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**TRANSFORMATION OF DIGITAL FINANCE AND PAYMENT
SERVICES IN MODERN ECONOMY
ABSTRACT**

In recent decades, the process of digitalization has triggered profound and lasting transformations in the financial sector globally. Traditional financial and banking systems are increasingly (Məmmədov, Amanova, 2024), being replaced by digital platforms, mobile banking services, e-wallets, and payment cards. These changes have not only enhanced the accessibility, speed, and transparency of financial services but also contributed to the expansion of digital financial inclusion. However, this transformative process has also introduced new risks and technological and regulatory challenges. As of 2024 (Digital, 2025), the global digital payments market reached a volume of \$144,9 billion, and it is projected to surpass \$701,5 billion by 2034. The number of digital (Which, 2024) wallet users has reached 4,3 billion, with expectations of increasing to 5,8 billion by 2029. Furthermore, digital wallets accounted (50+Digital) for 50% of global e-commerce transactions in 2024, while mobile payments represented 30% of the total digital payments. In line with these global trends, Azerbaijan has made significant strides in the field of digital finance and payment services. In 2023, the volume and number of cashless payments in the country, particularly in POS terminals and e-commerce, saw considerable growth. The dynamics of operations through the Instant Payment System (IPS) have also shown an upward trend. Improvements in the regulatory and legal environment, the promotion of the fintech sector, and the application of technological innovations have reinforced the country's digital finance ecosystem. Nevertheless, several challenges remain. The share of cashless payments in the regions is low, digital financial literacy is weak, and the IPS and mobile banking services are not widely recognized. The institutional structure of the fintech sector is not yet fully established, and the digital infrastructure still faces limitations. Therefore, to fully realize the potential of digital finance, coordinated and comprehensive actions are necessary. This article aims to analyze the key changes in financial services and payment systems within the context of a digitalized economy, identify existing problems, and propose effective solutions. The study focuses on the deficiencies in legal and technological infrastructure, the necessity to improve digital literacy, cybersecurity, and the application of innovative technologies. As a result, digital financial services - especially mobile payments, online banking, and FinTech platforms - accelerate the integration of large segments of the population into the financial system and enhance economic inclusivity. For sustainable development in this sector, cooperation between the government, the banking sector, and private FinTech entities should be strengthened. Additionally, the regulatory and legal frameworks, as well as technological infrastructure, should be updated, with widespread adoption of e-identification and artificial intelligence-based security solutions. Steps taken in this direction will also create the foundation for the formation of a competitive digital finance environment in the country.

Keywords: digital finance, payment services, transformation, inclusivity, FinTech, digitalization, security.

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**MÜASİR İQTİSADİYYATDA RƏQƏMSAL MALİYYƏ VƏ
ÖDƏNİŞ XİDMƏTLƏRİNİN TRANSFORMASIYASI**

XÜLASƏ

Son onilliklərdə rəqəmsallaşma prosesi qlobal maliyyə sektorunda dərin və davamlı dəyişikliklərə səbəb olmuşdur. Ənənəvi maliyyə və bank sistemləri getdikcə daha çox rəqəmsal platformalar (Məmmədov, Amanova, 2024), mobil bank xidmətləri, elektron pul kisələri və ödəniş kartları ilə əvəzlənməkdədir. Bu dəyişikliklər maliyyə xidmətlərinin əlçatanlığını, sürətini və şəffaflığını artırmaqla yanaşı, rəqəmsal maliyyə inklüzivliyinin genişlənməsinə də şərait yaratmışdır. Bununla belə, bu transformasiya yeni risklər, texnoloji və tənzimləyici çağırışlar da meydana çıxarmışdır. 2024-cü ilədək qlobal rəqəmsal ödənişlər bazarının həcmi 144.9 milyard ABŞ dollarına çatmış, 2034-cü ilədək isə (Digital, 2025) bu rəqəmin 701,5 milyard dollardan çox olacağı proqnozlaşdırılır. Elektron pul kisəsi istifadəçilərinin (Which, 2024) sayı 4,3 milyarda çatmış və bu rəqəmin 2029-cu ilə qədər 5,8 milyarda qədər artacağı gözlənilir. Həmçinin, 2024-cü ildə qlobal e-ticarət əməliyyatlarının 50%-i elektron pul kisələri ilə, rəqəmsal ödənişlərin isə 30%-i mobil ödənişlər vasitəsilə (50+Digital) həyata keçirilmişdir. Bu qlobal tendensiyalar fonunda Azərbaycan da rəqəmsal maliyyə və ödəniş xidmətləri sahəsində əhəmiyyətli irəliləyişlər əldə etmişdir. 2023-cü ildə ölkədə nağdsız ödənişlərin həcmi və sayı, xüsusilə POS terminallar və e-ticarət sahəsində, nəzərəcarpacaq dərəcədə artmışdır. Ani Ödənişlər Sistemi (AÖS) vasitəsilə aparılan əməliyyatların dinamikası da müsbət inkişaf tendensiyası göstərmişdir. Tənzimləyici-hüquqi mühitin təkmilləşdirilməsi, fintech sektorunun təşviqi və texnoloji yeniliklərin tətbiqi ölkənin rəqəmsal maliyyə ekosistemini gücləndirmişdir. Bununla belə, bir sıra problemlər mövcuddur. Regionlarda nağdsız ödənişlərin payı aşağıdır, rəqəmsal maliyyə savadlılığı zəifdir, AÖS və mobil bankçılıq xidmətləri geniş tanınmır. Fintech sektorunun institusional strukturu hələ tam formalaşmayıb, rəqəmsal infrastruktur isə bəzi məhdudiyyətlərlə qarşı-qarşıyadır. Bu səbəbdən rəqəmsal maliyyə potensialından tam istifadə etmək üçün əlaqələndirilmiş və kompleks tədbirlərin həyata keçirilməsi vacibdir. Bu məqalədə rəqəmsallaşmış iqtisadiyyat şəraitində maliyyə xidmətləri və ödəniş sistemlərində baş verən əsas dəyişikliklər təhlil edilir, mövcud problemlər müəyyən edilir və onların effektiv həlli yolları irəli sürülür. Araşdırma hüquqi və texnoloji infrastrukturda olan çatışmazlıqlar, rəqəmsal savadlılığın artırılması, kibertəhlükəsizlik və innovativ texnologiyaların tətbiqinə dair məsələləri əhatə edir. Nəticə etibarilə, rəqəmsal maliyyə xidmətləri – xüsusən mobil ödənişlər, onlayn bankçılıq və FinTech platformaları – əhalinin geniş təbəqələrinin maliyyə sistemində inteqrasiyasını sürətləndirir və iqtisadi inklüzivliyi artırır. Bu sahədə davamlı inkişaf üçün dövlət, bank sektoru və özəl FinTech qurumları arasında əməkdaşlıq gücləndirilməlidir. Həmçinin, tənzimləyici və hüquqi çərçivələr, texnoloji infrastruktur müasirləşdirilməli, elektron identifikasiya və süni intellekt əsaslı təhlükəsizlik həllərinin tətbiqi genişləndirilməlidir. Bu istiqamətdə atılan addımlar ölkədə rəqəbatlı rəqəmsal maliyyə mühitinin formalaşmasına zəmin yaradacaqdır.

Açar sözlər: rəqəmsal maliyyə, ödəniş xidmətləri, transformasiya, inklüzivlik, FinTech, rəqəmsallaşma, təhlükəsizlik.

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ТРАНСФОРМАЦИЯ ЦИФРОВЫХ ФИНАНСОВ И ПЛАТЕЖНЫХ УСЛУГ В СОВРЕМЕННОЙ ЭКОНОМИКЕ

АННОТАЦИЯ

В последние десятилетия процесс цифровизации вызвал глубокие и долговременные трансформации в финансовом секторе по всему миру. Традиционные финансовые и банковские системы (Məmmədov, Amanoğlu, 2024) всё чаще заменяются цифровыми платформами, мобильным банкингом, электронными кошельками и платёжными картами. Эти изменения способствовали повышению доступности, скорости и прозрачности финансовых услуг, а также расширению цифровой финансовой инклюзии. Однако данный трансформационный процесс сопровождается новыми рисками, технологическими и регуляторными вызовами. По состоянию на 2024 год (Digital, 2025) объём мирового рынка цифровых платежей достиг 144,9 млрд долларов США, и ожидается, что к 2034 году он превысит 701,5 млрд долларов. Количество пользователей электронных кошельков составило (Which, 2024) 4,3 млрд человек, и прогнозируется рост до 5,8 млрд к 2029 году. Кроме того, электронные кошельки обеспечили (50+Digital) 50% глобальных транзакций в сфере электронной коммерции в 2024 году, тогда как мобильные платежи составили 30% всех цифровых платежей. В соответствии с глобальными тенденциями Азербайджан также добился значительных успехов в области цифровых финансов и платёжных услуг. В 2023 году объёмы и количество безналичных платежей в стране, особенно через POS-терминалы и в сфере электронной коммерции, заметно возросли. Отмечается рост операций через Систему мгновенных платежей (IPS). Совершенствование нормативно-правовой базы, развитие финтех-сектора и внедрение технологических инноваций способствовали укреплению экосистемы цифровых финансов в стране. Тем не менее, остаются определённые проблемы. Доля безналичных платежей в регионах остаётся низкой, уровень цифровой финансовой грамотности слабый, а система мгновенных платежей и мобильный банкинг недостаточно распространены. Институциональная структура финтех-сектора ещё не полностью сформирована, а цифровая инфраструктура сталкивается с определёнными ограничениями. Поэтому для полного раскрытия потенциала цифровых финансов необходимы скоординированные и комплексные меры. Цель данной статьи - проанализировать ключевые изменения в сфере финансовых услуг и платёжных систем в условиях цифровой экономики, выявить существующие проблемы и предложить эффективные решения. В исследовании рассматриваются недостатки правовой и технологической инфраструктуры, необходимость повышения цифровой грамотности, кибербезопасности и применения инновационных технологий. В результате отмечается, что цифровые финансовые услуги - в особенности мобильные платежи, онлайн-банкинг и финтех-платформы - ускоряют интеграцию широких слоёв населения в финансовую систему и повышают экономическую инклюзивность. Для обеспечения устойчивого развития в этом секторе необходимо укреплять сотрудничество между государством, банковским сектором и частными финтех-компаниями. Кроме того, требуется обновление нормативно-правовой базы и технологической инфраструктуры, а

также широкое внедрение электронной идентификации и решений на основе искусственного интеллекта для обеспечения безопасности. Принятие таких мер создаст основу для формирования конкурентной среды цифровых финансов в стране.

Ключевые слова: цифровые финансы, платёжные услуги, трансформация, инклюзивность, финтех, цифровизация, безопасность.

The modern development stage of digital financial services

In recent decades, rapid technological advancement has fundamentally transformed the global economy, redefining both the structural and functional principles of the financial sector. Traditional financial models are increasingly being replaced by digital payment platforms, electronic wallets, mobile banking, and artificial intelligence – driven financial services. This ongoing transformation represents not only technological modernization but also a new stage in economic integration and social inclusivity. Consequently, the development of digital financial services enhances efficiency, transparency, and security in global market relations, thereby strengthening the competitiveness and adaptability of national economies. New-generation payment systems - such as SWIFT GPI, SEPA Instant (Europe), FedNow (United States), Pix (Brazil), and UPI (India) - enable real-time cross-border transactions. These technologies have reduced the average execution time of international money transfers by nearly 80% (World Bank, 2023), significantly improving flexibility and liquidity in global financial flows. Digital financial services, particularly mobile banking and e-wallets (such as M-Pesa in Kenya, Alipay in China, and Paytm in India), have integrated millions of unbanked individuals into the formal financial system. Such inclusion (UNDP, 2022) has contributed to poverty reduction, women’s economic empowerment, and the promotion of regional economic equality. With the expansion of digitalization, issues related to financial stability and data security have become increasingly pressing. The International Monetary Fund (IMF, 2023) emphasizes that ensuring the resilience of digital financial systems requires the strengthening of KYC/AML requirements, the improvement of cybersecurity frameworks, and the regulation of cross-border data flows. These efforts aim to mitigate both reputational and technological uncertainty risks within the global financial system.

Legal and regulatory support for technological innovation in finance has become one of the key priorities of modern state policy. The European Union’s PSD2 Directive (European Commission, 2021) enhances transparency in financial services and protects consumer rights. Meanwhile, Singapore’s “Smart Financial Centre” strategy (WEF, 2023) creates a regulatory sandbox environment that fosters innovative start-ups, and countries such as the UAE, Bahrain, and Qatar have established specialized legal regimes for digital banking. The effective and secure use of digital financial services largely depends on users’ technological and financial literacy. Digital literacy encompasses not only the ability to use technology (OECD, 2022) but also skills in making informed financial decisions, managing personal data, and protecting against cyber threats. For this purpose, many countries have implemented targeted education programs - particularly for young people, women, and rural populations - to strengthen financial awareness and improve technological competence.

Next-generation digital platforms now perform not only operational functions but also analytical ones, including decision-making, risk forecasting, and customer behavior modeling. According to McKinsey (McKinsey & Company, 2024), the implementation of artificial intelligence technologies in the financial sector could contribute up to USD 1,2 trillion to global GDP by 2030. Recent studies demonstrate the remarkable growth of the global digital payments market. In 2024, its volume reached USD 144,9 billion, with projections indicating an increase to USD 701,5 billion by 2034. The number of digital wallet users rose to 4,3 billion, and is expected to reach 5,8 billion by 2029. In the same year (McKinsey & Company, 2024), digital wallets accounted for 50% of all global

e-commerce transactions, while mobile payments represented 30% of total digital payments. This evolution signifies a paradigm shift in financial intermediation: financial services are no longer the exclusive domain of traditional banks. FinTech companies (Arner, Barberis & Buckley, 2015), technology start-ups, and digital platforms have emerged as new and dynamic actors within the financial ecosystem. Thus, digital transformation:

- Enhances economic inclusivity, particularly among rural communities, women, and micro-entrepreneurs;
- Expands access to banking and financial services for unbanked populations;
- Creates new regulatory and cybersecurity challenges, including those related to data privacy and consumer protection.

The development of a sustainable digital financial system is closely linked with digital literacy, infrastructure quality, regulatory readiness, and public confidence in technology. Therefore, reforms in this area should not be limited to technological innovations but should also address economic, social, and institutional transformations. Ultimately, digital finance and payment services have become a strategic pillar of the modern economy. Their advancement enables deeper integration into the global financial system, enhances economic inclusivity, and ensures broader access to transparent and secure financial services. However, the continued success of this transformation depends on the improvement of regulatory and legal frameworks, the advancement of digital literacy, the modernization of technological infrastructure, and the expansion of international cooperation. Sustainable development in this sector will be achieved only through the alignment of technological innovation, human capital, and public policy.

A review of theoretical and conceptual foundations

There is a rich body of literature examining digital finance and financial services, emphasizing the nature and impact of digitalization. These studies converge on the conclusion that the rapid growth and expanding scope of digital financial services over the past decade have profoundly reshaped financial intermediation. Compared with traditional banking, digital finance and payment systems offer mechanisms that are more flexible, transparent, and accessible. Zetsche, Buckley, and Arner (Zetsche et al., 2020) define digital finance as the provision of financial services through digital technologies, encompassing mobile banking, e-wallets, blockchain-based platforms, QR-code payments, and a wide range of FinTech solutions. The transformation of digital finance and payment services extends beyond technological innovation. It also (Kass-Hanna, Lyons, & Fontes, 2022) involves multidimensional aspects such as economic inclusiveness, social equity, cybersecurity, sustainability, and regulatory adaptability. Consequently, this transformation embodies both functional innovation and institutional as well as behavioral change. According to the OECD (OECD, 2023), the technological shifts observed in modern economic relations are not confined to production and service sectors; they also drive deep structural transformation within the financial system. The process of digitalization alters the form, speed, geographical reach, and overall efficiency of financial service delivery, leading to a more interconnected and dynamic financial environment.

Demirgüç-Kunt et al. (2018) argue that the evolution of digital finance represents one of the clearest manifestations of transformation occurring at the intersection of technology and the economy. They emphasize that digital platforms enhance access to financial services, reduce transaction costs, and promote financial inclusion, though they simultaneously introduce new regulatory and technological challenges. Research by Demirgüç-Kunt et al. (2018) further demonstrates that digital financial systems facilitate the integration of unbanked populations – particularly in developing economies – into productive economic activities. In this sense, digital technologies align closely with the theoretical framework of financial inclusion. Arner, Barberis, and Buckley (2015) describe digital

finance as a new system emerging from the fusion of traditional financial instruments with digital technologies. They note that this transformation has evolved through four major stages: the development of financial technologies in the 1990s, the spread of internet banking in the 2000s, the rise of mobile payments in the 2010s, and the emergence of platform-based digital systems in the 2020s. Zetsche, Buckley, and Arner (2020) also propose a regulatory framework grounded in a proactive, technologically neutral, and flexible approach to digital finance. In their view, regulators should simultaneously foster innovation while ensuring consumer protection and cybersecurity. In the modern economy, the transformation of digital financial and payment services exerts a profound influence on both micro- and macro-level economic growth. According to Li and Xie (2025), digital finance reduces firms' financing constraints and accelerates their digital transformation. As the authors note, "digital finance can alleviate firms' financing constraints, expand firms' financing channels, and promote their digital transformation". This finding underscores that the development of digital financial infrastructure enhances corporate competitiveness and fosters greater openness to innovation.

At the same time, behavior-oriented research by Birigozzi, De Silva, and Luitel (2025) demonstrates a direct positive relationship between the diffusion of digital payments and overall economic growth. Their empirical estimates indicate that "each percentage increase in the adoption of digital payments contributes to an increase in GDP growth, boosting it between 6 % and 8 % of its current growth rate". Hence, the expansion of digital payment systems affects not only the financial sector but also the dynamism and productivity of the economy as a whole.

As highlighted in Mammadov (2023a), the expansion of digital services within Azerbaijan's regional development model has driven a transition to a new structural phase of economic growth. The author emphasizes that digital-infrastructure-based management mechanisms, e-services, and "smart" economic platforms play a pivotal role in reducing socio-economic disparities among regions. In this context, digital financial services enhance regional financial inclusion and banking penetration, improve fiscal revenues, and strengthen transparency in tax administration. In another dimension, Mammadov's (2023b) study on the foundations of the green economy stresses that digital services function as a vital platform for sustainable economic growth. Digital technologies enable flexible decision-making in the management of ecological and financial resources, improve information flows, and facilitate evidence-based economic policymaking. Consequently, this convergence gives rise to an emerging synthesis of *green finance* and *green digital economy* concepts.

In the international context, the study by Musayeva, Madatova, Mammadov, Gasimov, and Ahadova (2020) on evaluating tax-policy efficiency under uncertainty illustrates the growing importance of digital analytics and data technologies in fiscal governance. The authors highlight that digital platforms and data-driven models provide more accurate outcomes in risk assessment and revenue forecasting. Finally, Ganbarov, Smolağ, Muradov, Aghayeva, Jafarova, and Mammadov (2020), in their article published in *Sustainability*, emphasize the crucial role of digital services in ensuring transparency and sustainability within the mortgage and real-estate markets. Digital financial platforms hold strategic significance by enhancing social equity, mitigating market risks, and improving the overall efficiency of state regulation.

In the twenty-first century, three foundational pillars of information technology - blockchain, artificial intelligence (AI), and application programming interfaces (APIs) - have become the principal driving forces of digital transformation. These technologies represent not only technical progress but also a profound restructuring of economic systems, legal frameworks, and social relations. Understanding their theoretical foundations provides an essential intellectual basis for their practical application and integration across industries. Blockchain, AI, API technologies, and

decentralized finance (DeFi) systems collectively shape the next phase of digital finance. Gomber et al. (2018) observe that artificial intelligence is widely applied in modeling credit risk, enhancing customer service, and detecting fraudulent activities. Don and Alex Tapscott (Tapscott & Tapscott, 2016) describe blockchain as a “trust protocol,” emphasizing that it represents not merely the foundation of cryptocurrencies but a transparent, immutable platform for conducting all economic and social transactions. In their view, this technology reduces dependence on centralized intermediaries and possesses a strong potential for disruptive innovation.

Satoshi Nakamoto (Nakamoto, 2008), the creator of the blockchain concept, proposed in his 2008 technical paper on Bitcoin that “to create a completely trustless system, transactions must be immutable and validated through a consensus mechanism incentivized by cryptocurrency.” Nakamoto’s model introduced the technical foundations of distributed consensus and SHA-256 cryptography. Legal scholars De Filippi and Wright (2018) assess blockchain as both a mechanism of encoded governance and a tool for legal transformation. They argue that “code is equated with law - blockchain technology can automate and redesign legal processes.” Their concept of a “coded constitution” explores blockchain’s potential to influence normative systems and institutional structures. Kevin Werbach (2018) from the University of Pennsylvania examines blockchain through the lens of regulatory governance, asserting that “although blockchain may appear to be a self-regulating system, legal frameworks remain essential for its integration into society”. He concludes that blockchain must exist as a “code-governed but law-supported” structure to ensure legitimacy and trust. Arvind Narayanan and colleagues from Princeton University (Narayanan et al., 2016) draw attention to blockchain’s limitations and misconceptions, contending that “blockchain is not a universal solution; its application is meaningful only where decentralization creates real value”. They emphasize that blockchain is not solely a technical innovation but a complex conceptual framework that demands contextual and systemic coherence.

According to Russell and Norvig (Russell & Norvig, 2021), pioneers in the field of artificial intelligence, “AI is the creation of intelligent agents - systems that perceive their environment and act accordingly”. They stress that the ultimate goal of AI is not to imitate human behavior but to construct systems capable of making rational decisions. Nick Bostrom (Bostrom, 2014) warns that artificial intelligence, once it reaches the level of superintelligence, may pose existential risks to humanity: “Once a superintelligent AI is created, it may be impossible to predict or control its behavior, potentially threatening human existence”. He introduces the instrumental convergence thesis, which suggests that superintelligent systems may employ unforeseen and harmful methods to achieve their objectives. Yann LeCun (LeCun, 2019), head of Facebook AI Lab and one of the pioneers of deep learning, presents a more optimistic view, stating that “AI is designed to improve human life and augment human potential, not replace it”. He argues that human-level AI remains a distant prospect and that current efforts should prioritize practical and ethically guided applications.

Geoffrey Hinton (Hinton, 2017), one of the founding figures of deep learning, acknowledges the transformative power of AI but also highlights ethical and safety challenges. He asserts that “when we teach machines to learn, we face the problem of not understanding how they think,” referring to the “black box” nature of AI systems, whose decision-making mechanisms often remain opaque. Fei-Fei Li (Li, 2018) of Stanford University is among the leading advocates for human-centered and ethical AI. She argues that “we must think not only about what we can do, but also about what we should do. AI must remain human-centered.” Li highlights the potential of AI to promote equality and social welfare in fields such as medicine, education, and justice. Gary Marcus (Marcus, 2020), one of the prominent skeptics of AI, argues that current deep learning models are data-driven replication systems rather than true reasoning mechanisms. He maintains that AI must be reinforced

by stronger logical and interpretable structures in order to gain reliability and broader applicability. In sum, the development of artificial intelligence in the modern era has sparked profound debates not only on technical grounds but also from philosophical and ethical perspectives. Although scholars diverge in their viewpoints, they converge on the notion that AI represents not just technological progress but a phenomenon that reshapes societal values and structures. Hence, decisions about AI's future must integrate both scientific reasoning and ethical responsibility. Application Programming Interfaces (APIs) serve as the connective medium that enables different software systems to communicate and exchange data. They (Fielding, 2000), play a vital role in fostering interoperability among applications, facilitating data sharing, and expanding overall functionality. This approach forms the foundation of modern programming principles such as modular design and reusable code. The Representational State Transfer (REST) architecture, introduced by Roy Fielding, significantly simplified and expanded the scalability of APIs. Fielding (2000) conceptualized this model around the HTTP protocol, emphasizing the importance of designing APIs in a stateless and resource-oriented manner to ensure efficiency and flexibility. APIs are considered a central element of both Service-Oriented Architecture (SOA) and Microservices frameworks. James Lewis and Martin Fowler (2014) describe these technologies as “independently deployable systems composed of functional components,” arguing that APIs are the foundation of agile system design. The theoretical underpinnings of API technologies are not solely technical but also economic and architectural. APIs extend software functionality, enable cross-platform interoperability, and stimulate innovation across digital ecosystems. Researchers increasingly recognize APIs as strategic instruments for structuring and integrating modern digital environments.

In the evolution of contemporary technological systems, the concept of inter-technology synergy has emerged as a novel intellectual paradigm. This idea demonstrates that the integration of diverse technologies results not only in technical convergence but also in economic, social, and ethical transformations. Klaus Schwab (2020), identifies inter-technology synergy as the cornerstone of the Fourth Industrial Revolution, emphasizing that the convergence of technologies such as artificial intelligence (AI), blockchain, IoT, biotechnology, and quantum computing produces structural, not superficial, transformations that reshape global systems. Similarly, Erik Brynjolfsson and Andrew McAfee (Brynjolfsson & McAfee, 2017), confirm that combining technologies like AI and robotics leads to higher productivity and new economic models. They argue that synergy-driven approaches transcend the limits of traditional technological applications, generating fundamental social and organizational change.

Don and Alex Tapscott (2018) explore the synergy between blockchain and IoT systems, noting that such integration enhances transparency, trust, and operational efficiency. According to their findings, this synergy accelerates the automation of supply chains and increases traceability across networks. Michael Porter and James Heppelmann (2015) introduce the concept of “smart-connected products,” highlighting how inter-technology synergy defines the strategic direction of the manufacturing sector. The integration of sensors, artificial intelligence, cloud computing, and data analytics reshapes both product development and service delivery. Based on the analysis of current research, it can be proposed that most existing approaches to inter-technology synergy focus on parallel technological integration, whereas a new perspective - the ethical-intellectual synergy model - may offer deeper insights. This model suggests that technologies once considered independent, such as AI, blockchain, bioinformatics, and social psychology, can collectively generate systems sensitive to ethics, human dignity, and social responsibility. In practice, this model can be observed in smart city frameworks, where AI-based systems are connected with ethical governance mechanisms. Such integration enables the creation of automated yet privacy-preserving environments that enhance urban functionality while protecting citizens' data and individuality. In the Azerbaijani context, examples

of this transformation include the Instant Payment System (IPS), the expansion of POS transactions, the growth of e-commerce platforms, and the increasing use of mobile banking. However (CBAR, 2024), regional disparities in digital access, low levels of digital literacy, and the underdeveloped institutional structure of the FinTech sector still constrain the realization of the full potential of digital transformation.

A regional adaptation model of inter-technology synergy is therefore essential. Technologies are not universal; they must be contextualized according to local geography, cultural codes, and social structures. For example, integrating agricultural technologies with AI in Azerbaijan's regions, while respecting local and religious ethics, would ensure a more inclusive and culturally sensitive approach. AI, blockchain, and API technologies collectively create powerful synergy in the field of digital finance, driving substantial advancements in automation, security, and transparency. AI-based algorithms can predict user behavior to improve credit and risk management; blockchain ensures immutability and traceability of transactions; and APIs enable real-time system integration across financial platforms.

The McKinsey Digital Report (2023) emphasizes that API integration fosters flexible and transparent interactions among banks, FinTech startups, and customers. APIs synchronize services such as digital identification, payment platforms, and tax systems, accelerating the pace of digital transformation. The European Central Bank (ECB, 2024) highlights the role of API technologies within the PSD2 and SEPA Instant frameworks, noting that they enable secure data sharing and support the principles of open banking, thereby enhancing the efficiency and safety of financial transactions. The ethical-intellectual synergy model can also be applied to digital finance. Under this approach, AI-driven credit systems should align with human rights principles, blockchain infrastructures should balance transparency and data privacy, and API technologies should operate in harmony with ethical regulatory frameworks. Likewise, a regional adaptation model remains crucial for ensuring the successful implementation of digital finance technologies in local contexts. Promoting digital literacy among entrepreneurs and facilitating the adoption of blockchain and API systems tailored to regional realities are vital steps. Ultimately, inter-technology synergy must transcend technical efficiency - it should be perceived as a harmonious process that integrates ethical, social, geographic, and cultural realities. Such an approach prioritizes not the technology itself but the construction of a technologically responsible society. Accordingly, multi-intellectual, ethically convergent, and context-driven synergy models may shape the technosocial architecture of the future.

The global landscape of digital payments demonstrates region-specific approaches shaped by regulatory frameworks, technological capacity, and market dynamics. Europe has adopted a regulatory-driven strategy through initiatives such as PSD2 and SEPA Instant, which have fostered open banking ecosystems and enabled real-time payment infrastructures. This approach (BIS, 2023; ECB, 2023), has strengthened competition among financial institutions and stimulated innovation, particularly in fintech services. In contrast, China and South Korea exemplify a state-supported and technology-led model. The dominance of platforms such as Alipay, WeChat Pay, and KakaoPay reflects the success of government-backed digital finance ecosystems that leverage strong technological leadership. The result has been mass adoption, deep integration of payment solutions into daily life, and rapid digital transformation across sectors. Meanwhile, Latin America follows a market-driven and inclusion-oriented trajectory, prioritizing mobile-based payment systems like Pix in Brazil and PSE in Colombia. These platforms have significantly expanded financial inclusion and facilitated wider participation in digital economies, particularly among unbanked populations. Overall (BIS, 2023; ECB, 2023), these regional experiences highlight how regulatory innovation in

Europe, technological dominance in Asia, and inclusion-focused initiatives in Latin America collectively shape the global evolution of digital payment ecosystems.

Table 1

Regional Strategies and Models of Digital Payment System Development

Region	Strategy	Applications	Outcome
Europe	PSD2, SEPA Instant	Open banking, real-time payments	Competition increases, innovation is stimulated
China, Korea	Government support and technological leadership	Alipay, WeChat Pay, KakaoPay	Widespread use and rapid expansion
Latin America	Mobile-based payments and incentives	Pix (Brazil), PSE	Broad coverage and inclusiveness

Source: Compiled by the author based on table [BIS, 2023; ECB, 2023].

The transformation of digital finance and payment services possesses not only technological but also socio-economic significance. Research indicates that successful implementation depends on several key conditions:

- Technological infrastructure (e.g., broadband internet, mobile devices)
- Digital and financial literacy
- Regulatory adaptation
- Support for an innovative ecosystem and startups

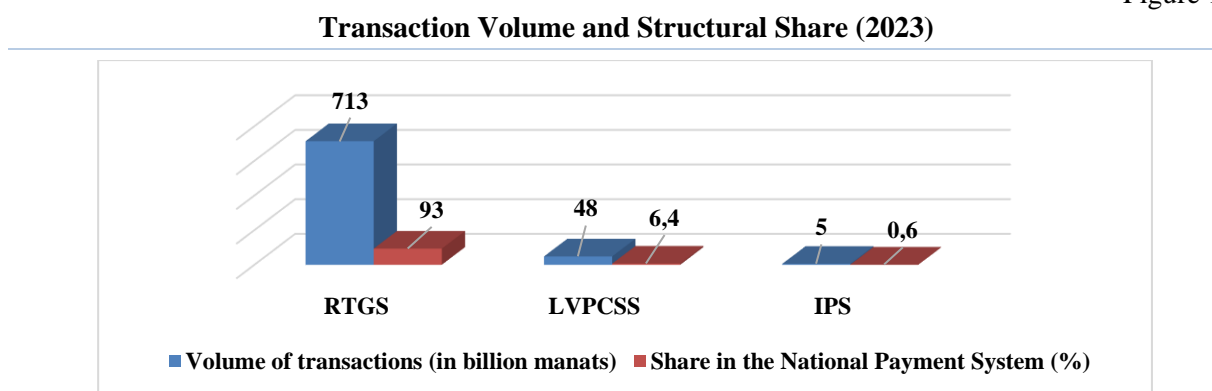
Within this framework, Azerbaijan's strategic development plans and infrastructural initiatives in the field of digital finance - such as the Instant Payment System and e-government payment solutions - can be evaluated as integral components of this broader transformation process.

The modern development level and megatrends of Azerbaijan's National Payment System

The rapid advancement of digital financial technologies has transformed national payment systems into a strategic pillar of the modern financial infrastructure. The efficiency of these systems goes far beyond ensuring the speed and security of transactions (World Bank, 2023), they also play a crucial role in maintaining macroeconomic stability and deepening the digital economy. In recent years, Azerbaijan's National Payment System (NPS) has demonstrated remarkable progress against the backdrop of expanding digital financial technologies. The following analysis, based on international comparisons, draws upon referenced statistics, reports from global financial organizations, and regional examples to provide a comprehensive evaluation. The total volume of transactions executed through Azerbaijan's (CBAR, 2024), NPS in 2023 amounted to 766,4 billion manats, exceeding the country's nominal GDP by a factor of 6,2. This ratio of payment turnover to GDP indicates the intensive digitalization of the financial system and suggests that payment operations are increasingly outpacing the real sector of the economy. Transactions processed via RTGS (Real-Time Gross Settlement System) accounted for 93% of the total payment volume. This system (CBAR, 2024), primarily serves large-value, high-reliability, and real-time transactions. Compared with 2010, the number of transactions processed through AZIPS in 2023 increased 5,9 times, the total volume rose 9,1 times, and the average transaction value grew 1,5 times. The Low-Value Payment Clearing and Settlement System (LVPCSS) mainly processes recurring and small-scale payments. In 2023 (CBAR, 2024), the number of transactions in this system increased 14,8 times, and the total volume rose 7,7 times compared with 2010, while the average transaction value decreased 1,9 times. This trend confirms that LVPCSS has become increasingly oriented toward micro-payments. The Instant Payment System (IPS), launched at the end of 2020 (CBAR, 2024), has shown rapid expansion within a short period. In 2023, the number of transactions increased 42 times,

while the total value grew 21 times. However, the average transaction value declined twofold, demonstrating that İPS is primarily used for fast and low-value daily payments.

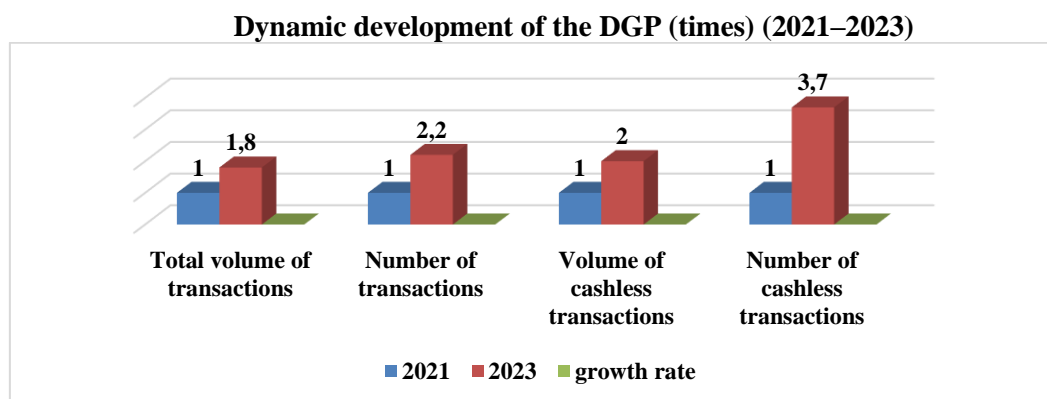
Figure 1



Source: Figure prepared by the author based on data from sources [CBAR, 2024].

A significant increase has also been observed in transactions conducted through the Digital Government and Government Payment Portal (DGP). Compared to 2021, the total volume of transactions in 2023 rose by 1,8 times, while the number of transactions increased by 2,2 times. The number of cashless transactions grew by 3,7 times, and their total value doubled. This trend (Digital Government Report, 2023) is closely associated with the digitalization of public services and the enhancement of citizens’ digital financial literacy.

Figure 2



Source: Figure prepared by the author based on data from sources [CBAR, 2024].

Azerbaijan’s National Payment System (NPS) has entered an advanced phase of digital transformation in recent years. The dominant position of RTGS demonstrates that the country has established a reliable infrastructure for large-value transactions. Nevertheless, there remains significant potential for integrating small-value and everyday payments into digital platforms. Research reveals a structural imbalance in the composition of payment systems-most of the operational load is concentrated on RTGS. This highlights the necessity of developing the infrastructure and legal framework of small-value payment systems and instant payment mechanisms. The assessment of the current state of Azerbaijan’s National Payment System allows the following conclusions:

- The dominant role of RTGS within the national payment infrastructure indicates that large-value and critical transactions are primarily processed through this system, underscoring its strategic importance for financial stability.

- LVPCSS is mainly used for interbank and routine operations, providing flexibility but operating at a significantly smaller scale compared to RTGS.

- The relatively low share of instant payment systems IPS indicates that they are either newly introduced or functionally limited; however, their expansion offers strong potential for microfinance development and technological innovation.

- The upward trend observed in the Digital Government Payment (DGP) system - especially in cashless transactions - reflects the growing digital financial literacy of the population and the wider adoption of digital technologies.

From the perspective of the further development of Azerbaijan's National Payment System, the following priorities are crucial:

- Expansion and functional enhancement of the IPS system, turning it into an effective payment tool for micro-enterprises and individual entrepreneurs.

- Acceleration of the DGP system through incentives for cashless payments and tax concessions.

- Consolidation of the National Payment Platform, which can improve efficiency through greater integration and data sharing across subsystems.

- Promotion of digital financial literacy OECD. (2023).

- Expansion of digital infrastructure across all regions of the country.

- Development of interoperability mechanisms between systems.

- Enhancement of the functional capacity of LVPCSS and IPS.

- Creation of behavioral incentive mechanisms to promote the use of digital payment habits among users.

Comparative international and regional analysis of the development of Azerbaijan's National Payment System

One of the key indicators for assessing the effectiveness of a modern financial infrastructure is the technological level, security standards, and usage intensity of national payment systems. From this perspective, Azerbaijan's National Payment System (NPS) has demonstrated remarkable progress in recent years under the influence of digital technologies. Structurally, Azerbaijan's NPS - comprising the RTGS, LVPCSS, IPS, and DGP components - represents a multi-layered system capable of supporting various types of financial operations. However, when compared with international leaders, the scope and intensity of utilization of these systems remain relatively limited. The table below presents a comparative overview of the main indicators of Azerbaijan's NPS in contrast with selected international and regional benchmarks.

Table 2.

Comparative indicators of instant payment systems by country (2023)

Country	Instant Payment System	Number of Instant Transactions (billion)	Transactions per Capita	Cashless Turnover / GDP (%)	Cards per Capita (million)
Azerbaijan	IPS (Instant Payment System)	0,005	0,5	40	1,375
India	UPI (Unified Payments Interface)	100	70	65	0,643
Brazil	Pix	24	110	75	2,51
United Kingdom	Faster Payments	4,5	65	95	2,46
Estonia	SEPA Instant	0,06	45	90	1,92
Poland	Express Elixir	2,4	60	70	1,18

Source: Authors' compilation based on data from Banco Central do Brasil (2023), Bank for International Settlements (2023), Central Bank of the Republic of Azerbaijan (2024), European Central Bank (2023), Narodowy Bank Polski (2023), and World Bank (2023).

At the international level, countries such as India and Brazil have achieved remarkable success in both the implementation and widespread use of innovative payment systems. For instance, the UPI system in India has reached over 100 billion annual transactions, reflecting the rapid adoption and deep integration of digital payments into everyday life. In Brazil, the number of transactions per capita has risen to 110, which demonstrates the country's high level of digital financial literacy and the broad diffusion of digital financial services. By comparison, Azerbaijan's corresponding figure of 0,5 indicates that the role of digital payments in daily economic life remains relatively limited. In terms of cards per capita, Azerbaijan shows a certain degree of proximity to international leaders. This implies that access to bank cards is relatively high; however, their use in everyday payment operations remains modest. With respect to cashless turnover, Azerbaijan's share (40%) still lags behind the global average and particularly behind the European benchmark, where the average ranges between 80% and 90%. These comparisons reveal that while Azerbaijan's digital payment infrastructure is well-developed in terms of accessibility, its usage culture and transactional intensity remain in the early stages of diffusion. The experiences of India's UPI and Brazil's Pix show that success in digital payment ecosystems depends not only on technological readiness but also on behavioral transformation, policy incentives, and public trust. For Azerbaijan, a transition toward higher usage rates could be accelerated by:

- promoting financial literacy programs focused on digital payments;
- integrating instant payment systems more deeply into e-commerce and government service platforms;
- and introducing tax and transactional incentives to encourage cashless behavior.

Such measures could significantly enhance the penetration and sustainability of the national digital payment ecosystem, aligning it with global best practices in financial innovation. From a regional perspective, Russia and Türkiye occupy leading positions in the field of National Payment Systems. In Russia, the SFP (System for Fast Payments) system processed approximately 9,5 billion transactions in 2023. This achievement reflects not only the country's advanced technological infrastructure but also the high level of public confidence in digital payment solutions. In Türkiye, the FAST system, despite being relatively new, reached 4,2 billion transactions within a short period. Kazakhstan and Georgia are also experiencing a steady upward trajectory in the development of their respective instant payment systems. Azerbaijan, however, remains comparatively behind in terms of transaction volumes. Yet, according to the cards per capita indicator, Azerbaijan outperforms both

Georgia and Kazakhstan - an outcome that signifies successful progress in financial inclusion and bank penetration, while also indicating limited utilization of payment cards for digital transactions.

Table 3

Regional comparison of instant payment system development Indicators (2023)

Country	Instant Payment System	Instant Transaction Volume (billion)	Transactions per Capita	Cashless Turnover/GDP (%)	Cards per Capita (million)
Azerbaijan	IPS	0,01	0,5	40	1,4
Georgia	Instant Payment	0,1	27	52	1,4
Kazakhstan	IBS	0,4	18	58	2,4
Uzbekistan	SMS-based	0,1	1,5	30	0,6
Türkiye	FAST	4,2	49	65	3,7
Russia	SBP	9,5	65	75	2,4

Source: Authors' compilation based on data from Bank for International Settlements (2023), Central Bank of the Republic of Azerbaijan (2023), European Central Bank (2023), UK Finance (2023), and World Bank (2023).

The National Payment System of Azerbaijan has been technically structured and modernized; however, its level of practical use still lags behind both global and regional leaders. The main reasons for this gap include a relatively low level of public awareness regarding the Instant Payment System, insufficient legal and institutional promotion of APIs and Open Banking mechanisms, restricted accessibility of digital identity tools, and limited technology transfer through regional cooperation frameworks.

Analysis of payment card usage level in Azerbaijan

In Azerbaijan, the majority of cardholders still tend to use their payment cards primarily as a means of cash withdrawal rather than for cashless transactions. On average, an Azerbaijani citizen performs around 16 cash withdrawal operations per year via payment cards - a figure approximately three times higher than the global and regional averages. This situation indicates that payment cards in Azerbaijan are still predominantly perceived as instruments for accessing cash rather than as digital payment tools. One of the underlying causes of this tendency lies in the relatively underdeveloped processing infrastructure within the country. Although the POS (Point of Sale) network has expanded in recent years, ATMs continue to be used mainly for cash withdrawals. This pattern points to ongoing structural transformations in the payment culture, where the transition from a cash-based to a cashless economy remains incomplete. During the period of 2018–2023 (CBAR, 2024), the number of cash withdrawals increased by threefold, and their total volume rose by 2,5 times, reaching 162,3 million transactions and 39,1 billion AZN, respectively. In comparison, the number of transactions conducted via POS terminals doubled, while their total volume increased by 2,4 times. However, 99,8% of all card transactions were carried out through ATMs, whereas only 0,2% were executed via POS terminals. These figures clearly demonstrate that the prevalent card usage behavior in Azerbaijan remains heavily oriented toward cash withdrawals. In contrast, the principal goal of the digital financial economy is to enhance the share of cashless turnover by promoting electronic payments, thereby strengthening financial inclusion and transaction transparency.

In 2023, approximately 75% of all card transactions in Azerbaijan consisted of cash withdrawal operations. For comparison (CBAR, 2024, World Bank, 2023), this indicator stood at 48% in Ukraine, 40% in Kazakhstan, 28% in Russia, and the global average was only 14%. Such a large disparity highlights the underdeveloped state of cashless payment culture in Azerbaijan and remains one of the key structural challenges facing the national financial sector. The persistently high level of cash withdrawals also poses significant macroeconomic implications. It not only slows the transition

toward a digital financial ecosystem but also increases the risk of shadow economic activity, as cash-based operations are harder to monitor and regulate. Consequently, reducing cash dependency and promoting the adoption of electronic payments have become strategic priorities for ensuring financial transparency, efficiency, and fiscal sustainability in Azerbaijan. The predominance of cash withdrawals in total payment card operations in Azerbaijan in 2023 can be explained by four key factors:

1. Lack of established card usage habits: A significant portion of citizens primarily use their payment cards to receive salaries, pensions, or social benefits, after which they immediately withdraw the funds in cash. This behavioral pattern reflects a limited transition toward digital consumption and weak confidence in non-cash transactions.

2. Limited POS terminal infrastructure in the trade and service sectors: Especially in the regions, the availability of POS (Point of Sale) terminals remains insufficient. The underdevelopment of merchant acceptance networks restricts consumers' ability to make card-based payments and reinforces the preference for cash settlements.

3. High propensity toward cash circulation: In certain sectors of the economy, cash transactions are deliberately preferred as a means of avoiding formal accounting or taxation. This trend not only reduces financial transparency but also indirectly supports the expansion of the shadow economy.

4. Low level of financial literacy: Public awareness regarding the advantages of cashless transactions - such as convenience, traceability, and security – remains limited. Insufficient educational and promotional efforts hinder the formation of a strong digital payment culture among consumers and businesses.

Taken together, these factors illustrate that the persistence of cash-based behavior in Azerbaijan is primarily structural and behavioral, requiring both institutional reforms and comprehensive awareness campaigns to accelerate the shift toward a cashless economy. In Ukraine, the share of cash transactions has been steadily declining. Over the past few years, the expansion of digital payment incentives, financial inclusion programs, and the rapid growth of e-commerce have significantly increased the share of non-cash payments. Remarkably, even during wartime, public confidence in electronic payment systems remained stable. In Kazakhstan, the National Bank's initiatives during 2021–2023 to promote digital payments led to a notable expansion of the POS (Point of Sale) network. Since these programs covered not only urban centers but also rural regions, the level of cash withdrawals declined considerably. In Russia, the government has long promoted non-cash payments through the Mir national payment system, mobile payment platforms such as SberPay and YandexPay, and tax incentives. This integrated policy approach has substantially reduced the level of cash-based card usage. Globally, only about (UK Finance, 2023, World Bank, 2023) 13–15% of payment card transactions involve cash withdrawals. In advanced digital economies such as the Nordic countries, Singapore, South Korea, and Canada, this figure drops below 5%, demonstrating the successful establishment of fully cashless economic systems.

By contrast, Azerbaijan's 75% cash withdrawal ratio in 2023 indicates that the transition toward a cashless economy remains slow. A more balanced POS infrastructure, nationwide awareness programs, promotion of official payment systems, and digital tax incentives could play a vital role in accelerating this transition. Despite the high share of cash withdrawals, digital commerce and non-cash operations grew sharply in 2023. The total volume of domestic e-commerce transactions increased (CBAR, 2024, McKinsey & Company, 2024, Məmmədov Y.Ə., Amanova Ş.M., 2024) 5.2 times compared to 2021, reaching 39.2 billion azn (manat), while cross-border e-commerce rose 1.5 times to 2 billion azn. These developments indicate that the population is gradually adopting digital

payment practices; however, this transformation has not yet been fully reflected in the behavioral patterns of cardholders. This dual dynamic - rapid growth in electronic commerce alongside the continued dominance of cash operations - can be explained by the following structural and behavioral contradictions:

1. Urban–regional disparity: Digital trade is concentrated mainly in Baku and large cities. In regional areas, limited infrastructure and logistical constraints make citizens more dependent on cash payments.

2. Role of bank cards in e-commerce: Approximately 95% of e-commerce transactions are conducted through bank cards. Although this demonstrates their potential in trade operations, such potential is not yet fully realized in daily consumer payments.

3. Expansion of digital platforms but practical application gap: Large-scale e-commerce platforms such as ABB, Bravo, eManat, and Kontakt are rapidly expanding. However, a segment of consumers still prefers to pay couriers in cash after online purchases, creating a paradox of “digital trade, cash payment.”

4. Share of e-commerce in total consumption: The share of e-commerce in total retail trade increased from 15% in 2021 to 66% in 2023, creating favorable conditions for digital payment transformation. Yet, post-purchase behaviors, particularly cash withdrawals, continue to impede full transition to cashless commerce.

It should be noted that in countries (OECD, 2022) such as Scandinavia, South Korea, and Singapore, 98–99% of e-commerce transactions are completed via payment cards, leaving virtually no cash component. In Azerbaijan, despite expanding digital infrastructure, cash-based payment behavior continues to coexist in parallel. The coexistence of a high cash withdrawal ratio with the rising role of payment cards in e-commerce highlights that the expansion of digital payments requires more than technological infrastructure. It must be supported by behavioral change, financial education, and regulatory incentives. To transform the current situation and foster the transition toward a cashless economy, the following strategic priorities are essential:

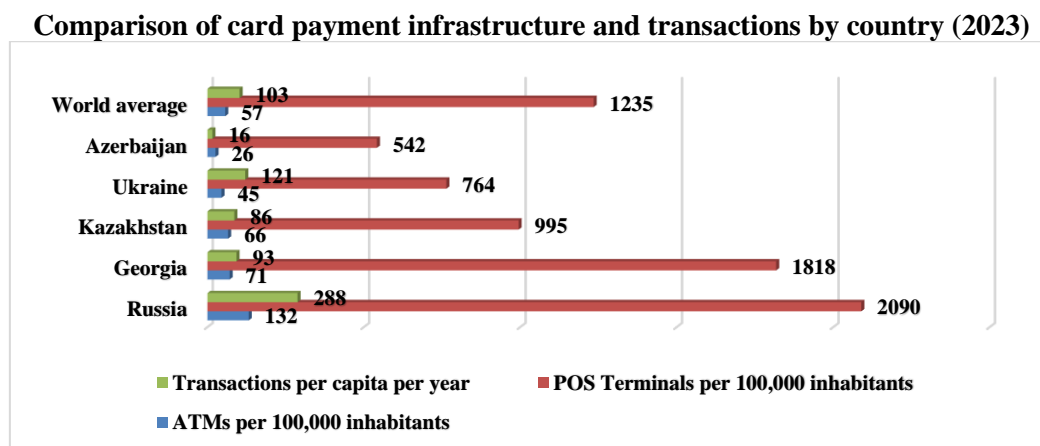
- Expansion of POS networks in regional areas;
- Implementation of national programs for digital financial literacy;
- Regulation of cash withdrawal operations through tax and commission mechanisms;
- Introduction of additional incentives and benefits for cashless payments in e-commerce.

The level of domestic use of debit cards in Azerbaijan has been steadily increasing. In 2023, the number of transactions conducted via debit cards reached 1,1 billion - representing a 10,4 - fold increase - while their total volume amounted to 85,1 billion manats, showing a 5,3-fold rise compared to previous years. The volume distribution by transaction channels was as follows: ATMs – 42%, POS terminals – 12%, e-commerce – 44%, and self-service terminals – 2%. These figures indicate that debit cards are becoming an integral component of everyday financial behavior, with a growing role in electronic commerce each year. International transactions performed (Məmmədov Y, Amanova Ş, 2024) with debit cards have also demonstrated notable growth. Between 2018 and 2023, the number of cross-border transactions made with debit cards increased 7,7 times, while their total volume rose 3,5 times, with 94% of operations being cashless. This trend reflects the rising participation of Azerbaijani citizens in cross-border e-commerce and tourism activities. Progress has also been observed in the use of credit cards. During the same period (Məmmədov Y, Amanova Ş, 2024), (2018–2023), the number of domestic transactions made through credit cards increased 8,5 times, and their total volume grew 3,3 times, reaching 117 million transactions and 6,3 billion manats, respectively. In 2023, the structure of domestic credit card transactions by channel was as follows: ATMs – 21%, POS terminals – 32%, e-commerce – 43%, and self-service terminals – 4%. Additionally, 27% of these operations were conducted through contactless POS terminals, reflecting

a significant digitalization trend in payment behavior. Although the number of international transactions using credit cards increased 2,6 times in the same period, their total volume declined by 11%, with 99% of these transactions being cashless. This suggests that credit cards are primarily used for consumer purchases, while households remain cautious about over-indebtedness risks.

Despite substantial progress in the development of the national payment card ecosystem over the past decade, debit cards continue to dominate the market. In particular, debit card operations account for 93% of the total transaction volume within Azerbaijan’s payment services market. This dominance highlights the population’s preference for lower-risk, deposit-based instruments and the central role of debit cards in advancing financial inclusion and digital payments. Reforms carried out in Azerbaijan to promote cashless payments have already started producing tangible results. As a consequence of these reforms, both the volume and the coverage of non-cash transactions have expanded substantially. The use of payment cards in executing domestic and international electronic commerce (e-commerce) and service transactions has increased rapidly. Between 2021 and 2023, the domestic volume of e-commerce grew 5,2 - fold, reaching 39,2 billion manats, while international e-commerce rose 1,5 - fold to 2 billion manats. For comparison, the share of e-commerce in the country’s (CBAR, 2024) consumer market (retail trade, public catering, and paid services) increased from 15% in 2021 to 66% in 2023, demonstrating remarkable expansion. In contrast, the scale of e-commerce operations in foreign trade remains relatively modest. Overall, these indicators confirm the broadening of the digital economy in Azerbaijan and the growing importance of card-based payment systems in its infrastructure. The intensity of card-based payments within e-commerce has been rising steadily. Over the past five years, the number of card payment transactions in this segment increased six-fold, while their monetary volume surged twenty-fold. Despite this significant progress, the saturation level of the domestic payment card market and the development of processing infrastructure remain comparatively lower than global and regional averages. For instance, Azerbaijan lags behind several neighboring and peer countries - Russia, Georgia, Kazakhstan, and Ukraine - as well as the global average, in terms of the number of ATMs and POS terminals per 100 thousand inhabitants. This disparity reflects that the technological and geographical balance of payment infrastructure has not yet been fully achieved. Bridging these gaps is essential for ensuring equitable access to digital financial services and enhancing the inclusiveness of the cashless economy.

Figure 3.



Source: Authors’ compilation based on data from Bank for International Settlements (2023), Central Bank of the Republic of Azerbaijan (2023), European Central Bank (2023), UK Finance (2023), and World Bank (2023).

Despite notable progress in recent years, Azerbaijan's payment card system remains characterized by a cash-dominant structure and certain institutional and infrastructural shortcomings. Promoting a culture of cashless payments and expanding payment infrastructure in regional areas should therefore be considered key priorities to align the national system with global benchmarks. At the same time, initiatives aimed at enhancing financial literacy and digital inclusion are essential to facilitate this transition and ensure more balanced, sustainable growth in the payment ecosystem.

Conclusion

The integration of digital technologies into the financial sector has led to profound transformations in Azerbaijan's banking, payment, and fintech ecosystem. The rapid expansion of mobile and internet banking has significantly increased financial inclusion, particularly in regions with limited access to traditional banking services. This expansion not only enhances operational efficiency but also reduces transaction costs and broadens participation in financial markets. Fintech companies have become key drivers of innovation and competition by introducing alternative financial solutions such as e-wallets, peer-to-peer transfers, and digital microfinance tools. Their growing presence has improved access to finance, strengthened efficiency, and created new investment opportunities within the national financial system. Simultaneously, the steady growth of cashless payments and the modernization of national payment infrastructures - including Azericard and MilliKart - have contributed to greater transparency and tax compliance in the economy. The widespread use of payment cards, mobile applications, and online platforms has accelerated the shift toward a more digital and accountable financial environment.

Microfinance mechanisms also play a pivotal role in expanding access to finance for small and medium-sized enterprises (SMEs) and rural populations. These mechanisms enhance regional economic activity, reduce social inequality, and help curb the informal economy. To ensure the security and sustainability of these processes, the Central Bank of Azerbaijan has been aligning the national regulatory framework with international standards. Although the legal status of cryptocurrencies in Azerbaijan remains undefined, ongoing discussions and pilot initiatives reflect a growing institutional interest in blockchain-based solutions. The potential introduction of a Central Bank Digital Currency (CBDC) could mark a new stage in the evolution of the national financial system. The digital financial services market in Azerbaijan is undergoing a comprehensive and dynamic transformation. Key pillars of this process include the expansion of digital banking, fintech innovation, promotion of a cashless economy, development of microfinance instruments, and progressive regulatory reforms. In the near future, the adoption of blockchain and digital currency solutions may accelerate the transition to a more inclusive, efficient, and technology-driven financial ecosystem - serving as a strategic catalyst for Azerbaijan's economic modernization and social prosperity.

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