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ORIGINAL

Ensuring Financial Security: approaches to Risk Management and Protection in the Digital Economy

Garantizar la seguridad financiera: enfoques de gestión de riesgos y protección en la economía digital

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ABSTRACT

Introduction: the rapid development of digital technologies and their integration into financial systems, accompanied by the emergence of new types of risks and threats, necessitates the use of effective strategies aimed at minimizing financial risks.
Objective: the purpose of this article is to analyse risk protection and risk management strategies in the digital economy to ensure financial security.
Method: during the study, the author analysed the literature, which made it possible to identify relevant strategies for protecting and managing risks in the digital economy. As part of the study, an expert survey was conducted among 20 scientists, the results of which allowed for a correlation analysis in the JASP software to determine the effectiveness of financial risk management strategies.
Results: the outcomes of the correlation analysis revealed that the standardization of digital technologies reduces credit risk and cyber risk (r = -0,549, p = 0,01), while increasing reputational risk (r = -0,742, p = 0,001); the regulation of digital assets leads to an increase in counterparty and inflation risks (r = -0,742, p = 0,001); and the development of financial literacy reduces counterparty risk (r = -0,645, p = 0,002), reputational risk (r = -0,833, p = 0,001), and inflation risk (r = -0,645, p = 0,002).
Conclusions: based on the findings of the study, different risk management strategies in the digital economy demonstrate different effectiveness in mitigating specific financial risks, which emphasizes the need for a comprehensive approach to ensure overall financial stability.

Keywords: Digital Economy; Digital Technologies; Financial Security; Business Process Transformation; Green Economy; International Business; Project Management.

RESUMEN

Introducción: el rápido desarrollo de las tecnologías digitales y su integración en los sistemas financieros, acompañado de la aparición de nuevos tipos de riesgos y amenazas, hace necesario estrategias dirigidas a minimizar los riesgos financieros es extremadamente relevante.

Objetivo: el objetivo de este artículo es analizar las estrategias de protección y gestión de riesgos en la economía digital para garantizar la seguridad financiera.
Método: en el transcurso del estudio, el autor analizó la bibliografía, lo que permitió identificar las estrategias pertinentes para proteger y gestionar los riesgos en la economía digital. Como parte del estudio, se llevó a cabo una encuesta de expertos entre 20 científicos, cuyos resultados permitieron realizar un análisis de correlación en el software JASP para determinar la eficacia de las estrategias de gestión de riesgos financieros.
Resultados: los resultados del análisis de correlación revelaron que la normalización de las tecnologías digitales reduce el riesgo de crédito y el riesgo cibernético (r = -0,549, p = 0,01), mientras que aumenta el riesgo de reputación (r = -0,742, p = 0,001); la regulación de los activos digitales provoca un aumento de los riesgos de contraparte y de inflación (r = -0,742, p = 0,001); el desarrollo de los conocimientos financieros reduce el riesgo de contraparte (r = -0,645, p = 0,002), el riesgo de reputación (r = -0,833, p = 0,001) y el riesgo de inflación (r = -0,645, p = 0,002).
Conclusiones: sobre la base de los resultados del estudio, que las diferentes estrategias de gestión de riesgos en la economía digital demuestran una eficacia diferente en la mitigación de riesgos financieros específicos, lo que pone de relieve la necesidad de un enfoque integral para garantizar la estabilidad financiera global.

Palabras clave: Economía Digital; Tecnologías Digitales; Seguridad Financiera; Transformación De Procesos Empresariales; Economía Verde; Negocios Internacionales; Gestión De Proyectos.

INTRODUCTION

In the conditions of digital technologies' rapid development and globalization of economic processes, the digital economy became a key driver of the world economy, providing 3 % of international employment and contributing to gross domestic product growth of 5 %.[1] Innovative digital technologies and modern information systems provide an opportunity to ensure high accuracy and efficiency of financial data collection and processing, which is a key factor in the strategic decisions' effectiveness. In the modern world, digital economy represents a key factor of economic growth – in particular, it is expected that till the end of 2024 it will constitute 24 % of world economy. Now, in countries with high level of technological development and active digitalization, growth of business productivity is observed,[2,3] as well as attraction of additional investments,[4] shaping of new competitive advantages due to innovations introduction,[5] reducing of costs for business processes implementation,[6] expansion of smart products.[7,8] Moreover, one can see a growth of the role of digital technologies for business sphere,[1,9] development of green economic efficiency,[10,11,12] as well as development of online tools, web platforms and digital electronic payment systems. In addition, digital economy transforms business processes of project management, operations management, management of risks and capital,[13,14] as well as financial planning, data analysis and strategic decision-making.[15]

Digital platforms and applications integrate various financial processes, thus facilitating transparency and control over financial flows. At the same time, the growth of the digital economy implies new challenges and risks that can significantly affect the financial security of companies and states. In particular, development of digital technologies and transformation of key economic processes create new opportunities for raising financial systems' effectiveness, but simultaneously impact mechanisms of risk prevention and risk management.[16,17] The situation in the international business' financial security in the context of sustainable development is influenced by factors shaping technology base of modern financial technologies and cybersecurity of individual national payment and bank systems.[18] Thus, one of the main problems is ensuring financial security in the conditions of increasing cyberthreats and complication of management processes.

In particular, cyber threats, fraud, and data breaches are becoming increasingly common challenges, requiring organizations to implement reliable defence mechanisms. An integral part of this process is represented by the development of comprehensive strategies that include both technical and organizational measures aimed at minimizing risks and ensuring financial stability. Considering the research by Kaur et al.,[19] Kryshtanovych et al.,[20] Mostafa et al.,[21] one should note that the effectiveness of measures aimed at cybersecurity determines both financial assets and financial operations' stability, in particular regarding payment processing, carrying out bank transfers, and investment portfolios management. Introduction of modern data protection technologies such as encryption and multi-factor authentication allows reducing risks derived from information leakage and financial losses.[22,23] Preventing fraud is crucially important component of observing financial legislation which is aimed at mitigation of risks connected with fraudulent actions that may put stability and reputation of organization at risk.[24] Moreover, for prevention of financial risks, the necessary aspect is observing regulatory standards and internal control, intended for provision of transparency and accountability of financial operations, which includes thorough monitoring, accounting and audit directed at revealing and preventing of

fraud in organizations.[25] Moreover, innovative approaches to risk management with the application of artificial intelligence, machine learning, Internet of Things (IoT) and automation, for planning and forecasting financial risks, open new opportunities for ensuring financial security. In this context of research, Dana et al.,[26] Metawa et al.,[27], Milojević and Redzepagic[28] show that adaptation to changing conditions of market and technological innovations due to introduction of modern digital technologies and analytical tools helps to shape high-quality strategies of financial risks management and to ensure stability of business environment and the country' economy as whole.

The purpose of writing this article is analysis of strategies for risk protection and risk management in the conditions of the digital economy, with making emphasis on ensuring financial security. The research implies identification of key approaches for managing risks which arise due to digital economy implementation and development. The research also aims at determining these risks' impact on organizations' financial security. In frames of the article, the effectiveness of various protection strategies will be analysed.

METHOD

In the process of research, analysis of literature sources was conducted in order to determine relevant strategies of risk protection and risk management in digital economy, which allowed define main directions and trends of their development. A method of systematization enabled clear description of strategies for prevention, maintenance, reducing, and transfer of risks, the goal and potential ad vantages in diminishing financial risks.

The study is descriptive and quasi-experimental in nature, as a two-level expert survey was conducted on the effectiveness of risk prevention and management strategies aimed at ensuring financial security and the significance of financial risks in the digital economy. The study was conducted from February to June 2024 and covered the assessment of the effectiveness of financial risk management strategies in the context of the digital economy. The expert survey was organized in an academic environment and conducted remotely with the involvement of scientists in the field of finance. The survey was conducted among 20 scientists (expert group included 7 professors and 13 associate professors), who carry out scientific activity focused on the sphere of finance. The sample is purposeful, since the individuals involved have proven scientific qualifications and experience in the field of financial risks. The selection of experts was carried out based on their scientific activity and publication activity. The expert survey was conducted in the form of a questionnaire, where the answers to the questionnaire questions were recorded in a standardized format for further quantitative analysis.

To ensure the reproducibility of the study, a detailed procedure for conducting the survey and processing the obtained data was developed:

I. Formation of a list of experts according to their experience and academic activity.

II. Development of a questionnaire to assess the effectiveness of financial risk management strategies on a scale from 0 to 10 points, where: 0–3 points - low efficiency; 4–7 points - medium efficiency; 8–10 points - high efficiency.

III. Conducting a remote survey of experts and collecting data.

IV. Analysis of the received estimates, their summary in a table and assessment of financial risks took place considering the significance coefficients, where: <1 - high level of significance; 0,5–1 - medium level of significance; 0,5 - insignificant impact.

V. Based on the results of assessment of strategies and available financial risks, experts conducted correlation analysis with the use of statistical software JASP ("Classical Correlation" tool), aimed at revealing the extent of risk management strategies' effectiveness in eliminating current financial risks.

The study was conducted in accordance with the ethical standards of scientific research. The participation of experts was voluntary, the anonymity of respondents was preserved. The data was used exclusively in a generalized form for scientific purposes, without disclosing the personal information of the participants.

RESULTS

In the conditions of digital economy' rapid development, ensuring financial security acquires special weight for both state-wide and international economic systems. In this context, risk management represents a key process for ensuring financial security in today economic system and is a complex activity which covers identification, analysis and making decisions aimed at maximization of positive consequences and minimization of negative effects from risk events.[17] The main goal of risk management implies a systematic approach to assessment of potential threats and opportunities, which allow effective reaction to unforeseen situations, as well as ensuring of financial stability. In the economic and financial mutual relationships that arise in frames of risk management, it is important to take into account both strategic and tactical aspects of managerial decisions. The choice of risk management methods should correspond to principles which include assessment

of risk consequences and compliance with available resources volumes.[29] In strategic management of financial risks within digital economy, it is important to observe principles of systematicity in construction, which ensures all strategy elements' consistency with the system of financial security, complex nature of decisions, guaranteeing their balance and avoidance of new risks, continuity of the process, that provides the possibility of fast reaction to threats, constant monitoring for timely detection and evaluation of threats, as well as flexibility and adaptiveness, allowing effective reaction on rapid changes and new challenges.

Thus, effective strategies should focus on raising the level of cybersecurity, integration of new technologies for risks monitoring and management, as well as development of appropriate measures for risk prevention (table 1). In this context, it is necessary to take into account not only current threats, but also potential risks, which may arise due to technological changes and global economic trends.

Table 1. Strategies of risk protection and risk management for ensuring financial security

Strategies		Characteristics
Risk avoidance	Digital technologies standardization	Development and implementation of national standards for digital technologies and platforms, which ensures compatibility and security of financial transactions. For example, standards ISO/IEC 27001 for information security management reduce the risk of cyberthreats. Thus, increasing of financial operations security and trust to digital solutions is achieved.
	Restriction of unreliable technologies use	Refusing the use of unverified or obsolete digital technologies, which can represent a threat to country' financial security. For example, prohibition of using obsolete encryption systems, which are not protected, facilitates reducing the probability of cyberattacks and financial losses.
	Digital assets regulation	Establishment of clear rules and regulations for the use of digital assets and cryptocurrencies, which reduces the risks of financial fraud and losses. For example, introduction of regulatory requirements for cryptocurrencies exchange and Initial Coin Offerings (ICO), which improves transparency and security in digital assets market.
Risk reduction	Investments in cybersecurity	Expanding of investment in cybersecurity infrastructure for protection of national financial systems from cyberthreats, which reduces probability of financial losses. For example, financing of programs for the development of national Computer Emergency Response Teams (CERT), which improves resistance to cyberthreats and protection of financial assets.
	Personnel professional development	Education and advanced training for experts in the sphere of cybersecurity for effective protection of digital financial systems. For example, organization of national certification programs for cybersecurity experts (CISSP, CISM) increases the level of financial systems protection from cyberthreats.
	Regular audits and rusks assessments	Carrying out regular audits and assessment of risks in digital economy for timely revealing and minimization of financial security threats. Introduction of annual audits based on National Institute of Standards and Technology (NIST) standards facilitates identification of weak points and increasing of the overall security level.
Risk transfer	Use of international insurance	The use of international insurance mechanisms for transfer of the financial risks' parts to international organizations. In particular, insurance of public debt or export credits through international agencies reduce the financial burden on the public budget in case of crisis situations.
	Partnership with international institutions	Cooperation with international financial institutions for sharing financial risks and obtaining financial support in case of necessity. In particular cooperation with particular, cooperation with the IMF or the World Bank.
	Hedging use	The use of financial tools for hedging the risks of national currency or main export goods prices. For example, concluding forward contracts for the sale of currency or raw materials facilitates reducing the risk financial losses due to market prices fluctuation.
Risk retention	Stabilization reserves formation	Creation of stabilizing reserves for covering possible financial losses in case of crisis situations. For example, in order to improve resistance to financial crises and enabling economic stability, reserves of Central Bank are used for maintaining national currency exchange rate.

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	Supporting financial sector sustainability	Support of banking and financial sectors resilience due to introduction of appropriate regulatory norms and requirements. In particular, observance of description to banks' capital according to Basel agreements for decreasing the probability of financial institutions' bankruptcy and increasing the overall stability of financial system.
	Development of population' financial literacy	Increasing the level of population' financial literacy for reducing risks associated with undue management of individual' finances. For example, national programs of financial education, which will reduce the level of debt load on the population and will enable increasing of economic stability.

To assess the effectiveness of defined risk protection and risk management strategies application, expert survey was carried out among 20 scientists in the sphere of finance, in particular, 7 professors and 13 associated professors. In frames of this analysis, assessment on the scale from 0 to 10 was carried out. The assessment was distributed in the following manner: 0–3 points – low efficiency; 4–7 points – average level of efficiency; 8–10 points – high efficiency. The results of experts' assessment regarding strategies of risk protection and risk management are presented in table 2.

Table 2. Assessment of financial risk protection and risk management strategies efficiency

Strategies	Assessment directions	Weighting factor	Average	Rating	Total
	Digital technologies standardization (S1)	0,25	6	1,5	
Risk avoidance	Restriction of unreliable technologies use (S2)	0,20	5	1	4,6
	Digital assets regulation (S3)	0,30	7	2,1	
	Investments in cybersecurity (S4)	0,35	9	3,15	
Risk reduction	Personnel professional development (S5)	0,25	7	1,75	7,3
	Regular audits and rusks assessments (S6)	0,30	8	2,4	
	Use of international insurance (S7)	0,30	8	2,4	
Risk transfer	Partnership with international institutions (S8)	0,25	6	1,5	5,3
	Hedging use (S9)	0,20	7	1,4	
	Stabilization reserves formation (S10)	0,30	9	2,7	
Risk retention	Supporting financial sector sustainability (S11)	0,35	9	3,15	7,6
	Development of population' financial literacy (S12)	0,25	7	1,75	

Based on analysis results, it was revealed that the most effective are strategies aimed at risks retention (Total = 7,6), in particular stabilization reserves formation and supporting financial sector sustainability, which provide high level of stability and readiness for crisis situations, that is crucially important for long-term financial security. Among strategies of risk reduction (Total = 7,3), the highest effectiveness was manifested by investments in cybersecurity, regular audits and rusks assessments, which testifies to the importance of continuous monitoring and improvement of protective measures aimed at supporting financial systems' security. At the same time, strategies of risk avoidance (Total = 4,6), such as digital assets regulation and digital technologies standardization, have average level of effectiveness, to some extent lower in comparison with strategies of risks reduction and retention. Moreover, risk transfer (Total = 5,3) through mechanisms of international insurance also demonstrated moderate effectiveness, which testifies to the importance of international cooperation for reducing financial burden on national budget. In overall, the most effective ones are strategies providing internal stability and readiness for potential crises, such as risks retention and those which relate to investment in cybersecurity, that are key for ensuring financial security within digital economy.

For carrying out complex analysis of the effectiveness of measures in frames of identified strategies for risks protection and risks management, the existing group of experts, consisted of 20 persons, assessed the most spread financial risks according to the degree of their importance in the conditions of digital economy. Calculated indicators show a high significance of risk at < 1, average significance of indicators from 0,5 to 1, and insignificant impact of risk in the global economic environment at > 0,5. The results of expert survey are given in table 3.

With development of digital technologies, cyberthreats are becoming more diverse and complex, which increases potential risks for financial systems, determining high indicator of cyber risk significance (R5 = 2,4). Effective cyber risks management is a necessary condition for cyberthreats protection and ensuring security of digital economy. High assessment of market risk (R3 = 2,25) is justified by the fact that fluctuations of market

conditions can significantly influence financial security. Market risks include change in assets value, impact of macroeconomic factors and fluctuations of financial instruments prices, which makes them critically important for management at the macrolevel. Significance of credit risk (R1 = 1,6) is determined by the possibility of counterparties' default that can lead to severe financial losses. At the same time, operational risk (R4 = 1,4), related to internal processes, human factors and technical problems, negatively influencing financial operations stability, as well as reputation risk (R8 = 1,4), related to negative impact on the reputation of country, business, or financial institution, leads to loss of clients, decreasing assets value, and reducing incomes. Other risks, although having less significance, should be taken into account in frames of complex strategy of financial security for ensuring economic system protection and providing financial security.

Table 3. Assessment of financial risks significance in the conditions of digital economy

Risks	Weighting factor	Average	Rating
Credit risk (R1)	0,20	8	1,6
Liquidity risk (R2)	0,15	6	0,9
Market risk (R3)	0,25	9	2,25
Operational risk (R4)	0,20	7	1,4
Cyber risk (R5)	0,30	8	2,4
Counterparty risk (R6)	0,15	6	0,9
Regulatory risk (R7)	0,10	5	0,5
Reputation risk (R8)	0,20	7	1,4
Inflation risk (R9)	0,10	6	0,6
Risk of change in taxation policy (R10)	0,05	5	0,25
Risk of change in economic environment (R11)	0,15	6	0,9

The next stage of analysis is investigation of identified strategies' effectiveness at preventing financial risks occurrence and overcoming their possible consequences. This investigation was carried out on the base of previously obtained expert assessments regarding effectiveness of risk management strategies and significance of identified financial risks. The analysis was carried out with the help of JASP software ("Classical Correlation" tool).

The results of the correlation analysis are presented in table 4.

Table 4. Correlation analysis of effectiveness of strategies for risk protection and risk management for ensuring financial security

		Pearson's Correlations											
Variable		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
R1	Pearson's r	-0,549	0,000	-0,546	0,218	-0,273	1,000	0,154	-0,087	-0,195	-0,535	-0,154	0,218
	p-value	0,012	1,000	0,013	0,355	0,245	< ,001	0,516	0,716	0,410	0,015	0,516	0,355
R2	Pearson's r	-0,154	0,515	-0,166	0,066	-0,132	-0,087	0,421	1,000	-0,089	0,162	0,281	0,430
	p-value	0,517	0,020	0,485	0,781	0,578	0,716	0,064	< ,001	0,710	0,494	0,230	0,058
R3	Pearson's r	-0,258	-0,295	0,000	1,000	0,000	0,218	0,354	0,066	0,075	0,204	0,354	-0,167
	p-value	0,272	0,207	1,000	< ,001	1,000	0,355	0,126	0,781	0,755	0,388	0,126	0,482
R4	Pearson's r	0,032	-0,501	0,042	0,000	1,000	-0,273	-0,412	-0,132	0,783	-0,102	0,354	0,083
	p-value	0,893	0,024	0,862	1,000	< ,001	0,245	0,071	0,578	< ,001	0,669	0,126	0,727
R5	Pearson's r	-0,549	0,000	-0,546	0,218	-0,273	1,000	0,154	-0,087	-0,195	-0,535	-0,154	0,218
	p-value	0,012	1,000	0,013	0,355	0,245	< ,001	0,516	0,716	0,410	0,015	0,516	0,355
R6	Pearson's r	1,000	0,411	0,742	-0,258	0,032	-0,549	-0,320	-0,154	0,231	-0,079	-0,502	-0,645
	p-value	< ,001	0,072	< ,001	0,272	0,893	0,012	0,170	0,517	0,327	0,740	0,024	0,002
R7	Pearson's r	0,411	1,000	0,177	-0,295	-0,501	0,000	0,333	0,515	-0,237	-0,289	-0,583	-0,088
	p-value	0,072	< ,001	0,456	0,207	0,024	1,000	0,151	0,020	0,314	0,217	0,007	0,711
R8	Pearson's r	0,742	0,177	1,000	0,000	0,042	-0,546	-0,530	-0,166	-0,075	0,102	-0,236	-0,833
	p-value	< ,001	0,456	< ,001	1,000	0,862	0,013	0,016	0,485	0,755	0,669	0,317	< ,001

R9	Pearson's r	1,000	0,411	0,742	-0,258	0,032	-0,549	-0,320	-0,154	0,231	-0,079	-0,502	-0,645
	p-value	< ,001	0,072	< ,001	0,272	0,893	0,012	0,170	0,517	0,327	0,740	0,024	0,002
R10	Pearson's r	0,411	1,000	0,177	-0,295	-0,501	0,000	0,333	0,515	-0,237	-0,289	-0,583	-0,088
	p-value	0,072	< ,001	0,456	0,207	0,024	1,000	0,151	0,020	0,314	0,217	0,007	0,711
R11	Pearson's r	-0,154	0,515	-0,166	0,066	-0,132	-0,087	0,421	1,000	-0,089	0,162	0,281	0,430
	p-value	0,517	0,020	0,485	0,781	0,578	0,716	0,064	< ,001	0,710	0,494	0,230	0,058

Correlation analysis results indicate different degrees of interconnection between financial risk protection and management strategies, in particular digital technologies standardization reduces both credit risk (r = -0,549 at p = 0,01) and cyber risk (r = -0,549 at p = 0,01), thus raising overall security and reliability of technologies, at the same time diminishing probability of technical failures and cyberthreats which may cause credit losses. At the same time, positive correlation between strategy aimed at standardization and reputation risk (r = -0,742 at p = 0,001) testifies to the fact that observance of standards often attracts more attention to the activities of organizations, which may lead to amplified criticism in case of any deviations or unforeseen circumstances.

Strengthening of digital assets regulation may increase counterparties risks (r = -0,742 at p = 0,001) and inflation risks (r = -0,742 at p = 0,001), which is determined by the fact that regulation creates additional barriers and costs for counterparties and also can influence overall economic stability and level of inflation through restriction of liquidity in the market. Moreover, negative correlation between effectiveness of regular audits conduction and inflation risk (r = -0,549 at p = 0,01) testifies to high probability of inflation reduction through economic environment stabilization and containment of inflationary processes due to timely identification and minimization of potential threats. In turn, hedging requires complex operations and processes, which may increase risks related to management and fulfilment of these operations (r = -0,783 at p = 0,001).

Support of financial sector sustainability helps to reduce risks related to changes in taxation policy (r = -0,583 at p = 0,007) and regulatory environment (r = -0,583 at p = 0,007), which is due to the fact that sustainable financial sector is better prepared for adaptation to new conditions and changes in legislation. Also, there is high degree of effectiveness of strategy aimed at population' financial literacy development, at reducing of counterparty risk (r = -0,645 at p = 0,002), reputation risk (r = -0,833 at p = 0,001), and inflation risk (-r = 0,645 at p = 0,002); thus, improvement of population' financial literacy ensures better understanding and management of finances among population, which facilitates reduction of counterparties insolvency risk, improves reputation of financial institutions and contributes to economy' stability, diminishing inflation risks. Hence, the results of correlation analysis demonstrate that different strategies have significant impact on different types of financial risks, which emphasizes the importance of complex approach to financial security management in the conditions of digital economy.

DISCUSSION

The intensification of digital technologies development and transformation of key economic processes create unique possibilities for increasing financial systems' effectiveness. At the same time, there are differences in the assessments of the effectiveness of different financial risk management strategies. In particular, the results of the correlation analysis demonstrate a significant impact of digital technology standardization on reducing credit and cyber risks, which is consistent with studies by Desyatnyuk et al., which prove that standardization contributes to the stability of the financial system.[16,18] However, according to Milojević and Redzepagic, it can increase reputational risks, which reflects a broader discussion in the literature on the potential bureaucratization of processes and the exacerbation of reputational threats.[28] In addition, based on the conducted study, it can be argued that we agree with the conclusions of Dana et al. that successful financial risk management requires the integration of modern technological solutions adapted to the specifics of the market.[26]

The impact of increased regulation of digital assets remains a controversial issue, as, on the one hand, it may increase the level of transparency of financial transactions, and on the other hand, it creates additional obstacles for financial intermediaries, which may negatively affect market liquidity.[23] This approach implies development and introduction of national standards for digital technologies, which ensure compatibility and security of financial operations, as well as personnel professional development for effective use of new cybersecurity technologies.[19, 20,21,22] It is also important to conduct regular audits and risks assessments in order to timely determine and minimize threats to financial security, as well as preserve positive image and diminish potential losses related to negative reputational events.[25,24] Thus, the results obtained confirm the importance of a comprehensive approach to financial risk management, which involves the integration of digital technologies, the development of regulatory standards and the improvement of financial literacy strategies. In this context, introduction of innovative approaches to risk management and constant improvement of data protection technologies represents key drivers of financial security provision in the conditions of digital

transformation. The obtained results emphasize the importance of integrative approach, uniting modern technologies and strategic planning, for achieving high level of financial stability.

CONCLUSION

The research findings confirm that different risk management strategies exert varying effects on financial security in the digital economy. In particular, introduction of standardization increases overall reliability and security of technological processes, diminishing probability of technical failures and cyberthreats which may cause financial losses. Regulation of digital assets increases counterparty risks and inflation risks, creating additional barriers and costs, which emphasizes the importance of balancing between regulatory measures and economic stability. Efficiency of conducting regular audits facilitates reducing inflation risks, which indicates the importance of timely detection and minimization of potential threats to economic environment stabilization. Support of financial sector sustainability contributes to reduction of risks related to changes in taxation policy and regulatory environment, which allows better preparing to adaptation to new conditions and legislative changes. Increasing population' financial literacy ensures better understanding and management of finances among population, which facilitates reducing the risk of counterparties' insolvency, improves reputation of financial institutions and contributes to economy' stability, diminishing inflation risks. Introduction of appropriate strategies and their regular updating allow for effective reduction of different kinds of financial risks and ensuring stability and security of financial system.

REFERENCES

1. Williams LD. Concepts of digital economy and Industry 4.0 in intelligent and information systems. International Journal of Intelligent Networks 2021; 2:122-129. Available in: https://doi.org/10.1016/j.ijin.2021.09.002

2. Byrne DM. The Digital Economy and Productivity. FEDS Working Paper 2022; 2022(38):1-51. Available in: http://dx.doi.org/10.17016/FEDS.2022.038

3. Pan W, Xie T, Wang Z, Ma L. Digital economy: An innovation driver for total factor productivity. Journal of business research 2022; 139:303-311. Available in: https://doi.org/10.1016/j.jbusres.2021.09.06

4. Nikonenko U, Shtets T, Kalinin A, Dorosh I, Sokolik L. Assessing the policy of attracting investments in the main sectors of the economy in the context of introducing aspects of Industry 4.0. International Journal of Sustainable Development and Planning 2022; 17(2):497-505. Available in: https://doi.org/10.18280/ijsdp.170214

5. Koch T, Windsperger J. Seeing through the network: Competitive advantage in the digital economy. Journal of Organization Design 2017; 6:1-30. Available in: https://doi.org/10.1186/s41469-017-0016-z

6. Asanova A, Olshanska O, Saiensus M, Usatenko O, Makurin A, Sukhostavets A. Digital platform for managing enterprises' business processes in an innovative economy. Journal of Theoretical and Applied Information Technology 2022; 100(12):4590-4601. Available in: https://www.jatit.org/volumes/Vol100No12/26Vol100No12.pdf

7. Akhtar P, Ghouri AM, Ashraf A, Lim JJ, Khan NR, Ma S. Smart product platforming powered by AI and Generative AI: Personalization for the circular economy. International Journal of Production Economics 2024; 273:109283. Available in: https://doi.org/10.1016/j.ijpe.2024.109283

8. Sturgeon TJ. Upgrading strategies for the digital economy. Global strategy journal 2021; 11(1):34-57. Available in: https://doi.org/10.1002/gsj.1364

9. Shevchenko I, Lysak O, Zalievska-Shyshak A, Mazur I, Korotun M, Nestor V. Digital Economy in a Global Context: World Experience. International Journal of Professional Business Review 2023; 8(4):1-16. Available in: https://doi.org/10.26668/businessreview/2023.v8i4.1551

10. Kong L, Li J. Digital economy development and green economic efficiency: Evidence from province-level empirical data in China. Sustainability 2022; 15(1):3. Available in: https://doi.org/10.3390/su15010003

11. Liao W. How does the digital economy affect the development of the green economy? Evidence from Chinese cities. PloS One 2023; 18(8):e0289826. Available in: https://doi.org/10.1371/journal.pone.0289826

12. Zhang M, Yin S. Can China's digital economy and green economy achieve coordinated development? Sustainability 2023; 15(7):5666. Available in: https://doi.org/10.3390/su15075666

13. Katamadze D. Challenges of business management transformation in the Digital Economy. Innovative Economics and Management 2024; 11(2):143-158. Available in: https://doi.org/10.46361/2449-2604.11.2.2024.143-158

14. Khaminich S, Kuznietsov E, Ptashchenko, O., Halaz L, Milcheva V, Boiko O. Managing the product's creation of an innovation-oriented engineering business. International Journal of Advanced Research in Engineering and Technology (IJARET) 2020; 11(4):278-289. Available in: https://ssrn.com/abstract=3599717

15. Kinelski G. The main factors of successful project management in the aspect of energy enterprises' efficiency in the digital economy environment. Polityka Energetyczna-Energy Policy Journal 2020; 23(3):5-20. Available in: https://doi.org/10.33223/epj/126435

16. Desyatnyuk O, Krysovatyy A, Ptashchenko O, Kyrylenko O. Financial security in the conditions of globalization: Strategies and mechanisms for the protection of national interests. Economic Affairs 2024; 69(Special Issue):261-268. Available in: https://doi.org/10.46852/0424-2513.1.2024.27

17. Onyshchenko V, Yehorycheva S, Maslii O, Yurkiv N. Impact of innovation and digital technologies on the financial security of the state. In International Conference Building Innovations. Springer International Publishing 2022; 181: 749-759. Available in: https://doi.org/10.1007/978-3-030-85043-2_69

18. Desyatnyuk O., Naumenko M., Lytovchenko I., Beketov O. Impact of digitalization on international financial security in conditions of sustainable development. Problems of Sustainable Development 2024; 1/2024:104-114. Available in: https://ph.pollub.pl/index.php/preko/article/view/5325/4341

19. Kaur G, Lashkari ZH, Lashkari AH. Understanding cybersecurity management in FinTech. Springer International Publishing 2021; 1-182. Available in: https://link.springer.com/book/10.1007/978-3-030-79915-1

20. Kryshtanovych M, Shulyar R, Svitlyk M, Zorya O, Fatiukha N. Theoretical and methodological approaches to the formation of a model for increasing the efficiency of the system for ensuring the economic security of a banking institution. Financial and Credit Activity: Problems of Theory and Practice 2023; 2(49):56-64. Available in: https://doi.org/10.55643/fcaptp.2.49.2023.3994

21. Mostafa AM, Ezz M, Elbashir MK, Alruily M, Hamouda E, Alsarhani M, Said W. Strengthening cloud security: an innovative multi-factor multi-layer authentication framework for cloud user authentication. Applied Sciences 2023; 13(19):10871. Available in: https://doi.org/10.3390/app131910871

22. Borky JM, Bradley TH. Protecting information with cybersecurity. Effective Model-Based Systems Engineering 2019; 345-404. Available in: https://doi.org/10.1007/978-3-319-95669-5_10

23. Olaiya OP, Adesoga TO, Ojo A, Olagunju OD, Ajayi OO, Adebayo YO. Cybersecurity strategies in fintech: safeguarding financial data and assets. GSC Advanced Research and Reviews 2024; 20(1):050-056. Available in: https://doi.org/10.30574/gscarr.2024.20.1.0241

24. Roszkowska P. Fintech in financial reporting and audit for fraud prevention and safeguarding equity investments. Journal of Accounting Organizational Change 2021; 17(2):164-196. Available in: https://doi.org/10.1108/JAOC-09-2019-0098

25. Ameyaw MN, Idemudia C, Iyelolu TV. Financial compliance as a pillar of corporate integrity: A thorough analysis of fraud prevention. Finance Accounting Research Journal 2024; 6(7):1157-1177. Available in: https://doi.org/10.51594/farj.v6i7.1271

26. Dana LP, Salamzadeh A, Mortazavi S, Hadizadeh M. Investigating the impact of international markets and new digital technologies on business innovation in emerging markets. Sustainability 2022; 14(2):983. Available in: https://doi.org/10.3390/su14020983

27. Metawa N, Hassan MK, Metawa S. Artificial intelligence and Big Data for financial risk management: Intelligent

applications. (pp. 1-49). London: Routledge 2022 . Available in: https://doi.org/10.4324/9781003144410

28. Milojević N, Redzepagic S. Prospects of artificial intelligence and machine learning application in banking risk management. Journal of Central Banking Theory and Practice 2021; 10(3):41-57. Available in: https://doi.org/10.2478/jcbtp-2021-0023

29. Toporkova OV, Akimova NS, Naumova TA. Strategic aspects of risk management to ensure the economic security of the enterprise. Business Inform 2019; 8:237-243. Available in: https://doi.org/10.32983/2222-4459-2019-8-237-243

30. Oloyede AA, Faruk N, Noma N, Tebepah E, Nwaulune AK. Measuring the impact of the digital economy in developing countries: A systematic review and meta-analysis. Heliyon 2023; 9(7):e17654. Available in: https://doi.org/10.1016/j.heliyon.2023.e17654

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