

# Scientific Bulletin of Mukachevo State University

Series

## Economics

Volume 13, No. 1, 45-54

Journal homepage: <https://economics-msu.com.ua/en>

UDC 336.7:004:005.334

DOI: 10.52566/msu-econ1.2026.45

ISSN 2313-8114

E-ISSN 2518-1254

### Business digital transformation: Innovation, financial security, and inclusive growth – evidence from Ukraine

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**Abstract.** The accelerated diffusion of digital technologies during the 2015-2025 period substantially transformed global economic systems, intensifying the integration of automation, data analytics, and digital financial services into business processes while simultaneously increasing exposure to cybersecurity risks, regulatory fragmentation, and social inequality. In economies undergoing structural transformation, ensuring that digital innovation supports both financial security and inclusive growth emerged as a pressing scientific and policy challenge. The purpose of this study was to identify and substantiate effective pathways of business digital transformation that simultaneously strengthened financial security and promoted inclusive access to digital financial services. To achieve this objective, the research applied a

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Received: 10.11.2025, Revised: 27.03.2026, Accepted: 01.04.2026, Published: 06.04.2026

**Suggested Citation:** Desyatnyuk, O., Krysovaty, A., Ptashchenko, O., & Kyrylenko, O. (2026). Business digital transformation: Innovation, financial security, and inclusive growth – evidence from Ukraine. *Scientific Bulletin of Mukachevo State University. Series "Economics"*, 13(1), 45-54. doi: 10.52566/msu-econ1.2026.45.



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mixed methodological framework combining systemic and institutional analysis, comparative analysis, statistical and correlation modelling, and analytical synthesis of international and national datasets derived from the World Bank, the National Bank of Ukraine, and OECD analytical frameworks. The results demonstrated that the expansion of digital financial technologies was strongly associated with higher levels of institutional stability and economic resilience. Empirical evidence from Ukraine for the 2022-2024 period showed that the number of active payment cards increased by more than 10%, while the share of cashless transactions exceeded 90%, indicating a rapid diffusion of digital payment instruments. The widespread adoption of Near Field Communication technologies, tokenised payment cards, and cloud-based financial services contributed to faster transaction processing, enhanced transparency, and improved protection of financial data. At the same time, the analysis identified persistent risks and barriers related to cybersecurity vulnerabilities, regulatory misalignment, and uneven digital inclusion across population groups, particularly in rural areas and among individuals with limited digital literacy. These findings confirmed that digitalisation generated both efficiency gains and new configurations of financial and institutional risks. The practical significance of the results lies in their applicability for policymakers, financial regulators, and business managers in designing coordinated digitalisation strategies that integrate technological innovation with cybersecurity standards, regulatory coherence, and inclusive financial development

**Keywords:** digital economy; financial technologies; cybersecurity; institutional resilience; cashless payment

## Introduction

In the modern dynamic digital economy, the daily processes of enterprises have inconspicuously transformed into one of the key drivers of growth, competitiveness, and inclusiveness. With the gradual transition of finance and data into the online environment, access to services is expanding, business practices are changing, and, at the same time, new challenges arise, in particular, securing cybersecurity, financial stability, and finding a fragile balance between innovation and regulation. The true feature of this era lies in the attempt to combine technological progress with financial systems that strive for efficiency without losing fairness. As M.A. Adegbite (2025) noted, the expansion of digital financial platforms brings both opportunities and risks: gaps in data protection and cyber vulnerability have become almost inevitable, reminding governments of the need for rapid adaptation of institutional protection mechanisms to preserve trust and information integrity.

Digitalisation operates in two directions. It creates new opportunities, speeds up decision-making, and reduces barriers, but at the same time, it prompts the creation of new system threats. This imbalance is particularly visible in countries where digital infrastructure is still forming and technological innovations exceed regulatory frameworks. Artificial intelligence, blockchain, and open banking environments have made financial processes faster and more interconnected. At the same time, they have raised concerns about fraud and cybercrime. Thus, financial inclusion is not only about expanding access but also about ensuring that the system can remain resilient under crisis conditions.

Over the period of 2014-2024, research on digital transformation and inclusion has become truly interdisciplinary, combining economic, technological, and socio-political approaches. A broad perspective shows how FinTech transforms financial intermediation, creating tools that make the financial sphere more efficient and accessible. The scientific findings demonstrate that digital platforms can integrate previously excluded groups into the formal economy while forcing institutions to rethink risk management

and user protection approaches. For example, V. Kamboj & D. Sharma (2025) viewed inclusion as a multi-level process shaped by technology, governance, and people's readiness to adapt. From this point of view, inclusive growth and digital progress are not conflicting – they are two sides of the same coin that supports long-term stability.

New approaches to measuring inclusion reflect a shift in thinking. B. Marza *et al.* (2021) applied Analytic Hierarchy Process (AHP) and Fuzzy Analytic Hierarchy Process (fuzzy-AHP) methods to assess digital and financial inclusion, combining expert opinions with empirical data, which allows aligning perceptions with real indicators in changing conditions. S. Li & N. Xie (2025) added that digital finance drives business renewal: expanded access to technologies helps attract investments, modernise operations, and maintain resilience in uncertain environments. Their findings confirmed a pattern: the more closely finance and technology interact, the higher productivity and competitiveness become.

Despite this, some questions remain unanswered. One of them is why financial security is seldom considered in discussions about inclusion. Researchers have analysed access and user experience in detail but have not sufficiently explored how inclusion interacts with systemic stability. Another gap is the uneven nature of innovation: although FinTech has transformed banking services, its adoption in small and medium enterprises remains limited due to financial and organisational barriers. A third, more hidden aspect is the link between digital transformation and financial performance: the question is not only whether one factor affects the other but how their coherence shapes resilience. K. Valaskova *et al.* (2025) rightly pointed out that digital transformation reaches its full potential only when strategy, finance, and technology develop in synchrony – a balance that current studies and policies still lack.

Taking these gaps into account, the study aimed to analyse how enterprises adapt to the digital economy. The main focus was on the intersection of gender equality and

security, which is the point where the design process determines whether the advantages of innovation are widespread or only a few. The analysis covered conceptual and institutional frameworks of digital transformation, examines inclusion mechanisms through the lens of data protection and risk management, and poses a practical question: which technologies and management approaches improve efficiency while ensuring openness and fairness of the system? Ultimately, this analytical perspective sought to transform these insights into practical recommendations for creating a financially secure digital environment within enterprises. In this vision, digitalisation appears not as a faceless process of automation but as a human-driven evolution capable of forming systems that combine innovation with responsibility, resilience, and fairness.

Within this framework, the research focused on determining scientifically grounded and practically achievable paths for re-evaluating the evolution of business processes within the digital economy through a dual dimension – financial security and inclusion. The study aimed to investigate how the integration of technologies such as artificial intelligence, blockchain, cloud computing, big-data analytics, and FinTech solutions transforms the structure of corporate governance and financial relations, ensuring a balance between efficiency, transparency, and accessibility of financial services. The central scientific question focused on how the interaction between contemporary technologies and regulatory practices creates a new paradigm of financial security that simultaneously contributes to economic resilience and social inclusion. This focus was operationalised through several analytical objectives:

1. Identifying structural correlations between the level of financial systems' digitalisation and institutional stability.
2. Assessing risks and barriers associated with the implementation of innovations in the financial sector (including cybersecurity threats, regulatory gaps, and inconsistencies between technological development and legal norms).
3. Analysing the dynamics of digital inclusion, measured by indicators of access to banking services, share of cashless operations, volume of mobile payments, and level of population's digital literacy.

## Literature Review

Contemporary studies convincingly demonstrate that digitalisation, financial inclusion, and security are now much more closely interwoven than previously assumed. D. Basnayake *et al.* (2024) noted that digital financial services provide a new impulse for local economic development and, in many cases, help whole communities overcome poverty. Similar conclusions are reached by A. Demir *et al.* (2022) since they made a critical qualification: the benefits of FinTech depend primarily on the flexibility and efficiency of state institutions. From the point of view of sustainable development, O. Desyatnyuk *et al.* (2024a; 2024b) stressed that global digitalisation adds an extra layer of financial risk – one that requires strengthened control and more effective governance. At the corporate

level, J. Dong (2023) examined these risks further, showing that companies must learn to manage uncertainty in near real-time if they wish to remain competitive. C.A. Durigan Junior *et al.* (2024) saw open banking as a true catalyst for innovation and efficiency, while L. Kvasnii *et al.* (2023) and Q. Guo *et al.* (2024) warned that without inclusive regulation, tools designed to promote equality may, on the contrary, exacerbate inequality.

The issues of security and transparency are central to the studies of A. Krysovaty *et al.* (2024a; 2024b), as well as Yu. Skulysh & V. Fathutdinov (2022), who directly linked technological progress with the financial stability of the state. In a similar vein, T. Kukman & S. Gričar (2025) emphasised that traceability and trust embedded in blockchain significantly reduce the possibility of fraud. A. Kumar (2024) and L. Lee (2024) shifted the discussion to the sphere of artificial intelligence, demonstrating how AI and machine-learning systems gradually transform the logic of banking operations, decision-making, and risk assessment. At the same time, both researchers admitted that these technological leaps make regulatory and supervisory functions more complex.

At the household level, H. Skyba *et al.* (2023) and J. Liu *et al.* (2024) proved that digital inclusion can mitigate financial vulnerability, though the urban-rural divide remains apparent. N. Nagaaba *et al.* (2025) stressed that financial literacy and social trust are no less important than access itself, while P.K. Ozili (2021) considered inclusion within the context of the UN Sustainable Development Goals. This trend is extended by mobile technologies: A.A. Shaikh *et al.* (2023) identified mobile money as one of the key drivers of financial inclusion, while T. Xu *et al.* (2024) demonstrated that digital finance enhances the ability of enterprises to withstand and adapt to economic shocks.

The synthesis of these studies allows three key conclusions to be drawn. Firstly, digitalisation has become a powerful driver of inclusive growth. Secondly, it generates new, increasingly pressing challenges in the sphere of cybersecurity. Thirdly, digital technologies gradually transform the business environment through the interaction of AI, blockchain, and FinTech. Collectively, this corpus of evidence forms a cohesive understanding of how digital innovations can simultaneously strengthen financial stability and expand access for all participants in the contemporary interconnected economy.

## Materials and Methods

The research was conducted in 2024-2025 within the framework of a broader interdisciplinary initiative dedicated to digital transformation, financial inclusion, and business-system security. The empirical base consisted of peer-reviewed scientific publications, international conference proceedings, analytical reports of financial institutions, and verified statistical databases. Key sources included the Global Findex Database of the World Bank (2023), reports of the UAFIC (2023) and the National Bank of Ukraine (2024). This complex of sources ensured

methodological consistency and increased the reliability of the results obtained.

The theoretical foundation of the research is based on the principles of institutional, systemic, and innovation economics, examined through comparative and mixed-approach paradigms (Fetters *et al.*, 2013; Zayed *et al.*, 2022). For gaining a comprehensive understanding of how digital transformation reshapes contemporary business practices, ten interconnected methods were adopted. The structural-logical method was applied to construct an integrated analytical model that explicates the interaction between technological, institutional, and socio-economic components of digital transformation, where digital technologies act as enabling drivers, regulatory mechanisms perform stabilising functions, and inclusion indicators reflect socio-economic outcomes. Comparative and analytical approaches enabled the comparison of financial inclusion levels between developed and developing countries, identifying their strengths and structural gaps in digital infrastructure. Within this framework, risks and barriers related to digital innovation were assessed using an indicator-based analytical approach, including cybersecurity vulnerability indicators, regulatory-alignment criteria, and institutional-capacity metrics, while the method of analytical synthesis helped to combine theoretical frameworks with empirical data, refining the correlations between inclusion and financial security in the transformation process.

The systemic approach, aligned with macro-institutional models developed by the OECD (2023), enabled the consideration of the digital economy as a dynamic network of technological, financial, and institutional components. Institutional stability within this framework was operationalised using indicators of regulatory effectiveness, financial-system resilience, and cybersecurity preparedness, including the stability of payment infrastructure, regulatory alignment with international standards, and the incidence of operational and cyber risks. Statistical analysis, conducted using standard analytical tools (IBM Corporation, n.d.), was applied to interpret trends in the development of cashless payments, FinTech adoption, and cybersecurity readiness based on data from the National Bank of Ukraine (2024), World Bank (2023), and UAFIC (2023). Correlation analysis was performed to quantify the relationships between digitalisation intensity (measured by the share of cashless transactions and digital payment penetration) and institutional stability indicators, directly addressing the first research objective. The historical-evolutionary method made it possible to trace the dynamics of financial digitalisation over the 2014-2024 period, while economic modelling and graph-analytical tools were used to visualise correlations between the intensity of digital transformation and digital inclusion indicators, including access to formal banking services, the share of cashless operations, the volume of mobile payments, and selected proxies of digital literacy.

Special attention was paid to two approaches. Firstly, the structural-functional method revealed internal interdependencies between business digitalisation, financial

inclusion, and security. Secondly, comparative institutional analysis, aligned with international methodological standards (OECD, 2023), provided the possibility to compare inclusion mechanisms and cybersecurity standards of different countries, defining Ukraine's position within the global context of digitalisation. Collectively, these methods formed a coherent analytical framework that allowed a comprehensive exploration of how innovative digital technologies transform business processes and contribute to achieving the dual goal of financial inclusion and security in a technologically oriented and sustainably developed economy.

## Results

The conducted analysis showed that the transformation of business processes in the digital economy is a complex and multidimensional process. It does not unfold along a predictable linear trajectory but through the interaction of technological innovations, institutional changes, and human behaviour. Statistical data convincingly confirm that the level of financial inclusion and financial security depends directly on the speed and efficiency of integrating digital technologies into the economy.

According to the Global Findex Database of the World Bank (2023), about 76% of the adult population globally have access to at least one formal financial service, while ten years ago this figure was only 51%. This dynamic reflects the widespread adoption of digital accounts, mobile banking, and online payment platforms that have made financial services more accessible, convenient, and secure. Over time, these tools have become an integral part of business practices, transforming into true drivers of sustainable economic growth.

The development of Ukraine in this context demonstrates similar trends. According to the National Bank of Ukraine (2024), the share of cashless operations in 2023 exceeded 92%, and the number of active payment cards reached 115.1 million – about 5% more than the previous year. These figures indicate the high resilience and adaptability of Ukraine's financial system even under wartime conditions. The rapid expansion of digital infrastructure has not only ensured business continuity but also strengthened transparency and security of financial flows across the entire economy.

Correlation analysis performed using the IBM SPSS Statistics software (IBM Corporation, n.d.) confirmed a strong positive correlation ( $r = 0.82$ ) between the growth of digital transactions and key macroeconomic stability indicators. This means that the expansion of cashless payments contributes to increased transparency of economic processes and strengthens systemic resilience. In practice, secure digital technologies increasingly function as stabilisers of economic activity and as instruments for maintaining social trust in the national financial system. These results empirically confirm the existence of a structural relationship between the level of financial-system digitalisation and institutional stability, directly addressing the first research objective.

A comparative analysis was conducted between Ukraine and developed economies to identify structural differences in access to digital finance. As shown in Table 1, the study covers indicators of digital account ownership, mobile payment activity, and access to online credit platforms. The results revealed a clear, though gradually

narrowing, inclusion gap between Ukraine and the average level of OECD countries. This convergence trend indicates that financial accessibility in Ukraine is gradually approaching that of developed states – driven by continuous technological progress and the consistent strengthening of institutional capacity.

**Table 1.** Comparative indicators of digital financial inclusion (2023)

| Indicator  | Ukraine | OECD Average | Gap, p.p. |
|--|---------|--------------|-----------|
| Adults with digital payment accounts (%)         | 75      | 94           | -19       |
| Population using mobile payments weekly (%)      | 41      | 69           | -28       |
| SMEs with access to digital credit platforms (%) | 38      | 72           | -34       |
| Women with access to digital banking (%)         | 67      | 89           | -22       |

**Note:** “Gap, p.p.” denotes the absolute difference between the indicator values for Ukraine and the OECD average, expressed in percentage points. Negative values indicate a lower level of digital financial inclusion in Ukraine compared to OECD countries

**Source:** compiled by the authors based on World Bank (2023), OECD (2023)

The comparative analysis confirmed that inequality in access to digital financial services has not disappeared yet, although the gap is gradually narrowing due to the spread of mobile technologies and digital identification systems. According to the OECD (2023), countries that have implemented unified digital ID-platforms alongside open-banking standards usually achieve higher levels of financial inclusion while experiencing lower operational risks. This pattern underlines the institutional dimension of digitalisation: long-term stability depends not only on technological capacities but also on the quality of regulation, standardisation, and policy coherence that support them.

At the micro level, the impact of digital transformation is clearly visible in everyday business practices. Both enterprises and consumers are increasingly using digital tools that make payments faster, securer, and easier to track. According to the National Bank of Ukraine (2024), the number of contactless payment cards increased by 17.1% in 2023, while the number of tokenised cards reached 12.4 million. By the end of the year, around one in four active cards was tokenised, and nine out of ten retail transactions were completed using Near Field Communication (NFC) technology. This steady shift from cash to secure contactless payments has strengthened public trust and significantly improved data-protection mechanisms in the financial sector.

At the same time, the results allow identifying the key risks and barriers associated with digital innovations in the financial sector. Despite the positive dynamics of cashless and contactless payments, three groups of

constraints were revealed. First, cybersecurity and operational risks increase alongside the growing scale of tokenised and NFC-based transactions, expanding the digital attack surface and raising dependence on secure authentication and monitoring systems. Second, regulatory and institutional barriers persist, as the pace of technological adoption exceeds the harmonisation of consumer-protection rules, cybersecurity standards, and interoperability requirements. Third, inclusion-related barriers remain evident in segments with lower digital literacy and limited access to trusted digital financial services, particularly in rural areas. These results indicate that digital innovation, while enhancing efficiency and inclusion, simultaneously generates new risk configurations that require coordinated institutional and regulatory responses.

Statistical modelling performed in IBM SPSS Statistics (IBM Corporation, n.d.) revealed a clear quantitative relationship: every additional percentage point in the share of cashless operations corresponds on average to a 0.2% increase in GDP and a 0.3% reduction in operational losses. These findings confirm that digitalisation has a multiplicative effect – it simultaneously stimulates economic growth, improves efficiency, and strengthens security. For visualising these trends, Table 2 presents the key indicators of payment card circulation and the level of contactless technology adoption in Ukraine. All key parameters – card emission, tokenisation, and NFC usage – demonstrate a steady positive dynamic, indicating Ukraine’s growing digital maturity and the enhanced resilience of its financial system.

**Table 2.** Dynamics of cashless and contactless payments in Ukraine, 2022-2024

| Year | Total cards (mln) | Share of cashless transactions (%) | Tokenised cards (mln) | NFC share in retail (%) |
|------|-------------------|------------------------------------|-----------------------|-------------------------|
| 2022 | 109.6             | 87                                 | 7.9                   | 82                      |
| 2023 | 115.1             | 91                                 | 12.4                  | 90                      |
| 2024 | 121.3             | 94                                 | 16.8                  | 93                      |

**Source:** compiled by the authors based on National Bank of Ukraine (2024)

The observed trends indicate that Ukraine is gradually approaching the level of digital maturity characteristic of

OECD countries. At the same time, a clear infrastructural gap remains between urban centres and rural communities.

According to the World Bank (2023), only about 54% of rural residents regularly use mobile banking applications, while among urban population this figure reaches nearly 80%. Bridging this gap requires not only further technological development, but also long-term financial literacy programmes and the creation of decentralised digital platforms capable of providing affordable and convenient financial services across all regions of the country.

The current institutional transformation of Ukraine's financial ecosystem is closely linked to the dynamic growth of the national FinTech sector, which complements traditional banking by providing flexibility and innovation. These firms belong predominantly to the financial technology (FinTech) sector, encompassing payment services, digital lending, regulatory technologies, insurtech, and blockchain-based financial solutions, and operate at

the intersection of finance, information technology, and data-driven services. According to the UAFIC (2023), 204 companies are actively operating in Ukraine. About 45% of them specialise in payment processing and API solutions, 20% in peer-to-peer lending, and around 14% develop regulatory technologies (RegTech).

The analysis of this sector's structure showed growing technological diversity in Ukraine's financial services and strengthening of their role in digital transformation processes. As presented in Table 3, most FinTech companies are focused on payments and money transfers, while lending, RegTech, and blockchain solutions remain smaller but rapidly growing segments. Collectively, these shifts mark a decisive step toward building an adaptive, innovative, and inclusive financial environment where technological progress combines with accessibility, trust, and long-term resilience.

**Table 3.** Structure of FinTech activity in Ukraine (2023)

| FinTech category                | Share of firms (%) | Key applications                       |
|---------------------------------|--------------------|--|
| Payment and Money Transfers     | 45                 | API integration, contactless payments  |
| Lending and Crowdfunding        | 20                 | P2P lending, credit scoring            |
| RegTech and Compliance          | 14                 | AI risk monitoring, AML/KYC automation |
| InsurTech and WealthTech        | 11                 | Digital insurance, portfolio tools     |
| Blockchain and Crypto Solutions | 10                 | Smart contracts, asset tokenisation    |

**Source:** compiled by the authors based on UAFIC (2023)

Statistical results showed that companies operating under the "digital-first" principle exhibit greater flexibility and a higher capacity to adapt to market changes, while simultaneously reducing transaction costs compared to traditional financial institutions. When FinTech-platforms are integrated into state financial systems within a consistent regulatory framework recommended by OECD (2023), national financial stability is significantly strengthened. This interaction not only expands access to credit and minimises information asymmetry, but also creates a foundation for transparent, accountable, and trust-based financial cooperation.

In the methodological dimension, the study is based on a hybrid analytical approach combining quantitative analysis with institutional interpretation according to the mixed-methods framework proposed by M.D. Fetters *et al.* (2013). This approach provided not only empirical depth but also conceptual consistency of the results. The generalisation of the findings revealed that financial digitalisation reduces average operational costs for small and medium-enterprises while enhancing information security through multi-layer encryption and biometric identification. Moreover, digital tools enhance institutional transparency, contributing to improved fiscal discipline and reduction of corruption risks. Collectively, these trends indicate that digital transformation not only optimises economic processes but also improves managerial efficiency and the overall quality of corporate and government governance.

Additional analysis conducted under the OECD (2023) framework showed that countries where technological innovations are combined with efficient institutional regulatory

mechanisms usually recover from crises faster and gain higher levels of investor confidence. From this perspective, Ukraine's financial digitalisation appears not merely as a technical upgrade but as a stabilising factor strengthening the nation's financial security amid deep structural transformations. The aggregate results, drawn from international and national statistical sources (World Bank, 2023; UAFIC, 2023; National Bank of Ukraine, 2024) and processed using modern analytical tools (IBM Corporation, n.d.), convincingly demonstrate that digital transformation has gradually become the strategic core of economic resilience. The synergy of technological development, institutional reforms, and financial inclusion now forms the foundation for sustainable growth. In this context, financial digitalisation represents not only a technical innovation but a key element of systemic security and inclusive development in the modern digital economy.

## Discussion

The obtained results convincingly confirmed that digital transformation has become a defining factor in the development of both financial inclusion and financial security within modern business ecosystems. The analysis showed that the coordinated interaction of financial technologies, regulatory reforms, and institutional mechanisms significantly enhances the resilience of financial systems. The expansion of digital infrastructure and the widespread diffusion of FinTech tools have made financial services more accessible to households and enterprises while reducing systemic risks and creating a more inclusive model of economic growth. This confirms the study's central thesis:

digitalisation and inclusion function as mutually reinforcing components of financial stability.

The observed correlation between the pace of digitalisation and inclusion indicators aligns with global trends. As noted by F. Yang & T.A. Masron (2023), in China's banking sector, digital transformation stabilises the link between inclusion and institutional efficiency even under technological turbulence. A similar dynamic is experienced in Ukraine, where the expansion of mobile and cashless payments has increased transparency and operational efficiency. The findings of W. Zhu (2023) also indicated that digital inclusion promotes a fairer income distribution by integrating previously excluded groups into the formal financial system. Collectively, these evidences prove that technological diffusion stimulates growth while simultaneously reducing inequality by broadening financial participation.

Despite this, Ukraine's trajectory remains shaped by structural constraints that distinguish it from OECD countries. Although the proportion of adults with digital financial accounts is steadily increasing, institutional and infrastructural barriers persist. This corresponds to the observations of P.K. Ozili (2021), who noted that progress in global financial inclusion remains uneven and largely depends on the quality of regulation, infrastructural readiness, and digital literacy. For Ukraine, the priority is to strengthen institutional trust, enhance cybersecurity, and improve consumer-protection mechanisms – components that form the foundation of a sustainable and inclusive financial system.

Another critical area is the role of FinTech in expanding business resilience. As explained by T. Xu *et al.* (2024), contemporary digital financial solutions increase enterprises' ability to withstand macroeconomic shocks, and this trend is confirmed by Ukrainian data. The study's results showed that institutions that have integrated digital platforms managed to maintain operations and retain clients during periods of instability. This finding aligns with P. Zhang & Y. Wang (2024), who emphasised that corporate digitalisation is not simply a technical upgrade but a comprehensive reengineering of financial management, risk assessment, and data operations. The structural-functional analysis conducted confirmed this standpoint, showing that effective digitalisation requires synchronising technological innovations with institutional changes, particularly in risk control and compliance.

In comparative terms, Ukraine's progress in digital financial inclusion can be described as transitional. The country is moving consistently toward OECD standards in technological implementation; however, it still lags in regulatory capacity and cybersecurity guarantees. This imbalance highlights the need for a balanced approach: technological modernisation must proceed in parallel with institutional reforms to maintain systemic stability. In this context, the study's conclusions P.K. Ozili (2021), who stressed that successful inclusion depends not only on technology but also on the quality of governance and intersector cooperation.

Combining empirical results with theoretical insights allows the identification of practical recommendations for policymakers and business leaders. FinTech innovations implemented within a sound regulatory environment improve transparency, enhance supervision in financial intermediation, and expand participation in economic life. Further improvement of digital literacy, strengthening of data-protection standards, and harmonisation of national legislation with international norms are essential for sustaining inclusion in the long term. As F. Yang & T.A. Masron (2023) noted, technological progress in the financial sphere should be seen not only as a means of cost optimisation but as a strategic path to social integration and restoring public trust in financial systems.

At the same time, certain limitations of the research must be acknowledged. The analysis relied mainly on secondary data and macro-level indicators which, although being reliable, do not fully capture behavioural aspects and internal corporate decision-making. In addition, differences in statistical approaches and terminology among international databases partly complicate the comparison of results. Future studies could overcome these limitations by applying panel or micro-level data to more accurately identify causal links between digitalisation, inclusion and financial security.

Overall, the discussion confirms that digital transformation performs a dual function – a catalyst and a protective mechanism of financial inclusion, strengthening systemic resilience while promoting social fairness. The results confirm the study's hypothesis and are consistent with the findings of W. Zhu (2023), T. Xu *et al.* (2024) and P. Zhang & Y. Wang (2024), while reflecting the specific challenges of Ukraine identified by P.K. Ozili (2021) and F. Yang & T.A. Masron (2023). In conclusion, it can be stated that the success of digitalisation policies depends on three interconnected factors: consistency of institutional design, inclusivity of financial innovations, and the capacity of governance systems to adapt to accelerated technological change.

## Conclusions

The conducted research showed that digital transformation fundamentally reshapes the logic of modern business, establishing a strong interconnection between financial inclusion and financial security. The obtained results confirmed that technological innovations supported by institutional adaptation determine the long-term stability and sustainability of financial ecosystems. When managed effectively, digitalisation becomes not only a driver of economic growth but also a social mechanism that ensures fairness and balanced development across different sectors of the economy.

A clear conceptual and empirical link was identified between the development of digital financial infrastructure and the strengthening of institutional security. The spread of FinTech solutions, mobile and cashless payment systems, as well as regulatory technologies, contributes to the stability of the financial environment and reduces systemic risks.

However, technological progress alone does not guarantee inclusivity or resilience. Long-term success depends on institutional capacity, the quality of the regulatory environment, and the level of societal trust. In practical terms, this means that government policies should focus on improving financial literacy, enhancing cybersecurity standards, building open-data environments, and strengthening cooperation among regulators, financial institutions and technology companies. For businesses, digital transformation should run parallel to risk-management and transparent compliance mechanisms to ensure that innovations remain safe and accountable.

The scientific novelty of the present research lies in the integration of systemic, comparative and institutional approaches to explain the impact of digitalisation on inclusion at different economic levels. Although the analysis was mainly based on secondary data and did not cover micro-level behavioural aspects, the results provide a reliable foundation for future studies. A promising area of future research is the examination of social and ethical

dimensions of financial digitalisation – in particular, the responsible use of artificial intelligence, data ethical standards development, and the creation of comprehensive indicators that simultaneously reflect both inclusion and security levels. Ultimately, the sustainability of digital transformation depends not so much on the speed of technological implementation as on the quality of governance and the inclusivity of institutions. When these factors are in balance, innovation transforms from a technical achievement into a strategic path toward a fair, secure, and sustainable economic future.

## Acknowledgements

None.

## Funding

None.

## Conflict of Interest

None.

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## Цифрова трансформація бізнесу: інновації, фінансова безпека та інклюзивне зростання – досвід України

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**Анотація.** Прискорене поширення цифрових технологій упродовж 2015-2025 років суттєво трансформувало глобальні економічні системи, посиливши інтеграцію автоматизації, аналітики даних і цифрових фінансових сервісів у бізнес-процеси та водночас підвищивши рівень уразливості до кіберзагроз, регуляторної фрагментації й соціальної нерівності. В економіках, що перебувають у процесі структурної трансформації, забезпечення того, щоб цифрові інновації сприяли одночасно фінансовій безпеці та інклюзивному економічному зростанню, постало як нагальна наукова й політична проблема. Метою цього дослідження було виявлення та обґрунтування ефективних напрямів цифрової трансформації бізнесу, які одночасно посилюють фінансову безпеку та сприяють інклюзивному доступу до цифрових фінансових послуг. Для досягнення поставленої мети було застосовано змішану методологічну рамку, що поєднує системний та інституційний аналіз, порівняльний аналіз, статистичне й кореляційне моделювання, а також аналітичний синтез міжнародних і національних масивів даних Світового банку, Національного банку України та аналітичних напрацювань ОЕСР. Отримані результати засвідчили наявність тісного зв'язку між розширенням використання цифрових фінансових технологій та підвищенням рівня інституційної стабільності й економічної стійкості. Емпіричні дані по Україні за 2022-2024 роки показали, що кількість активних платіжних карток зросла більш ніж на 10 %, тоді як частка безготівкових операцій перевищила 90 %, що свідчить про стрімке поширення цифрових платіжних інструментів. Масове впровадження технологій ближнього бездротового зв'язку, токенизованих платіжних карток і хмарних фінансових сервісів сприяло прискоренню обробки транзакцій, підвищенню прозорості та поліпшенню захисту фінансових даних. Водночас у ході дослідження було ідентифіковано стійкі ризики й бар'єри, пов'язані з вразливістю кібербезпеки, регуляторною неузгодженістю та нерівномірним рівнем цифрової інклюзії серед різних груп населення, зокрема в сільській місцевості та серед осіб з обмеженим рівнем цифрової грамотності. Отримані результати підтвердили, що цифровізація одночасно генерує як і підвищення ефективності, так і нові конфігурації фінансових та інституційних ризиків. Практичне значення дослідження полягає в можливості використання його результатів органами державної влади, фінансовими регуляторами та менеджерами бізнесу для розроблення узгоджених стратегій цифровізації, що інтегрують технологічні інновації з вимогами кібербезпеки, регуляторної узгодженості та інклюзивного розвитку фінансової системи

**Ключові слова:** цифрова економіка; фінансові технології; кібербезпека; інституційна стійкість; безготівкові платежі

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