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Научная статья

Payment System Infrastructure Amid the Development of Digital Technologies in Kazakhstan

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Abstract. In the current global economy, digital transformation encompasses all segments of the financial market, with the digitalization of the banking sector being a key element of this process. Studying the current state and development prospects of Kazakhstan's payment system infrastructure is essential for the country's economic growth. Objective – to identify the key factors influencing the development of the payment system and to assess the impact of digital innovations on the stability, security, and efficiency of payment mechanisms. Methods – includes an analysis of the legal and regulatory framework of the Republic of Kazakhstan, a comparative study of central bank digital currency (CBDC) implementation among EAEU countries, a dynamic analysis of SMEs over the past 10 years, and statistical data provided by the National Bank of Kazakhstan, the International Monetary Fund, the World Bank, and other analytical institutions. Results – this article will review the latest changes and innovations in cashless payments, as well as identify the upcoming trends in the development of the payment sphere in Kazakhstan. Conclusions – the authors determine the key factors influencing the pace of digitalization of payment systems and formulate priority directions for further development of payment infrastructure.

Keywords: payment system, digital transformation, financial technologies, cashless payments, Kazakhstan, digital currency, fintech.

Introduction

In the era of digitalization, the payment system infrastructure acquires new functional characteristics requiring high speed, security and transparency of financial transactions. The capabilities of new technologies make it possible not only to meet these requirements, but also to anticipate the needs of customers - what they will be in the future (Central Bank of Russia, 2024).

The rapid development of this area has shaped new forms of payments, such as central bank digital currencies (CBDC), instant payment systems (IPS) and blockchain technologies (TASS,

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2023). The above-mentioned systems are already being implemented in the national payment infrastructures of a number of countries. Among the CIS countries, Kazakhstan and Russia are leaders in terms of digitalization of payment systems.

It is worth considering the fact that both new technologies and regulatory authorities, which support innovation opportunities, play an important role here. Regulators' initiatives help to ensure economic growth, increase the country's investment attractiveness, business activity and improve the quality of life of the population. In Kazakhstan, the role of regulators is fulfilled by: the Agency of the Republic of Kazakhstan on Regulation and Development of Financial Market (ARFM), the National Bank of the Republic of Kazakhstan (NBRK), the Agency of the Republic of Kazakhstan on Financial Monitoring (AFM), the State Revenue Committee of the Ministry of Finance of the Republic of Kazakhstan and the Kazakhstan Deposit Guarantee Fund (KDGF).

The relevance of this paper is determined by the insufficient level of comprehensive research on the current state and prospects of development of the payment system infrastructure, necessitating an analysis of the digital transformation of the financial sector of the Republic of Kazakhstan in the modern context.

The purpose of the study is to identify the key factors determining the development of payment infrastructure in 2025, as well as to assess the impact of digital innovations on the sustainability and security of payment mechanisms.

Literature review

Research into payment system infrastructure in the context of digital transformation draws on a vast body of scientific literature covering issues of financial and banking stability, as well as the role of payment institutions in ensuring macroeconomic stability in a country. Among foreign studies, special attention is paid to the fundamental works of such scholars as S. Kidwell and M. Campbell (Campbell Verduyn, M., & Campbell, R. J., 2023), who reveal the basics of the functioning of banking systems and payment infrastructure in a market economy. Their works serve as a methodological basis for determining the degree of stability of the payment system during the period of digitalisation. F. Mishkin's ideas on the transmission mechanism of monetary policy and the risks of destabilising financial flows have been adapted to the economic conditions of Kazakhstan (Mishkin, F. S., 2007).

The vulnerability and stability of the banking sector have been analysed by CIS economists O.M. Bogdanova (Kaffel, B., & Abid, F. 2021), L. Sysoeva (Sysoyeva, L., 2020), I.V. Larionova, O.I., Lavrushin and many others (Abramova, M. A., Dubova, S. E., et al., 2020). Their research highlighted the importance of monitoring systemic risks, strengthening supervisory mechanisms and assessing the impact of innovative payment solutions on the overall stability of the financial sector.

In the context of Kazakhstan, domestic researchers have made a significant contribution to the development of the theory and practice of the banking system and payment infrastructure: Alina G.B., Iskakova Z.D., Zholamanova M.T., Mazhitov D.M., Makysh S.B., Musina A.A., Seytkasimov G.S. and others. Their works examine the peculiarities of the formation of Kazakhstan's modern financial architecture, the role of digital technologies in ensuring financial inclusion, as well as the institutional aspects of regulating electronic payments. Seytkasimov and Mauletov in their works analyse in detail the structural elements of the payment system of the Republic of Kazakhstan and its institutional framework, justifying the basic components of the payment infrastructure (S. Seytkasimov, K. M. Mauletov, 2008). The works of Musina A.A. emphasise

that financial stability is an integral element of the sustainability of the payment system infrastructure, especially in the context of the introduction of fintech solutions and digital settlement mechanisms (Musina, A.A., 2024). According to the latest research the digital tenge is an innovation that contributes to increasing transparency and reducing operational risks of the payment system as a whole (Makysh S.B., 2023).

Thus, the theoretical and methodological basis of the study is based on an interdisciplinary synthesis of foreign and domestic scientific experience. This allowed for a comprehensive approach to analysing the transformation of Kazakhstan's payment system in the context of the introduction of the digital tenge and the development of fintech solutions.

Research methods

During the course of the work, the results of a number of analytical and empirical studies were examined, including:

Content analysis was applied to the regulatory and legal acts of the Republic of Kazakhstan governing the payment system and digital currencies; official statistics from the National Bank of Kazakhstan (2020–2024), including data on the number of transactions, payment card turnover, the structure of SMEs and the level of digitalisation, as well as international reports and studies from the IMF, the World Bank and analytical agencies.

A comparative method was used to compare Kazakhstan's experience with similar transformations in EAEU countries in the introduction and use of central bank digital currencies (CBDCs).

A horizontal analysis was conducted to compare statistical data on key indicators of the digitalisation of payment instruments using a sample of data for 5 and 10 years to ensure accurate conclusions on dynamics.

System analysis made it possible to identify the interrelationships between technological innovations, the regulatory framework and the risks of the payment infrastructure.

The expert method included an analysis of the opinions of industry experts published in open sources.

The study was conducted in five stages:

- 1) collection and classification of secondary data (2020-2024).
- 2) content analysis of legal acts and strategic documents on the digital tenge and payment infrastructure.
- 3) comparative analysis of international cases in EAEU countries and Russia.
- 4) Horizontal analysis of statistics on payment cards, electronic transfers and digital services.
- 5) Evaluation of results and formulation of conclusions.

The following hypotheses are put forward within the framework of the research:

– Introduction of the digital tenge into the national payment system will lead to a reduction in the level of corruption and increase the efficiency of the targeted use of financial resources, in particular in the public sector.

– Macroeconomic sustainability of Kazakhstan is closely related to the national payment infrastructure, the development of which contributes to reducing dependence on foreign payment mechanisms and increasing the country's investment attractiveness.

Results and Discussion

Digital transformation of the financial sector in Kazakhstan has received a significant boost due to the «Development program of the national payment system in the Republic of Kazakhstan until 2025» approved by the National Bank (Resolution of the Board of the National Bank of the Republic of Kazakhstan, 2020). The Programme is aimed at creating an efficient and secure payment system, in four key areas:

- Instant Payment System (IPS): an infrastructure providing round-the-clock real-time payments, which will contribute to increasing the speed and convenience of non-cash settlements.
- Payment card transaction processing system: it will reduce dependence on foreign payment systems and ensure data security.
- Unification of standards and requirements: the aim is to ensure compatibility and efficient interaction between different systems and services.
- Improving financial literacy and accessibility: implementation of activities aimed at informing the population about the benefits of non-cash payments and providing access to modern payment instruments, especially in remote and rural areas.

The main objective of the program is to create a competitive and innovative payment market in Kazakhstan, ensuring high quality and security of financial services for users of all categories.

The National Bank of Kazakhstan has laid the foundation of a modern digital financial ecosystem. Initiatives such as the interbank clearing system, interbank money transfer system, identity exchange center and anti-Ford center have allowed Kazakhstan to adapt to modern challenges and establish its position as one of the exemplary cases of digital transformation for other countries (CSIS, 2024).

The National Digital Financial Infrastructure constitutes an integrated system of interacting components that ensure functionality of the entire payment system:

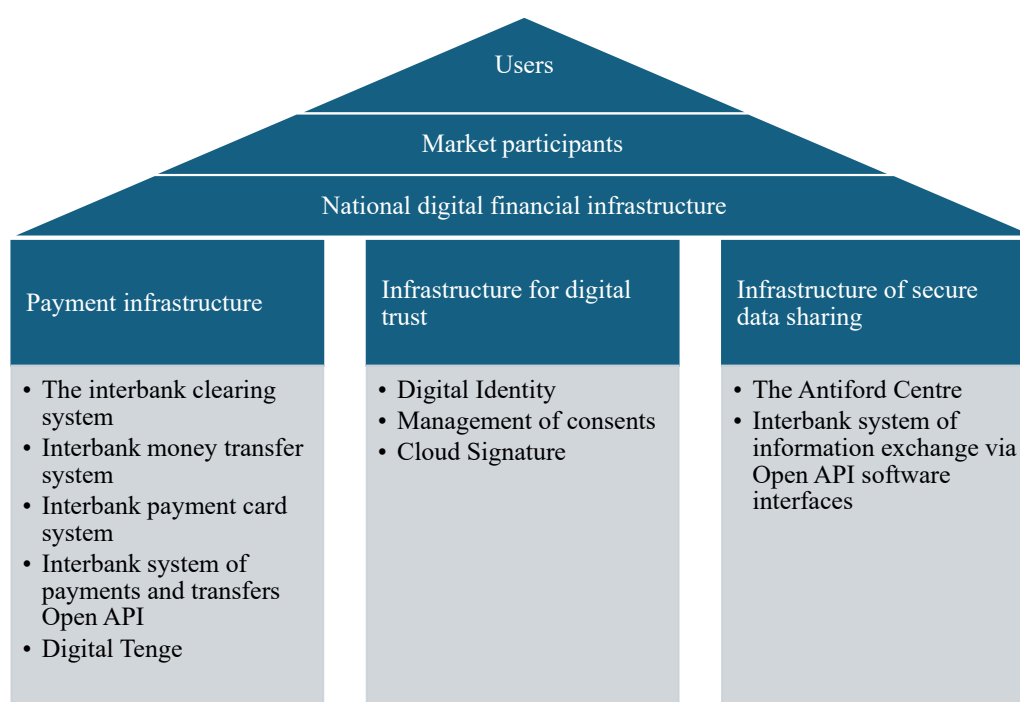


Figure 1 – National digital financial infrastructure

Note: compiled by the authors based on data (National Payment Centre of Kazakhstan, 2024)

In a more detailed analysis of the payment infrastructure, it can be stated that it provides interoperable payment services allowing to make payments and transfers instantly, in the most convenient way for the consumer. In other words, the infrastructure covers all types of payments and transfers, including card payments and includes the following systems:

I Interbank Clearing System:

Significant payment system – mainly small tax and pension payments, retail payments of individuals, up to 5 million tenge.

II Interbank Money Transfer System:

Systemically important payment system, real-time gross settlement system (RTGS) - DKP, large, urgent financial market payments without limit: mainly large payments by BVU and their customers, payments on securities transactions.

III Interbank Payment Card System:

The system ensures the processing of all card transactions within the country, guaranteeing 24/7 continuity. This strengthens payment sovereignty and localizes the settlement infrastructure within Kazakhstan. By December 2024, 100% migration of all domestic issuing and acquiring traffic within the territory of Kazakhstan was made across all participants of the ISPC system.

IV Interbank system of mobile payments and transfers Open API:

A payment system designed for instant payments and money transfers between clients of its members via mobile applications or other devices. It provides speed, convenience, and accessibility of financial transactions for individuals and legal entities within the country. The system is focused on local infrastructure and enables real-time transfers of funds between accounts in different banks in seconds, without the involvement of international payment systems; thereby increasing independence and reducing operational costs. The key features are lightweight details, namely QR codes and phone numbers.

Services within the system are:

- 1) P2P transfer service: allowing the phone number to be identified as an account identifier.
- 2) QR code payment service: payment for goods and services by a single QR code.

The innovations are aimed at simplifying and increasing user convenience, as well as increasing cashless payments.

V Digital Tenge:

The focus of the project in 2024 was on payments with participation of the government. Under this framework, 238 billion digital tenge were issued alongside integrations with government information systems. Among the EAEU countries implementing CSE, Kazakhstan and Russia are at the most advanced stages and only Kazakhstan is considering the implementation of both retail and wholesale models. Last year 5 scenarios were implemented with the application of properties of CT programmability: Scenarios «National Fund», «Average Road repair», «Purchase of farm animals», «Digital VAT» and «Investment subsidies to agriculture through JSC «KazAgroFinance» (National Payment Centre of Kazakhstan, 2024).

Table 1 – Status and utilisation pattern of CSEC among the EAEU countries for 2024 (Gali A.I., 2024).

Country	CSEC name	Status	Model
Russia	Digital ruble	Pilot project	Retail
Kazakhstan	Digital tenge	Pilot project	Wholesale and retail

Armenia	Digital dram	At the research stage	Retail
Belarus	Digital Belarusian ruble	At the research stage	Retail
Kyrgyzstan	Digital som	At the research stage	Retail

Note: compiled by the authors based on data (Gali A.I., 2024).

Significant changes in the development of the National Digital Financial Infrastructure were achieved in 2024 through the implementation of key projects according to the strategic plan of «Development program of the national payment system in the Republic of Kazakhstan» (Resolution of the Board of the National Bank of the Republic of Kazakhstan, 2020).

Table 2 – Chronology of project launches and scaling up within the National Digital Financial Infrastructure (National Payment Centre of Kazakhstan, 2024).

Dates	Implementation of initiatives
June 2024	Implementation of the FinID digital identification system.
July 2024	Creation of an Anti-fraud Center, a single platform for the operational exchange of data on payment transactions with signs of fraud.
October 2024	Launch of the accelerated VAT refund scenario as part of the 2nd phase of the digital tenge implementation (hereinafter referred to as the DT).
November 2024	Launch of the Interbank Payment Card System (IPCS).
November 2024	Launch of an interbank payment and transfer system based on the Open API.
December 2024	Launching a micro-subsidy and investment subsidy scenario.
Untill the end of 2025	Implementation and scaling of a single QR code. Introduction of the digital tenge.

Note: compiled by the authors based on data (National Payment Centre of Kazakhstan, 2024).

Today, Kazakhstan demonstrates not only the active promotion of the digital economy, contributing to the deep transformation of the payment infrastructure, but also confidently occupies leading positions in international rankings of digital development. In November 2024, Kazakhstan has entered the top 10 countries in terms of financial accessibility of digital services (Ranking.kz, 2024).

One of the key factors of successful development is the availability of mobile and online banking due to sustainable telecommunication and Internet infrastructure. According to the Bureau of National Statistics, as of 1 March 2025, the population of Kazakhstan was 20.3 million (Bureau of National Statistics of the Republic of Kazakhstan, 2025). At the time of Digital 2025: Kazakhstan, there were 19.2 million Internet users in the country (Digital 2025: Kazakhstan, 2025). This corresponded to a network penetration rate of 92.9%. Over the past year, the number of Internet users in Kazakhstan increased by 238 thousand people (+1.3%). However, the share of the population using the Internet remained at the same level (CSIS, 2024).

The share of the population using online banking has grown from a quarter of the population in 2018 to almost 100 % in 2024; digital transactions have increased from 7 % of all transactions in 2014 to 89 % in 2024; as a result of government partnerships with banks, public services,

government transfers and transactions are almost entirely digitalized. In addition, digital transactions have grown from about \$20 per capita in 2014 to \$13,800 in 2023.

As payments are digitized in Kazakhstan, the fintech and e-commerce ecosystems are rapidly developing and diversifying (YouTube, 2021). For example, the Halyk Bank app currently offers more than 60 services, Kaspi.kz - about 40, Bank CentreCredit – more than 30, and Freedom Bank – just under 20.

Consequently, the digital transformation of the economy has stimulated the advancement of SMEs (small and medium-sized enterprises), mainly due to the involvement of financial institutions (Primeminister.kz, 2025). A key contribution was made by the integration of STBs (second-tier banks) with state authorities. Mikhail Lomtadze, CEO and co-founder of Kaspi.kz, was the first to speak publicly about cooperation and integration in 2020. In his speeches, Lomtadze noted the high benefits and uniqueness of synergies that actually allowed to reopen the investment climate in the country (YouTube, 2021). The digitalization of financial and public services has resulted in simplified accounting, increased tax payments, online opening of sole proprietorships, bank accounts and other services.

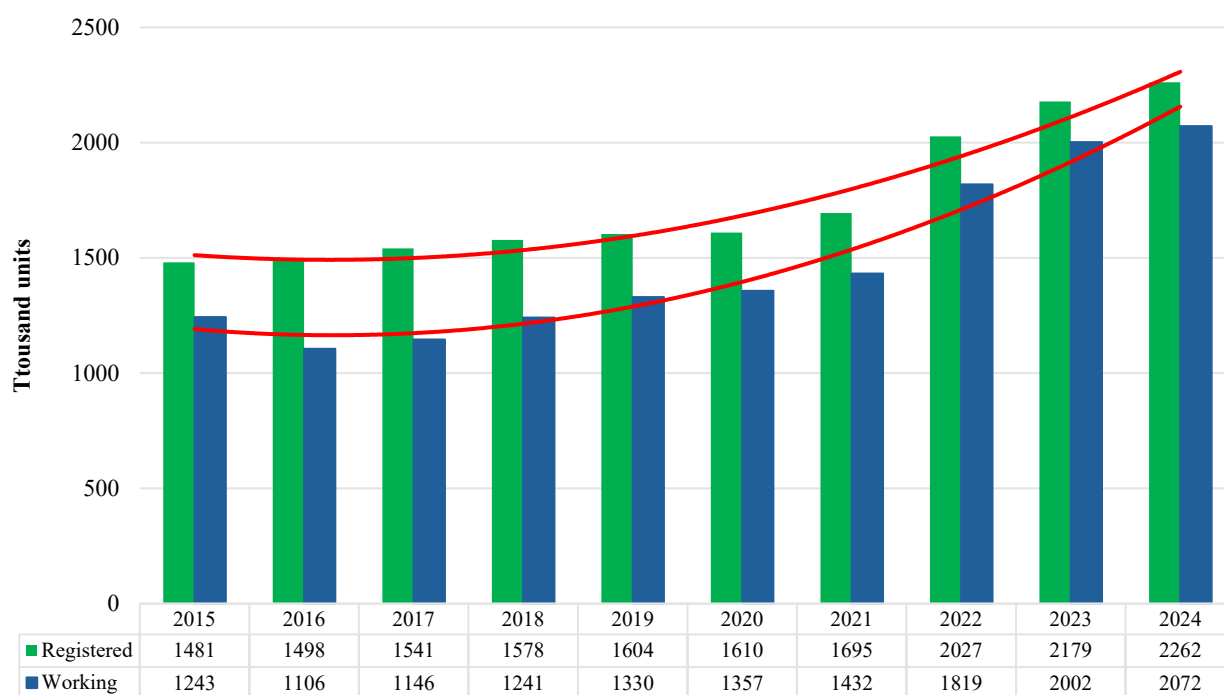


Figure 2 – Dynamics of SMEs in Kazakhstan over 10 years

Note: compiled by the authors based on data (National Bank of Kazakhstan, 2025).

As can be seen from the presented graph, since 2015, there has been a steady growth of taxpayers in the sector of small and medium-sized enterprises (SMEs). The correlation between the indicators of «registered» entities and «working» is directly proportional. The most pronounced growth rate came during the COVID-19 quarantine restrictions period, when businesses were forced to go completely online. The positive dynamics continues at present.

The significant contribution of digital financial technologies to the transformation of the economy of Kazakhstan is also evidenced by the statistics of e-commerce volumes – 3.2 trillion tenge in 2024 (Worldometers, 2025). According to the information provided in the annual

report on the development of the national digital financial infrastructure (Ranking.kz, 2024), in the first half of 2024, the share of non-cash payments in Kazakhstan was more than 85% of the total volume of transactions, of which 6% – QR, 11% – POS and 83% – Internet and mobile banking. The Republic of Kazakhstan is experiencing rapid growth in non-cash payments. Every day, more than 350,000 transactions pass through the infrastructure of the National Payment Corporation (National Payment Centre of Kazakhstan, 2024) which indicates a significant transition of the population to cashless payments, as well as the ability of the system to cope with high loads and ensure uninterrupted operation.

As of January 2025, the bulk of transactions are carried out through Internet and mobile banking (79.8% of the total number of transactions and 89.4% of the total volume of non-cash payments and money transfers) and POS terminals (20.1% and 10.2% of the total number and volume of non-cash payments and money transfers) (Worldometers, 2025).

The main factors contributing to the active development of cashless payments are the young demographic structure of users – the average age is 29.7 years (Mastercard Kazakhstan, 2023), the high level of Internet penetration – 91%, the availability of banking services – 81% and digital payments – 78% (Mastercard Kazakhstan, 2024). In this regard, we can identify five key trends in payment technologies: the emergence of digital wallets, increased interest in instant payments, open banking, central bank digital currencies (hereinafter CBDC) and the development of artificial intelligence.

Table 3 – Horizontal analysis of trends in the use of payment cards and electronic banking services (Mastercard Kazakhstan, 2024).

Parameters	Years (mln transactions)					Deviations			
						Absolute values (mln transactions)		Relative values (%)	
	2020	2021	2022	2023	2024	2024	2020-2024	2024	2020-2024
Quantity, in thousands	2878,4	6271,3	8586,7	11317,3	12836,8	1519,4	9958,3	11,8	346
Local systems	1979,3	5132,5	7290,1	9654,5	10777,5	1122,9	8798,1	10,4	444,5
International systems, in thousands	899,1	1138,8	1296,6	1662,8	2059,3	396,5	1160,2	19,3	129
Visa International	340,3	716,1	966,5	1424,8	1786,2	361,5	1446	20,2	425
MasterCard Worldwide	553,6	413,4	211,9	175,9	257,8	81,8	-296	31,8	-53,4

Note: compiled by the authors based on data (Mastercard Kazakhstan, 2024).

Based on the data of the horizontal analysis presented in Table 3, it was determined that the total number of transactions (in thousands) increased from 2,878,476 in 2020 to 12,836,823.48 in 2024. The absolute increase was 9,958,347.48 thousand transactions and the relative increase was 346% over the five-year period. In the year from 2023 to 2024 alone, the increase was 1,519,492.12 thousand transactions (+11.84%), indicating the rapid increase in digital payments and the shift of users from cash to cashless payments. International payment systems showed less aggressive but steady growth - absolute growth: +1,160,154.16 thousand, relative

+129.03%. Based on these indicators, we can state that international systems are inferior in scale to local players. The key factor of the quarantine period COVID-19 is also not excluded. Figure 3 clearly demonstrates the negative performance of MasterCard Worldwide. Despite a temporary recovery in 2023 (+81,866.46 thousand), there is a loss of the leading position against the background of active expansion of competitors.

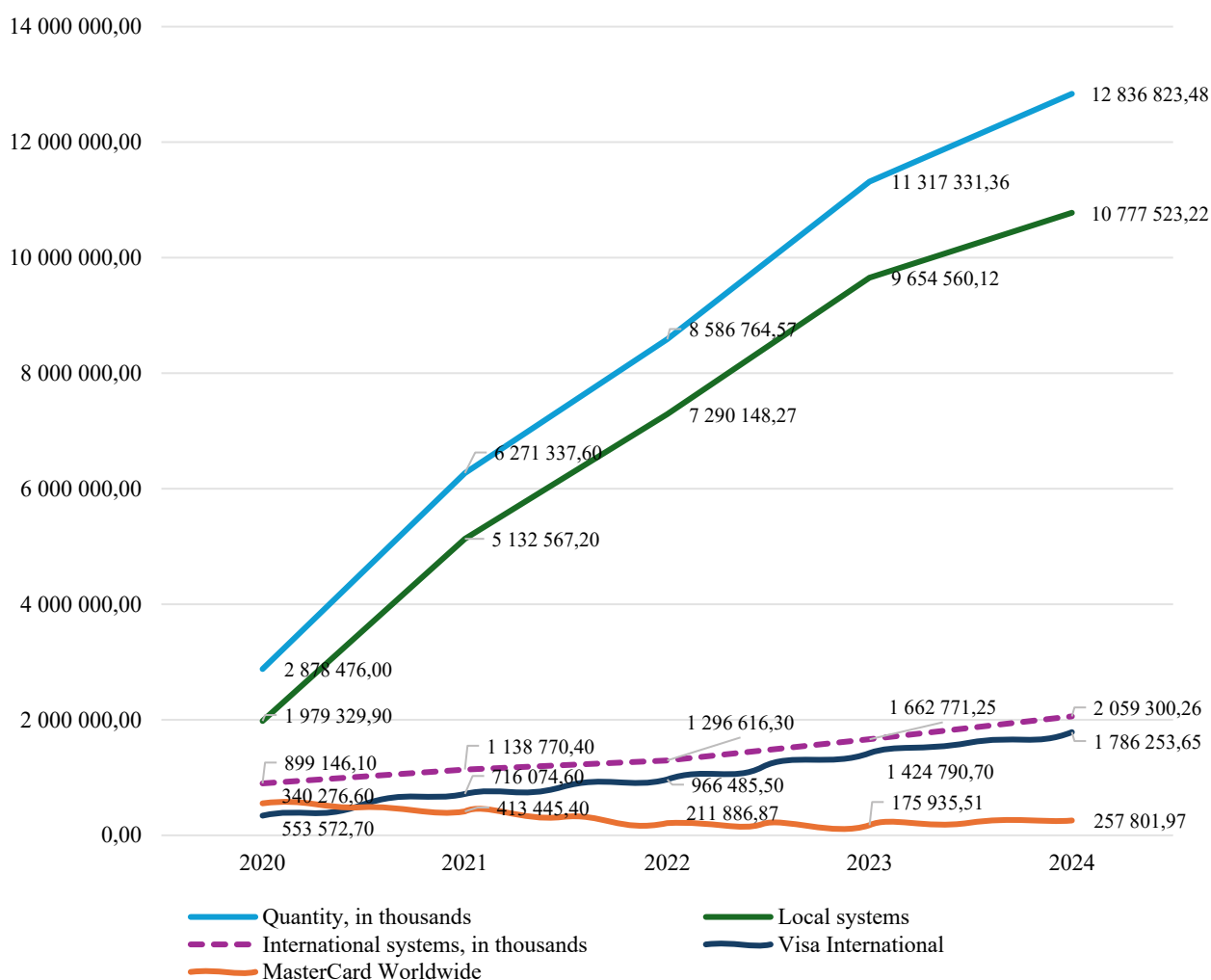


Figure 3 – Use of payment cards and electronic banking services within and outside the Republic of Kazakhstan in dynamics over the last 5 years

Note: compiled by the authors based on data (Ranking.kz, 2024).

Due to the fact that the majority of entrepreneurs switched to cashless payment earlier, the increase is only 11.8% in 2023. At the same time, there is a difference of more than 1.5 million between Visa International and MasterCard Worldwide users, which can be seen in the presented Figure 3. The dominance of local systems emphasises the importance of the national financial infrastructure and the need to make electronic payment methods available.

Conclusion

In conclusion, the analysis of the current state and development prospects of the payment system infrastructure in the Republic of Kazakhstan indicates that its dynamic development is primarily the result of extensive digitalization. The technological potential of the country allows the achievement of the set goals ahead of most other EAEU member states, which in turn increases economic stability and investment attractiveness for external investors.

In the future, the implementation of measures under the «Development program of the national payment system in the Republic of Kazakhstan» will significantly reduce dependence on foreign payment systems and ensure data security; increase the efficiency of targeted use of financial resources, which will contribute to reducing corruption; increase tax revenues and growth of financial literacy of the population. Implementation of innovations requires support from both users and regulators. This, in turn, requires comprehensive resolution of legal, infrastructural and organizational issues.

This study identified the main factors contributing to the active development of cashless payments: young demographic structure of users (average age 29.7 years), high Internet usage rate of 91%, availability of banking services – 81% and digital payments – 78%. The above factors demonstrate the urgent need to develop a single integrated payment platform capable of ensuring stable and secure transactions, reliable user identification and high data protection.

The issue of digitalization of the payment system remains highly relevant and the subject of further research. Today, the National Bank and regulatory authorities are tasked with the formation of a stable and secure financial infrastructure, which vector of development will be a determining reference point for the functioning of financial institutions.

Gratitude, conflict of interest. Absent

Authors' contribution.

Kushurova A.A. – theoretical justification, literature review, data collection, interpretation of results.

Alina G.B. – theoretical justification, problem statement, interpretation of results.

Kerimkulova D.D. – literature review, interpretation of results.

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Цифрлық технологиялардың дамуы жағдайында Қазақстандағы төлем жүйесінің инфрақұрылымы

Аңдатпа. Қазіргі жаһандық экономиканың жағдайында цифрлық трансформация қаржы нарығының барлық сегменттерін қамтып отыр, ал банк секторының цифрлануы осы үдерістің негізгі құрамдас бөлігіне айналды. Қаржылық технологиялардың дамуындағы негізгі қозғаушы күштер – тұтынушылар мен бизнес құрылымдар, себебі бұл технологиялар қолжетімділік, жылдамдық және қауіпсіздік деңгейі бойынша басымдыққа ие. Қазақстандағы төлем жүйесінің инфрақұрылымының қазіргі жай-күйін және даму болашағын зерттеу ел экономикасының өсуі үшін аса маңызды.

Ұсынылған ғылыми мақаланың мақсаты – төлем жүйесінің дамуына әсер ететін негізгі факторларды анықтау және цифрлық инновациялардың төлем механизмдерінің тұрақтылығы, қауіпсіздігі мен тиімділігіне ықпалын бағалау.

Әдістері – Қазақстан Республикасының нормативтік-құқықтық базасын талдау, ЕАЭО елдеріндегі орталық банктердің цифрлық валюталарын енгізу бойынша салыстырмалы талдау,

соңғы 10 жылдағы ШОБ субъектілерінің динамикасы, сондай-ақ Қазақстан Ұлттық Банкі, Халықаралық валюта қоры, Дүниежүзілік банк және басқа да аналитикалық құрылымдар ұсынған статистикалық деректерді өңдеу жатады. Нәтижелері – қолма-қол ақшасыз төлемдер саласындағы соңғы әзірлемелер мен инновациялар қарастырылып, Қазақстандағы төлем жүйесінің жақын арадағы даму үрдістері айқындалды. Қорытындылар – авторлар төлем жүйелерінің цифрлану қарқынына әсер ететін негізгі факторларды анықтап, төлем инфрақұрылымын дамытудың басым бағыттарын белгіледі.

Түйін сөздер: төлем жүйесі, цифрлық трансформация, қаржылық технологиялар, қолма-қол ақшасыз төлемдер, Қазақстан, цифрлық валюта, финтех.

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Инфраструктура платежной системы в условиях развития цифровых технологий Казахстана

Аннотация. В текущем состоянии мировой экономики цифровая трансформация охватывает все сегменты финансового рынка, а цифровизация банковского сектора выступает ключевым элементом данного процесса. Потребители и бизнес-структуры являются основными драйверами развития финансовых технологий в силу их доступности, скорости и уровня безопасности. Изучение текущего состояния и перспектив развития инфраструктуры платежной системы Казахстана имеет важное значение для экономического роста страны. Цель работы – выявление ключевых факторов, влияющих на развитие платёжной системы, а также оценка воздействия цифровых инноваций на устойчивость, безопасность и эффективность функционирования платёжных механизмов. Методологическая основа исследования включает анализ нормативно-правовой базы Республики Казахстан, сравнительный анализ внедрения цифровых валют центральных банков среди стран ЕАЭС, анализ субъектов МСБ в динамике за последние 10 лет, а также обработку статистических данных, предоставленных Национальным банком Республики Казахстан, Международным валютным фондом, Всемирным банком и другими аналитическими структурами. Результаты – рассмотрены последние разработки и инновации безналичных платежей, а также определены тенденции ближайшего развития сферы платежей в Казахстане. Выводы – авторы исследования определили ключевые факторы, влияющие на темпы цифровизации платёжных систем, а также сформировали приоритетные направления дальнейшего развития платёжной инфраструктуры.

Ключевые слова: платёжная система, цифровая трансформация, финансовые технологии, безналичные платежи, Казахстан, цифровая валюта, финтех.

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