenario axes, basic scenarios are formed, which include:

- an optimistic scenario that describes the most favourable development of events, where all key factors contribute to the successful implementation of the model. This scenario assumes high government support, rapid technology adoption, positive public perception, and active business participation. The result is high transparency, increased efficiency of financial management, and increased trust among market participants;

- a pessimistic scenario that reflects a negative development of events, where the main barriers and uncertainties prevent the implementation of the model. Possible constraints include low government support, technical difficulties, and resistance from businesses or the public. In this case, the implementation of the model may be partially or significantly delayed, which limits its impact on transparency;
- a realistic (average) scenario, which assumes a moderate development of events, where a mixed level of support and barriers is observed. The implementation of the model takes place gradually, with certain delays and challenges, but with positive results in the long term.

For each scenario, a detailed description of key characteristics is provided, such as the level of support from the state, business, and citizens, the degree of technology adoption, the availability of financial resources, and the ability to adapt. An assessment is made of the possible outcomes of each scenario, including the impact on public, corporate, and personal finances. Probable benefits, risks, and threats for each level of finance are considered. Determining critical points involves identifying the key points on which the implementation of the scenario depends, for example, the introduction of new technologies, the adoption of legislative changes, or changes in market behaviour.

Development of recommendations on actions to be taken to implement an optimistic scenario or to minimize the negative consequences of a pessimistic scenario includes measures to support adaptation, increase transparency, improve communications, and manage risks. It is important to create strategic plans for each scenario that include specific steps to achieve the model's goals. These can be plans for the introduction of technologies, measures to attract stakeholders, adaptation of legislation, or improvement of the financial literacy of the population.

The scenario formation stage is critically important for predicting possible future development paths and preparing for them. This allows organizations and government bodies to be more flexible and ready for changes in the external environment. Through a scenario approach, it is possible to better understand what factors can facilitate or hinder the implementation of the transparency model, and how to adapt strategies to ensure a successful outcome regardless of developments. The formation of scenarios helps to reduce risks and increase the chances of successful implementation of a digital multi-level model of transparency of financial and economic relations.

The stage «Assessment of consequences for each scenario» is important in scenario forecasting, as it allows a deeper understanding of what results may arise as a result of the implementation of each of the developed scenarios. This stage is aimed at analyzing the impact of predicted scenarios on public, corporate, and personal finances, as well as identifying possible benefits, risks, and challenges associated with each of them.

The first step of this stage involves the identification of key performance indicators (KPI). Definition of key indicators that will be used to assess the consequences of each scenario. These can be indicators of transparency, efficiency of financial management, level of trust among stakeholders, implementation costs, level of citizen involvement, economic benefits, etc. The combination of quantitative indicators (for example, increased revenues and reduced corruption risks) and qualitative assessments (for example, increased trust and improved interaction between the state and citizens) allows for a comprehensive assessment of the impact of transparency separately for each level of financial relations.

Assessment of the impact on public finances:

1. An optimistic scenario. In this scenario, a significant improvement in the transparency of public administration, a reduction in corruption, and an increase in the efficiency of the use of budget funds are expected. Consequences may include increased confidence in government institutions, improved country ratings at the international level, and increased investment attractiveness.
2. A pessimistic scenario. In the event of an unfavorable development of events, it is possible to maintain a low level of transparency, continue corrupt practices, and inefficient use of budget funds. This can lead to a decrease in trust in the government, an increase in social discontent, and a decrease in international ratings.
3. A realistic scenario. Implementation of partial changes can lead to gradual improvement but without radical changes. It is possible to reduce corruption and improve efficiency in certain sectors but without a significant impact on the overall level of transparency.

Assessment of impact on corporate finances:

1. An optimistic scenario. It is expected to increase the transparency of corporate governance, which contributes to the growth of investor confidence, improved access to financing, and lower cost of capital. This can stimulate the growth of companies, increase investment, and the development of innovation.

2. A pessimistic scenario. Maintaining a low level of transparency can lead to increased risks for investors, reduced value of companies, limited access to capital, and possible regulatory sanctions. This can negatively affect the financial stability of companies and restrain their development.
3. A realistic scenario. Partial improvements in corporate transparency may increase market attractiveness but without significant change. Limited benefits are expected for certain sectors, in particular for large companies that are more ready to implement changes.

Assessment of the impact on personal finances:

1. An optimistic scenario. Increasing the level of financial literacy, access to information and protection of consumer rights can lead to improved management of personal finances, increased savings and investments of citizens, as well as reducing the level of debt burden. This contributes to the financial stability of the population and the growth of the general economy.
2. Pessimistic scenario: if the level of transparency and financial literacy is maintained at a low level, negative consequences are possible, such as an increase in public debt, a decrease in savings, and an increase in the risk of financial fraud. This can lead to a decrease in the quality of life and an increase in social tension.
3. A realistic scenario. A gradual improvement in the management of personal finances is expected but without a significant impact on the massive growth in savings or investment. There is room for improvement in certain segments such as youth or digitally literate citizens.

Further, it is necessary to identify the potential risks associated with each scenario, such as technological failures, stakeholder resistance, insufficient regulatory support, or negative market reaction, and to identify the opportunities that may arise from the implementation of each scenario, including improved competitiveness, growth investments, increasing efficiency and reducing costs.

The «Development of strategic recommendations» stage involves:

- for an optimistic scenario, recommendations on maintaining a high level of implementation, strengthening state support, expanding educational programs, and attracting businesses to active participation;
- for the pessimistic scenario, the development of an action plan to overcome barriers, increase the motivation of market participants, strengthen regulatory requirements, and use incentives for business;
- for a realistic scenario, recommendations for gradual improvement include supporting the introduction of new technologies, improving legislation, and increasing cooperation between the state, businesses, and citizens.

At this stage, specific recommendations and strategies are formulated for each scenario, which will help implement the model effectively, minimize risks, and make the most of the opportunities identified in the previous stages. These recommendations help adapt to possible changes and challenges, ensure efficient use of resources, and maintain high motivation among all participants. The development of strategic recommendations provides the basis for making informed decisions that increase the probability of successful implementation of the model and achieving long-term goals in increasing the transparency of financial and economic relations.

DISCUSSION

The findings of this study provide critical insights into implementing a digital multi-level model of transparency in financial-economic relations across public, corporate, and personal finance levels. The results highlight the potential of digital technologies, such as blockchain and automated reporting systems, to enhance transparency, reduce risks, and improve the efficiency of financial management. Our scenario analysis identified three possible paths—optimistic, pessimistic, and realistic—that reflect different levels of adoption and effectiveness of transparency measures influenced by technological readiness, government support, and stakeholder adaptation.

Interpretation of Results

Public Finance: The study demonstrates that increased transparency in public finance through digital models can lead to better utilization of budgetary resources, reduced corruption, and improved trust in government institutions. This aligns with previous research indicating that digital solutions in public finance, such as blockchain for budget tracking, significantly reduce opportunities for fraud and enhance public accountability.

Corporate Finance: The results show that transparency improvements in corporate governance through digital tools can lower information asymmetry between companies and investors, reduce capital costs, and enhance corporate performance. These findings are consistent with studies that emphasize the positive effects of financial transparency on investment attractiveness and compliance with international reporting standards.

Personal Finance: The study found that increased transparency in personal finance, driven by digital platforms, helps improve financial literacy, enables better personal financial management, and enhances consumer protection. This echoes findings from recent literature that underscore the role of accessible financial information in empowering individuals and protecting them against financial fraud.

Comparison with Previous Studies

Our study extends the existing literature by examining the simultaneous impact of digital transparency on multiple levels of financial-economic relations, which has not been comprehensively explored before. Previous studies often focused on bi-directional influences, such as budget transparency's impact on governance or state development. By integrating these dimensions, our research provides a holistic view of how transparency can drive broader systemic improvements across various financial sectors.

Furthermore, unlike prior studies that mainly addressed transparency from a compliance perspective, our research emphasizes the strategic role of digital technologies in proactively shaping transparent practices. Incorporating scenario forecasting also adds a dynamic element to understanding potential future states, aligning with the advanced predictive approaches suggested.

Limitations

Despite its contributions, the study has several limitations. First, the analysis is based on data from a limited sample of EU member states, which may not fully capture the global diversity of financial systems and transparency practices. Future research could extend the scope to include non-European countries and emerging markets to generalize the findings.

Second, the reliance on existing indicators and metrics, such as the Open Budget Index and Worldwide Governance Indicators, may not fully reflect the nuances of digital transparency's impact. The study assumes that these indicators adequately capture the complexities of transparency, but emerging technologies and evolving definitions of personal and financial data might require more granular measures.

Third, while the scenario analysis provides valuable insights, it is inherently speculative and dependent on technological adoption and policy support assumptions. As such, the scenarios should be interpreted as potential pathways rather than definitive outcomes.

CONCLUSIONS

The digital multi-level model of financial and economic relations transparency is an important tool for ensuring transparency at public, corporate, and personal finance levels. Implementing this model makes it possible to improve the management of financial flows, reduce the risks of corruption, strengthen accountability, and increase the level of trust between market participants.

Implementing digital technologies, such as blockchain and automated reporting systems, increases public finances' transparency, which contributes to more efficient use of budget funds, reducing corruption and increasing citizens' trust in state institutions. This, in turn, can improve public administration performance and contribute to socio-economic development.

Increasing the corporate sector's transparency level through implementing digital transparency models helps reduce information asymmetry between companies and investors. This leads to a decrease in the cost of capital, an increase in the investment attractiveness of companies, and an increase in trust in corporate governance. Transparency promotes compliance with international reporting standards and improves interaction with regulatory authorities.

Transparency in personal finances contributes to increasing the financial literacy of the population, better management of personal finances, and protection of the rights of consumers of financial services. Implementing digital platforms that provide access to financial information and educational resources helps citizens make informed financial decisions and reduces the risks of financial fraud.

Scenario forecasting plays a key role in implementing a digital multi-level transparency model, as it allows you to consider the specifics of each level of finance and assess the potential consequences of implementing the model in different conditions. The development of different scenarios (optimistic, pessimistic, and realistic) helps to adapt implementation strategies to the changing external environment, which contributes to increasing the stability of the model and its successful integration into financial relations.

Further research could focus on evaluating the effectiveness of specific digital solutions, such as artificial intelligence, blockchain, and big data, to increase transparency at different levels of finance. This will help identify the most promising technologies and adapt them to public, corporate, and personal finance needs. It is important to investigate how increased transparency affects economic indicators, such as investment attractiveness, cost of capital, and company productivity, as well as social aspects, such as trust in the state and financial institutions. This will allow a better understanding of the complex impact of transparency on society and the economy. Further research can also be aimed at developing innovative methods for monitoring and assessing transparency, including automated data collection and analysis systems. This will help ensure a more accurate and timely assessment of the implementation of the model and increase the effectiveness of management decisions. Barriers to implementing digital transparency models must be explored, and effective incentives to overcome them must be identified. This includes an analysis of regulatory barriers, financial constraints, and cultural and organizational factors affecting the implementation of transparency. Further research can focus on adapting the transparency model to the specifics of different sectors of the economy or regional conditions. This will allow for the taking into account the specifics of specific sectors and provide a more targeted approach to increasing transparency.

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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Захаркін О., Мирошниченко Ю., Новіков В.

СЦЕНАРНЕ ПРОГНОЗУВАННЯ РЕАЛІЗАЦІЇ ЦИФРОВОЇ МУЛЬТИРІВНЕВОЇ МОДЕЛІ ТРАНСПАРЕНТНОСТІ ФІНАНСОВИХ ВІДНОСИН

Метою дослідження є розробка та оцінка сценаріїв реалізації цифрової мультирівневої моделі прозорості фінансово-економічних відносин, яка охоплює публічні, корпоративні та особисті фінанси. Дослідження спрямоване на виявлення ключових факторів, що впливають на рівень прозорості, оцінку наслідків впровадження моделі та розробку стратегічних рекомендацій для підвищення ефективності управління фінансовими ресурсами й зміцнення довіри між учасниками ринку.

Основні результати дослідження включають визначення трьох сценаріїв розвитку моделі: оптимістичного, песимістичного та реалістичного. Кожний сценарій ураховує специфіку публічних, корпоративних та особистих фінансів і відображає різні рівні впливу ключових факторів, таких як технологічна готовність, державна підтримка та адаптація учасників ринку до змін. Було проведено оцінку наслідків кожного сценарію, що включає потенційні вигоди, ризики та виклики, пов'язані з впровадженням моделі на різних рівнях фінансів.

Основні висновки дослідження підтверджують, що цифрова мультирівнева модель прозорості є ефективним інструментом для підвищення прозорості фінансово-економічних відносин, зниження ризиків та покращення ефективності управління. Впровадження моделі сприяє підвищенню довіри до державних інституцій, покращенню корпоративного управління та захисту прав споживачів фінансових послуг. Сценарне прогнозування дозволяє адаптувати стратегії впровадження моделі до змінних умов зовнішнього середовища, що сприяє її стійкості та успішній інтеграції у фінансову систему.

Дослідження також визначає напрями для подальших досліджень, включаючи оцінку впливу окремих цифрових технологій, розробку нових методів моніторингу прозорості та вивчення бар'єрів і стимулів для впровадження моделі в різних галузях і регіонах.

Ключові слова: фінансові відносини, прозорість, цифровізація, публічні фінанси, корпоративні фінанси, особисті фінанси, модель прозорості, сценарне прогнозування

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