

THE DIGITAL TRANSFORMATION OF THE FINANCIAL ECOSYSTEM: A COMPARATIVE STUDY OF EUROPEAN INTEGRATION STRATEGIES FOR SERBIA AND UKRAINE

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ABSTRACT

This literature review study investigates the digital transformation of the financial ecosystem in Serbia and Ukraine in the context of their integration pathway to the European Union. The methods employed in the research include literature analysis, systematic synthesis, thematic analysis, and a comparative case study approach. The study begins within a comprehensive theoretical analysis of the financial ecosystem and its components. Then there is an analysis of the digital transformation occurring in Ukraine's financial ecosystem, while concurrently discussing and analysing the digital transformation of Serbia's financial ecosystem. The analysis is followed by the comparative approach to shared opportunities and common challenges encountered by both countries in their digital transformation journey, showing the complexities of European integration for developing countries, and highlighting the long-term sustainable role of digitalising financial ecosystems. The study aims to pinpoint specific strategies, successes and obstacles encountered during this transformative process, offering insights into policy development and future integration efforts.

KEY WORDS: *digital transformation, financial ecosystem, European integration.*

JEL CODES: M48, F36, P34.

DOI: <https://doi.org/10.15181/rfds.v48i1.2792>

Introduction

Relevance of the research topic. The financial ecosystem is a complex dynamic network of institutions, markets and instruments in financial transactions, which creates an environment where worldwide money and financial instruments flow. The financial ecosystem is important for economic growth, as trading processes consist not only of the capital response to changes in goods, services and technologies (Bose, Dong, et al., 2019; Bose, Guo, et al., 2019; Payally, n.d.). Globally, an efficient financial ecosystem plays a significant role for the development of economic productivity, as it is the business supplier, innovation driver, productivity stimulator, and long-term sustainability guarantor (Nazir et al., 2025).

The research paper focuses on the critical intersection of the alignment of digital, innovation and economic development in the financial sector of developing economies such as Serbia and Ukraine, where digital transformation is not an option, but a necessity for financial inclusivity and the ability to compete. The comparison between Serbia and Ukraine aims to explain the contexts of developing countries in the leveraging

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of digital technologies for the modernization of financial systems and sustainable economic growth based on European Union (EU) standards and policies on the way to integration into the European Union framework.

The research paper provides insights for policymakers, academics and stakeholders involved in European integration and financial modernisation for planning best practices and more effective support mechanisms, as well as reducing potential pitfalls in the digitalising financial ecosystems. It highlights the universal importance of digital innovation in finance, and addresses the significant role of an efficient financial ecosystem in long-term sustainability in the broader European economic area.

The scientific problem of the article is to analyse comparatively the digital transformation of financial ecosystems in Serbia and Ukraine within the context of European integration strategies, identifying practical implications and challenges.

The purpose of the study is to analyse the digital transformation of financial ecosystems, specifically focusing on aspects of comparative European integration for Serbia and Ukraine, while exploring practical implications in real-world scenarios.

Research tasks: 1) To comprehensively define the financial ecosystem, its components, and the conceptual framework for the current study; 2) To analyse the digital transformations of Ukraine's ecosystem and its pathways towards European Union integration; 3) To analyse the digital transformations of Serbia's ecosystem and its pathways towards European Union integration; 4) To conduct a comparative analysis of the digital transformation opportunities and challenges of Serbia and Ukraine on their European integration pathways.

Research methods: literature analysis, systematic synthesis and thematic analysis, comparative case study approach.

1. A theoretical analysis of the financial ecosystem

The financial ecosystem is a purposeful arrangement between entities (Moden et al., 2022), a collaboration model (Roach, 2023), and the complex interaction and interdependency of financial institutions, markets, regulations, consumers and technology. A healthy financial ecosystem means financial inclusion, and is very important for economic growth, stability, prosperity and sustainability (Payally, n.d.). An efficient financial ecosystem plays a crucial role for the development of economic productivity, as it leads the allocation of capital to long-term sustainability, taking saver and investor relationships to a new level of financial management each time changes are applied (William, Fahad, 2024). Furthermore, Dao Ha et al. (2025) highlight the diversity the evolution of digital systems brought in the form of regulators, technology providers and new users. Their interactions shape the way we form the modern digital ecosystem. New technologies, including AI, blockchain and quantum computing, are significantly expanding the financial ecosystem, and fostering an innovative perspective on its structure and function, as demonstrated by Kou and Lou (2025). Unlike focusing solely on AI or blockchain, which are technologies within the ecosystem, the ecosystem structure provides a holistic view of how these technologies are deployed, governed and interact with the existing financial infrastructure and consumer behaviour. For Serbia and Ukraine, understanding this structure is paramount for aligning their DFS development with EU standards, and fostering interoperability, financial stability and consumer protection, which are key pillars of European integration. A well-defined DFS ecosystem structure facilitates the identification of gaps, opportunities for regulatory harmonisation, and the strategic deployment of digital innovations to achieve inclusive and efficient financial systems.

New technology, while bringing more benefits, comes with security concerns, so frameworks such as the ITU's 2021 DFS Security Assurance give an insight into how to mitigate vulnerabilities and risks, and stay key aspects on the way towards digital transformation for developing countries such as Ukraine and Serbia. Based on this, the ecosystem structure outlined by the ITU from 2019 is still valid, and can be applied to a modern system. The Digital Financial Services (DFS) ecosystem structure is presented in the table below (ITU, 2019):

Table 1. The DFS ecosystem structure

DFS providers	Banks, other financial institutions, licensed non-banks
DFS provider support services	Agents, processors
Users	Consumers, merchants, businesses, governments, non-profit groups
Digital financial services	Transaction accounts, payments services, savings accounts, investment services, loans, insurance services
Use cases	Storing funds, buying, paying bills, borrowing, saving, insuring assets and risks, sending/receiving funds

Source: ITU, 2019.

The ecosystem is built on DFA providers, which include banks, other financial institutions, and licensed non-banks, forming the foundational layer for offering digital financial products and services. These providers are supported by various DFS provider support services, such as agents and processors, who facilitate the delivery and operation of these services. The ultimate beneficiaries and participants in this ecosystem are the users, encompassing a broad spectrum, from consumers to businesses, governments and non-profit groups. The core offerings, or digital financial services themselves, are diverse, ranging from transaction accounts and payment services to savings accounts, investment services, loans and insurance services. These services enable a multitude of use cases, including storing funds, buying goods, paying bills, borrowing money, saving for the future, insuring assets and risks, and sending or receiving funds. This structure highlights the interconnectedness of various entities and services that collectively enable and support the widespread adoption and utilisation of digital financial solutions. The evolution of this ecosystem is often driven by technological advancements, regulatory frameworks and changing consumer demand, aiming to enhance financial inclusion and efficiency (ITU, 2019). This comprehensive perspective allows for a more effective assessment of how digital transformation impacts market competition, financial inclusion and systemic risk, all of which are critical considerations for countries aspiring to integrate into the European financial landscape. In a fast-changing world, in the century of digital innovation, international ecosystems require regular digital updates. The digitalisation of the financial ecosystem means competitive advantage, transparency, effective cooperation, and a time and cost saving perspective.

2. The digital transformation of Ukraine's financial ecosystem: pathways to European integration

European integration of the financial ecosystem for Ukraine means not only the innovative aspect of digital transformation, but also the laws, programmes and ethical norms accepted and promoted by the European Parliament due to actual issues and solutions that the digital financial ecosystem faces. Ukraine obtained EU candidate status in June 2022, which drives the country's financial ecosystem to improve transparency and collaboration, to be able to have a competitive advantage and faster sustainability through digitalization of the ecosystem and new regulations (European Parliament, 2022).

2.1. The financial ecosystem of Ukraine

DFS providers. The National Bank of Ukraine (NBU) serves as the primary regulatory body for payment institutions and electronic money providers within Ukraine's financial landscape, overseeing their licensing and establishing operational guidelines (Kinstellar, 2023; Kinstellar, 2024). Among other roles of the NBU are implementing monetary policy, supervising financial markets, and maintaining the stability of the

national currency, the Hryvnia (UAH) (KPMG, 2025). Also, the Ukrainian banking sector features a significant presence of foreign-owned financial institutions, which facilitate international trade and investment flows, connecting Ukraine more closely with the global economy. Among these institutions are Raiffeisen Bank Aval (Austria), OTP Bank (Hungary), Credit Agricole Bank (France), Ukrsibbank (BNP Paribas Group, France), and PKO Bank Polski (Poland) (International Trade Administration, 2023).

DFS provider support services. The NBU is responsible for most payment systems in Ukraine. For example, under the NBU's direct supervision, the PROSTIR national payment system operates for secure domestic transactions (Prostir, n.d.). Mastercard and Visa are available for both domestic and international payments. Also, telecommunications operators contribute to the payment ecosystem by offering mobile payments. All the listed DFS provider support services support the economic integration of the country (National Bank of Ukraine, n.d.).

Users. In Ukraine, 70% to 80% of all enterprises are the primary adopters of the nation's Digital Financial Services. At the end of 2024, the number of mobile banking service users reached 25 to 30 million, and electronic banking users totalled 35 to 40 million. The figures reflect the continued growth in digital financial service use caused by increased smartphone penetration, the convenience of digital platforms, and the ongoing modernisation of the Ukrainian financial sector (Lutsenko, 2025).

Digital financial services. Ukraine has experienced growth in the adoption of digital financial service, especially in instant payment systems. The NBU reports a broader trend towards digitalisation and reduced reliance on cash payments; for example, approximately 8,654.4 million transactions, valued at UAH 6,577.4 billion, were processed during 2024, 8,184.8 million, valued at UAH 4,243.5 billion, were cashless transactions (and these statistics are only for bank cards issued in Ukraine) (NBU, n.d.).

Use Cases. The NBU actively promotes the adoption of instant payments, focusing on the accessibility and efficiency of the real-time payment system, and a modernised financial infrastructure, such as P2P transfers, bill payments, and QR code-based transactions. The goal of the NBU is to integrate daily online payments, as they guarantee more transparency in the financial ecosystem. The system also supports the growing e-commerce sector and online platforms for financial operations (NBU, n.d.).

2.2. EU integration and policy alignment

Ukraine's digital transformation journey is closely intertwined with its aspirations for EU integration and EU digital economy norms. Specifically, since becoming an EU candidate in 2022, it has adopted numerous policies and regulations regarding digitalisation, cybersecurity and digital public services (IT Ukraine Association, 2025):

- The law on Digital Assets in Ukraine was passed in 2022 to legalise and regulate virtual assets in order to integrate them into the Ukrainian financial system and attract investment. The law defines virtual assets, financial virtual assets and non-financial virtual assets, aiming to integrate them into circulation and taxation. This law is the primary source and regulator for the National Bank of Ukraine and the National Securities and Stock Market Commission (Government Portal, 2022). The law is also important for EU integration, as it outlines requirements for virtual asset service providers, including registration, financial monitoring, anti-money laundering and counter-terrorist financing compliance (IT Ukraine Association, 2025).
- The Diia ecosystem is a comprehensive Ukrainian government digital platform launched in 2020, and can be reached through a single portal and mobile application. Diia provides access for citizens to many public services, aligning with the EU's e-government principles. The Diia ecosystem became a central pillar of Ukraine's digital transformation strategy (Digital State UA, n.d.).
- For cybersecurity improvements, Ukraine follows the models of the EU, NIS Directive and NATO, as well as cooperating with the European Union Agency for Cybersecurity (ENISA) to protect critical infrastructure. From a legal perspective in 2017, the law 'On Basic Principles of Cybersecurity' was passed (ENISA, 2023; European Union, 2025).

- There are also government-supported programmes for the IT sector to encourage digital innovation and drive digital literacy among the population, as well as initiatives that remove barriers to online trade to foster the digital economy (Diia.City, Diia.Digital Education, Diia. Digital Hromada, Diia. Business) (Digital State UA, n.d.). Ukraine also participates in numerous EU-funded projects aimed at fostering digital entrepreneurship and digitalising the public administration sector (the e-Residency programme, EU4Digital initiative, EGAP) (Government Portal, 2025).

Overall, Ukraine's digital transformation has positive ambitious towards integration with the EU's digital economy. The country has a proactive approach to adopting EU-aligned digital strategies and regulations in the areas of digital governance, cybersecurity and market development.

2.3. Cybercrime, cybersecurity and financial risk in Ukraine

One of the main threats to the digital financial ecosystem internationally is cybercrime. As the statistics for cybercrime do not show a decrease in cybercrime from 2022, the European Parliament introduces new laws and strategies, as well as requiring other participants in the financial services ecosystem to set safety and cybersecurity as the main long-term goals to reach financial sustainability. Despite this, according to the data, the largest financial cybercrime incidents happened during the Covid-19 pandemic and the beginning of the war in Ukraine, due to the increased intensity of international money transactions and no opportunity for the relevant systems of digital control (European Parliament 2022; European Parliament, 2025a; European Parliament, 2025b).

The risk for DFS and EU integration. On one hand, Ukraine is actively pursuing integration with the European Union from the perspective of aligning its digital financial services and cybersecurity with EU standards, such as the Digital Operations Resilience Act and EU cybersecurity legislation. On the other hand, Ukraine faces significant challenges in securing its DFS against cybercrime, including attacks targeting state financial systems. The country receives significant international support to bolster its cyber defences and to ensure the security of the financial systems, but under the conditions of war, even more support is needed (IT Ukraine Association, 2025).

Fraud and phishing in Ukraine. The amount of online financial fraud and phishing in Ukraine increased significantly since February 2022 after the full-scale invasion, as it created a fertile ground for cybercriminals, phishing schemes, social engineering tactics and the exploitation of humanitarian aid efforts, exploiting the vulnerabilities arising from economic hardship and fear among the population. As a result, the NBU reported the total increase of the amount of losses from illegal operations with payment cards at 73% in 2023, in comparison with 2022. In 2023 the Security Service of Ukraine uncovered a large-scale phishing network that created over a hundred fake websites, including a fake Diia government portal and various international humanitarian organisations. These collected personal data and bank card details, causing significant financial losses. Among other known online fraud and phishing that the Ukrainian National Police frequently reports are scammers in online marketplaces and social media sales, investment fraud, and cryptocurrency scams. For example, at the beginning of 2025, a group was apprehended for defrauding citizens by selling non-existent military equipment through fake online stores, accumulating over 5 million UAH in illicit gains. Just in the first half of 2024, the Cyberpolice of Ukraine blocked over 1,500 fraudulent websites, and more than 500 individuals involved in cybercrime (Koibichuk et al., 2024).

Under-reporting, corruption and money laundering. The situation regarding under-reporting, corruption and money laundering in Ukraine is a complex issue and concern, particularly in the context of the war and efforts towards European integration. Firstly, there is a high level of corruption in various sectors, including the Ukrainian government and the economy. Transparency International's 2023 Corruption Perception Index ranked Ukraine 104th out of 180 countries. Unfortunately, the war created new opportunities for corruption in processes related to defence and humanitarian aid, and the reconstruction sector. Secondly, the under-reporting of financial crimes, cybercrime and money laundering is a problem. The NBU and other financial ins-

titution units have worked to enhance their anti-money laundering and counter-terrorist financing regimes, but there is very complicated data collection and reporting process that causes the underestimation of the true scope. Thirdly, money laundering in Ukraine is often linked to organised crime, corruption, and illicit financial activities (Timofeieva, 2025).

The Financial Action Task Force (FATF) and Moneyval (the Council of Europe's Committee of Experts on the Evaluation of Anti-Money Laundering Measures and the Financing of Terrorism) have consistently highlighted the need for Ukraine to strengthen its measures to combat money laundering and terrorist financing. As a response, on the way to EU integration, Ukraine initiated various anti-corruption and transparency reforms, as well as establishing the National Anti-Corruption Bureau of Ukraine, the Specialised Anti-Corruption Prosecutor's Office, and the Anti-Corruption High Court (RUSI, 2025).

The country's commitment to European integration and the continued support from international partners, as well as the digitalisation of the financial ecosystem, are seen as key strategies to achieve transparency and improvements. So the European Commission regularly assesses Ukraine's progress on improvements in the under-reporting, corruption and money laundering situation.

3. The digital transformation of Serbia's financial ecosystem: pathways to European integration

Serbia emerged as a European Union (EU) in 2012 and has since been on the pathway of alignment with its financial ecosystem. By doing this, it is looking to improve the allocation of long-term sustainability and further improve the relationship between savers and investors (Boitan, Marchewka-Bartkowiak, 2020). To see the benefits of digitalisation (competitive advantage, transparency, collaboration, cost and time savings), Serbia will need to introduce new regulations, as well as improving its infrastructure and ethical norms that come with finance.

3.1. The financial ecosystem of Serbia

DFS providers. The central bank that oversees payment institutions and electronic money providers is the National Bank of Serbia (NBS, 2022a; Trajković, 2022). It licenses, as well as gives out regulations to all of the banks in Serbia. The banking sector is dominated by foreign-owned banks, such as Adikko Bank, Uni-Credit Bank, and Reiffaisen Bank. After the acquisition of Komercijalna Banka by Slovenian NLB Banka, the biggest state-owned bank in Serbia is Poštanka Štedionica.

DFS provider support services. Domestically, DinaCard and IPS NBS are the main agents of instant payments in Serbia, and both are supervised by the NBS (NBS, 2025). International processors are Mastercard and Visa. Payment facilitators include PaySpot, Euronet, and iPay. Telecom operators offer payment options too (e.g. Telekom Srbija, Yettel, A1 Srbija). Having multiple domestic and international processors will allow Serbia interoperability with the rest of the EU, while bolstering innovation.

Users. Out of all businesses in Serbia, 99.8% of them are Small and Medium-sized enterprises (SMEs), making them the main users of Serbia's DFS (Kvrgić et al., 2021). Individually, by the end of 2024, there were 4.6 million users of mobile banking services, and 4.4 million users of electronic banking (desktop/online) (NBS, 2025). This shows a 13.9% increase in mobile banking users and 7.5% increase in electronic banking, compared to the previous year (NBS, 2025). Mobile banking payments increased by 23.1% in Q2 2024, while electronic banking payments decreased by 2.8% (NBS, 2024a; NBS, 2025b). This further shows that people increasingly prefer digital formats of payment and banking.

Digital financial services. The instant payment system by NBS processed nearly 21.7 million transactions in Q3 2024, representing a 29.5% increase from Q3 2023 (NBS, 2025), showing a clear path towards digitalization. The full year of 2024 has also seen a rise in instant payment transactions compared to 2023 (NBS, 2025). Daily average payment had seen a significant spike from around 19,000 in 2019 to close to 240,000 in 2024 (NBS, 2025). This shift toward instant payments shows the results of digital transformation, where people's transaction behaviors are changing and slowly moving on from cash payments.

Use cases. Payments and transfers are supported by IPS NBS, which includes peer-to-peer payments, bill payments, and QR code transactions. E-commerce and physical stores are increasingly supporting instant payments. Finally, SMEs are continually transferring to online platforms for invoicing and payments, which increases visibility of cash flow and enables better assessment of credit (Kvrgić et al., 2021).

3.2. EU integration and policy alignment

Serbia is following a clear EU integration trajectory, and as such, its digital transformation has aligned with the norms that follow the EU digital economy. In recent years, it has adopted several strategies and regulations to help with this path:

- The Law on Digital Assets (2020), which was introduced by the Official Gazette of the Republic of Serbia, came into practice in June 2021. The law regulates digital assets, fostering improvements and security from crime. Furthermore, it enables financing using investment tokens, and allows for the use of digital technologies for the improvement of capital markets. Lastly, it looks to regulate power held by the Securities Commission and the NBS (NBS, 2020a; NBS, 2020b; CSJ Law Office, 2021).
- The strategy for the development of an information society and security in Serbia (2021–2026) aims to enhance the digital knowledge of all citizens, including vulnerable groups (Digital Watch Observatory, 2021; Government of the Republic of Serbia, 2021). It looks to digitalise education systems and attract foreign investment to expand digital transformation in line with the EU (Government of the Republic of Serbia, 2021). Finally, it ensures the safety of information, whether government-related or citizen-related, by fighting cybercrime (Government of the Republic of Serbia, 2021).
- An initiative that has a similar goal to the previous point was launched in 2020, and lasted until 2024. Unlike the strategy for the development of information and security in Serbia, this strategy focused solely on improving the digital knowledge and skills of citizens. The goal was for citizens to be able to meet the increasing demands of the economy and labour markets in the age of digitalisation. This programme was partly hindered by the Covid-19 virus (UNESCO, 2022)

Serbia's effort to improve digitalisation serves a major purpose in its EU integration, as it facilitates payments and trade between countries, further aligning its financial economy with that of the EU's single market. Moreover, initiatives such as the Go Digital programme further provide motivation for small and medium-size enterprises to invest in digitalisation in the west Balkans, or Serbia in this case (WBIF, 2025). Finally, the continuing improvements in the regulations and alignment with EU directives will allow for interoperability and Serbia's accession to the EU.

3.3. Cybercrime, cybersecurity and financial risk in Serbia

One of the main threats to the financial ecosystem of a country and its improvement is cybercrime. This can be manifested in the form of fraud, phishing, money laundering and structural vulnerabilities. All are equally harmful, and seem to be increasing in scale (Kuzior et al., 2024).

Fraud and phishing in Serbia. The National Computer Emergency Response Team (CERT) of Serbia is continually issuing warnings about possible phishing attempts that could potentially target bank stakeholders. One example is the warning in May 2024, when attackers impersonated banks and asked for confidential data, at the risk getting the account blocked (National CERT, 2024a). In September the same year, a similar attack was made by impersonating Serbian Raiffeisen Bank (National CERT, 2024b). The National Bank of Serbia also sent out a warning in November 2024 about emails impersonating them and asking for personal data (EuroNews Serbia, 2024). The NBS has further addressed the issue in their consumer-protection report, where they highlighted a pattern in fraudulent emails by noting that senders have fake official-looking addresses and use them to extract personal information (NBS, 2024a; NBS, 2024b). Although fraud

and phishing are very common in Serbia, in a survey conducted by Visa (Visa, 2023), they note that 52%, or every second Serbian, can spot a fraudulent message or email, and that 28% identify themselves as victims.

Organised fraud and cryptocurrency networks. Major investment fraud took place in Serbia, Cyprus and Bulgaria, where a network of call centres pitched fake investment and crypto-trading scams, thus making tens of millions of euros on the backs of scammed people (EuroJust, 2023a; EuroJust, 2023b).

Under-reporting, corruption and money laundering. As is the case with many developing countries, under-reporting, corruption and money laundering can also be seen in Serbia. A report by iPROCEEDS (COE. INT, 2017) noted that, rather than reporting cybercrime, banks in Serbia try to absorb the losses themselves. This is a problem, because it leads to no one being prosecuted, and the number of crimes is increasing. Although it is not in official reports, corruption and money laundering are also big issues. From experiences of living in Serbia and interacting with people and the culture, it is common to hear that the government carries out projects around the country at unreasonable prices for money-laundering reasons. This issue, along with corruption, was one of the catalysts for the ongoing protests and civil unrest in Serbia.

The risk to the DFS and EU integration. It is important to highlight the severity of cybercrime on the DFS of any country. The leaking of credentials can deter users from mobile and online banking. Any kind of investment or email fraud can lead to a loss of trust and credibility among users. To combat this, regulation, supervision and cybersecurity need to be improved. Of course, Serbia is not the only nest for cybercrime, and as such the EU has frameworks such as the Digital Operational Resilience Act (DORA) and EU cybersecurity legislation (EIOPA, 2025) (European Commission, 2025). Aligning with these initiatives is of great importance for Serbia's DFS.

Connection to Economic Productivity Development in Serbia. Firstly, a study that analyses digitalisation and financial performance in Serbia has shown that Serbian banks that invested more in digitalisation have a positive relationship with improved financial performance (Stefanovic, Barjaktarovic, Bataev, 2021). The study uses evidence from 2011–2020, and highlights the fact that intangible (digital) investment correlates positively with net profits, which further proves the benefits of digital transformation.

Furthermore, it not only drives improved profitability but also lessens operating costs and improves customer satisfaction (Milić, 2020). These results can be seen, as a study (Schneider, Krstić, 2015) suggests, in the banks that offered more digital channels, like mobile and online banking. By having greater customer reach and lower overheads, it can further improve access to finance for SMEs.

In Serbia, 21.2% of GDP in the business and entrepreneurial sectors was part of the shadow (informal) economy (Schneider, Krstić, 2015). This is partly due to the vast amounts of cash transactions that may have trouble in formal financial reporting. Digitalisation and frameworks that bolster formal finance and transparency can bring this percentage down. Studies have further found that digital payments lead to 0.4% of total factor productivity, and growth of GDP by 0.1 (Tombini, 2023). Moreover, they are related to a 0.6% decline of informal employment. This shows a theoretical correlation between digital transformation and productivity.

Similarly, proof that the digital ecosystem in Serbia is growing and improving can be seen in a report by the NBS that shows an increase of 80% from 2016 to 2021 (NBS, 2022). The National Cashless Payment Initiative also connects DFS and productivity (Bolji Način Initiative, 2025). It looks to counter the shadow economy by introducing 25,000 POS terminals in institutions around Serbia, thus lowering transaction costs (Bolji Način Initiative, 2025).

Finally, with all this in mind, there are still many problems, despite the positives. The older, less educated population still struggles to use the digital version of finance, and the informal sector is still very sizeable in Serbia. While the benefits of the DFS can be seen clearly, it still requires continual investment and improvement.

4. Common digital transformation opportunities and challenges to the financial ecosystems for Ukraine and Serbia

Both Serbia and Ukraine are on the path to EU integration, and are actively working on aligning their digital ecosystems and improving them according to EU directives. They recognise that digitalisation plays a major role in achieving a transparent and competitive ecosystem. On the other hand, because of the differing economic conditions of the two countries, approaches for achieving these goals also differ.

A summary of the financial ecosystem of Ukraine and Serbia is presented in the table below.

Table 2. A summary of comparison

Aspect	Serbia	Ukraine
EU status	Candidate since 2012	Candidate since 2022
Regulatory authority	National Bank of Serbia (NBS)	National Bank of Ukraine (NBU)
Key digital systems	IPS NBS, DinaCard	PROSTIR, Diia
Law on digital assets	Enacted 2021	Enacted 2022
Mobile banking users (2024)	4.6 million	25 to 30 million
Cybercrime risk level	Moderate, mainly phishing/fraud	High, linked to war and instability
Main challenges	Digital literacy, corruption, informal economy	Cybersecurity, war-related instability
Main strengths	EU policy alignment, SME focus	E-governance integration, innovation speed
Fintech ecosystem	Emerging regulatory sandbox since 2018	Rapidly growing, linked with EU4Digital
Digital economy goal	Regional competitiveness	Postwar resilience and EU integration

Source: prepared by the authors, based on a summary of comparison, 2025.

Serbia has been an EU candidate since 2012, and has gradually been adapting its regulations and institutions to EU standards. The NBS is a major financial services governing body, having developed platforms like IPS NBS and DinaCard (NBS, 2025). Mobile banking has seen positive improvements, with 4.6 million recorded users in 2024 (out of 6.6 million people living in Serbia) (NBS, 2025). SMEs represent most businesses in Serbia (99.8%); therefore, initiatives such as Go Digital Serbia and the National Cashless Payment Initiative seek to improve their competitiveness, digitalisation, and financial inclusion (Krvrgic et al., 2021; Bolji Način Initiative, 2025; WBIF, 2025). Serbia will still need to combat issues such as a lack of digital literacy among individuals, a prominent shadow economy, and limited infrastructure for innovation.

Ukraine, on the other hand, has been an EU candidate since 2022, and is forced to accelerate its digital transformation due to the pressures of war and the need for institutional resilience. The NBU, which has a modern payment system, is continually looking to enhance its digital finance. Furthermore, as a central pillar of Ukraine's transformation strategy, Diia has provided people with financial services on a par with the EU standard (Digital State UA, n.d.; Kinstellar, 2023; Kinstellar, 2024). It has shown a strong political commitment to digitalisation, through initiatives such as the Law on Digital Assets and the Digital Operational Resilience Act. Out of over 39 million citizens, 30 million use mobile banking services, which proves the penetration of digital adoption (IT Ukraine Association, 2025; Lutsenko, 2025).

As an emerging and developing economy, the fintech market in Serbia and Ukraine is still in its early stages. With continued innovation and developments, both on the regulatory and technological sides, the signs for its long-term success are positive. Research on the Balkan region shows that the growth of the digital economy is positively related to fintech development. Growth in both fintech and aspects of the availability of digital payment seems to have had a positive effect on the digital economy (Radulovic, Jovanovic, 2025).

An initiative that seems to have a positive effect on innovation and development in various sectors is the concept of a regulatory sandbox. This is a controlled environment where companies can test different innovations. The National Bank of Serbia introduced this concept in 2018 (Predojevic, 2020). However, it lacked certain aspects that developed countries have, like an innovation hub or a clear strategy (Predojevic, 2020). The regulatory side of Ukraine's and Serbia's digital transformation should be on par with the rest of the EU if further development is desired. Recent research has shown that improvements in fintech (in the broader and the Balkan context) can lead to increased financial inclusion, by providing new services and being able to reach groups that are underserved (Miftari et al., 2024; Ha, Le, Nguyen, 2025).

On the other hand, barriers and constraints are still present for the adoption and innovation of fintech. IMF and OECD reports have noted that e-commerce and digital skills in Serbia and Ukraine are underdeveloped, although the digital infrastructure is competitive (Government of the Republic of Serbia, 2024; Ha, Le, Nguyen, 2025; OECD, 2024). Other studies have also noted that uncertainty in regulation, digital literacy and the lack of infrastructure can be barriers for fintech (Mandić et al., 2025). The World Bank has further reported that digital loans, capital raising and broader fintech platforms are not commonly used or well developed in Serbia.

Fintech has shown positive results, although barriers and the costs of developing it persist. While it may improve access to finance and the overall digital economy, it still needs the appropriate regulatory changes and improved digital literacy

Conclusion

The first task this study set out to accomplish was to define the conceptual framework of a financial ecosystem in a broader sense. This followed the analysis of the same framework, and the transformation in the context of Ukraine and Serbia, and how it relates to their EU integration path. The final task was to compare these two countries, and analyse in what aspects they differ and what challenges they face. In Section 1, the theoretical framework for the study was established, and a basis for the rest of the paper was set. Section 2 analyses the financial system of Ukraine, its reforms led by the NBU, and the security risks it faces during the ongoing war. Section 3, in the same way, analyses the context of Serbia, its reforms led by the NBS, initiatives that were taken in further digitalisation, and what constraints it faces. The final, fourth, section, compares both countries, and highlights shared strengths, like EU policy alignment and the increase in instant payments, and weaknesses, like the gap in digital literacy and cybercrime. This finally achieves all the outlined tasks, and produces valuable insights for policymakers and stakeholders.

Ukraine and Serbia have seen major strides in their financial ecosystems, and many improvements can be seen in digitalisation, reforms in regulations, and continual alignment with EU directives and standards. Greater mobile banking and instant payment users reflect confidence, and readiness for further improvements and digitalisation. By introducing new regulations, such as the Law of Digital Assets, initiatives like the strategy for the development of an information society and security in Serbia, and numerous digital literacy programmes, they are continuing to go in a positive direction.

With this in mind, many barriers persist in the form of cybercrime, corruption, under-reporting, and a lack of digital literacy among people. For Ukraine, the ongoing war adds further digital security issues, while also being a motivation for its development. Addressing these issues will be instrumental in the futures of both countries' digital economies. With continued improvements in these aspects, they can further improve their EU integration, and consolidate themselves among other EU economies. Moreover, as the transformation of the digital financial ecosystem has both advantages and disadvantages, the steps taken by these two countries towards European integration should be set with SMART-goals, research and development investment, contingency planning, and changed management strategy application, to not only guarantee users' and other stakeholders' loyalty, but also to avoid government losses and a decrease in external funding.

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EKOSISTEMOS SKAITMENINĖ TRANSFORMACIJA: EUROPOS INTEGRACIJOS STRATEGIJŲ SERBIJAI IR UKRAINAI LYGINAMASIS TYRIMAS

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Santrauka

Finansų ekosistema yra sudėtingas, dinamiškas institucijų, rinkų ir priemonių tinklas, kur atliekami finansiniai sandoriai, jis sukuria aplinką, kurioje cirkuliuoja pasauliniai pinigai ir finansinės priemonės. Finansų ekosistema yra svarbi ekonomikos augimui, nes prekybos procesai apima ne tik kapitalo rinkas, bet ir išvestines finansines priemones, žaliavas, naftą, auksą ir valiutą; ji dinamiškai keičiasi reaguodama į prekių, paslaugų ir technologijų pokyčius. Pasauliniu mastu efektyvi finansų ekosistema atlieka svarbų vaidmenį ekonominio produktyvumo vystymuisi, nes ji yra verslo tiekėja, inovacijų variklis, produktyvumo skatintoja ir ilgalaikio tvarumo garantas.

Šio tyrimo tikslas yra išanalizuoti finansinių ekosistemų skaitmeninę transformaciją, sutelkiant dėmesį į Europos integracijos aspektus Serbijai ir Ukrainai, ištirti praktines pasekmes realaus pasaulio scenarijuose. Tyrimo metodai apima literatūros, sisteminę, teminę analizę ir lyginamąjį atvejo studijų metodą.

Šis literatūros apžvalgos tyrimas nagrinėja Serbijos ir Ukrainos finansų ekosistemos skaitmeninę transformaciją joms integruojantis į Europos Sąjungą. Tyrimas pradedamas išsamia teorine finansų ekosistemos ir jos komponentų analize. Toliau analizuojama Ukrainos finansų ekosistemoje vykdoma skaitmeninė transformacija, kartu aptariant ir analizuojant Serbijos finansų ekosistemos skaitmeninę transformaciją. Atlikus analizę vykdomas abiejų šalių bendrų galimybių ir bendrų iššūkių, su kuriais jos susiduria skaitmeninės

transformacijos kelyje, lyginamasis tyrimas, parodantis Europos integracijos sudėtingumą besivystančioms šalims ir pabrėžiantis ilgalaikį tvarų skaitmenizuojamų finansų ekosistemų vaidmenį, kartu sudarant pagrindą suprasti galimus pavojus suinteresuotosioms šalims abiejose šalyse, taip pat ir Europos Sąjungoje.

Ukraina ir Serbija padarė didžiulę pažangą finansų ekosistemoje, ypač skaitmenizacijos, reguliavimo reformų ir derinimo su ES direktyvomis aspektais. Padidėjęs mobiliosios bankininkystės ir momentinių mokėjimų vartotojų skaičius rodo pasitikėjimą ir pasirengimą tolesniems tobulinimams bei skaitmenizacijai. Įvedus naujus reglamentus, tokius kaip Skaitmeninio turto įstatymas, iniciatyvas, tokias kaip informacinės visuomenės ir saugumo plėtros strategija Serbijoje, bei vykdant daugybę skaitmeninio raštingumo programų, jų toliau daugėja.

Vis dėlto išlieka nemažai kliūčių, tokių kaip kibernetiniai nusikaltimai, korupcija, ne pranešimas apie nusikaltimus ir žmonių skaitmeninio raštingumo trūkumas. Ukrainai tebesitęsiantis karas sukelia papildomų skaitmeninio saugumo problemų, kartu tapdamas ir paskata jo plėtrai. Šių problemų sprendimas bus ypač svarbus abiejų šalių skaitmeninės ekonomikos atečiai. Nuolat tobulinant šiuos aspektus, jos gali toliau gerinti savo integraciją į ES ir įsitvirtinti tarp kitų ES ekonomikų. Kadangi skaitmeninės finansų ekosistemos transformacija turi ir privalumų, ir trūkumų, šių dviejų šalių žingsniai Europos integracijos link turėtų būti nustatyti su SMART tikslų, mokslinių tyrimų ir plėtros investicijų, nenumatytų atvejų planavimo ir pokyčių valdymo strategijų taikymu, siekiant ne tik užtikrinti vartotojų bei kitų suinteresuotųjų šalių lojalumą, bet ir išvengti vyriausybės nuostolių bei išorinio finansavimo sumažėjimo.

RAKTINIAI ŽODŽIAI: *skaitmeninė transformacija, finansinė ekosistema, Europos integracija.*

JEL KLASIFIKACIJA: M48, F36, P34

Received: 2025.11.04

Revised: 2026.01.03

Accepted: 2026.01.09