

# **Analysis of reforming the national payment system of Kazakhstan**

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## **Annotation**

In the whole world due to the growing market infrastructure, technological changes and the development of the global and national legal and regulatory environment, increase in the production volumes and, accordingly, the number of transactions of economic entities, including individuals and enterprises in the material production sector, as well as the development of technologies in the financial services industry there is a need for constant development and adaptation of national payment systems to the challenges of the market and their transformation into more modern and convenient services that meet the challenges of the time.

Presence of the payment system that meets the needs of the state, financial market, individuals and business entities in the safe and efficient transfer of funds is an important element of the national infrastructure of any developed country.

At all times, in order to meet the new requirements for the organization, regulation of payment systems and market demand, timely reforms in this area were required. Over the years, payment systems have undergone a number of significant changes as new payment methods, platforms and interfaces have emerged. This is due to the rapid development in the field of information and communication technologies, as well as the growing expectations and demand from clients - consumers of financial services.

Thus, the global processes of national payment systems formation and reform can be divided into the following main areas:

1) payment systems designed to make payments for large amounts are real-time gross settlement systems (RTGS) and clearing systems (DNS - deferred net settlement systems).

The Central Banks, which are the conductors of a public financial infrastructure for the financial market entities, played the main role in the emergence of the above mentioned systems.

In Kazakhstan, the creation of such payment systems fell on the period after the independence and was carried out in order to form the country's financial infrastructure that meets the requirements of the new market economy. As a result of the work done, RTGS and DNS systems were built - the Interbank Money Transfer System (2000) and the Interbank Clearing System (1999), which provide high-quality and timely execution of urgent and regular payments in the money

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and financial markets, thereby maintaining stable functioning financial ecosystem of the country.

2) payment systems designed for retail payments, which include Automated Check Clearing Houses, National Card and Switching Systems, and Instant/Fast Payment Systems.

Until recently, the creation and development of services that allow making payments in the retail segment was assigned to the banking community, whose activities include servicing retail customer transactions.

However, in recent years, due to the need to organize an interbank service for making fast, guaranteed and cheap payments, more and more Central Banks are working to introduce their own payment systems designed for interbank retail payments.

This direction is also relevant for Kazakhstan, where, within the framework of the Program of National payment system development in the Republic of Kazakhstan until 2025 approved by the Resolution of the Board of the National Bank № 133 of November 30, 2020 work is actively carried out to implement initiatives aimed at implementing new components of the National Payment System - the Instant Payment System and the Interbank Payment Card System (the national "switching" payment system), which are designed to ensure the continuity, efficiency, and ubiquity of the use of electronic online payments, regardless of the servicing bank and payment instrument.

Moreover, in some countries due to the emergence and integration of their fast payment systems, a new mechanism for cross-border payments has been implemented, which allows solving the problem of the speed and cost of cross-border payments.

In this study, a detailed analysis of the reform of the National Payment System of Kazakhstan, as well as international experience in the formation and development of payment systems is presented.

*Keywords and phrases: payments, payment system, modernization, RTGS system, clearing system, payment services, digitalization, financial services, token, cross-border payments, etc.*

*Keywords: payments, payment market, digitalization, trends, fintech, Instant payments, QR code, ecosystem, biometrics, central bank digital currency.*

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## **1. Introduction**

The process of formation and development of the national payment system is continuous. In recent years, there has been a rapid acceleration in the direction of fundamental reforms in the national payment systems around the world.

There are several basic options for classifying payment systems. In this paper, wholesale or systems for payments in large amounts and retail payment systems (depending on the scale of activity and the size of the payment) are considered. Depending on the type of processing of payment orders and other characteristics, wholesale payment systems are of two types: real-time gross settlement systems (RTGS) and systems based on deferred net settlement (DNS) or clearing payment systems.

The group of wholesale payments includes large in amount and urgent in terms of execution transactions in the money and stock markets. Large payments usually include all types of interbank cash settlements, including payments for transactions in the money market, with securities and foreign currency. The category of retail payments includes day-to-day monetary transactions associated with the purchase of goods and services by consumers and businesses for relatively small amounts. Such operations are carried out both in the form of one-time transactions and in the mode of periodically recurring payments.

Currently most countries use real-time gross settlement systems, automated clearing systems/chambers (mass payment systems), retail (card) payment systems. The process of formation, development and reform of the national payment systems in connection with the constant development of the market and change in the business models of economic entities has been continuous all over the world since the appearance of the first payment systems.

The process of reforming national payment systems can be conditionally divided into several areas.

1. The first direction of reforming national payment systems tentatively began in the 70s of the last century and ended in the first decade of 2000. For this period of time, the creation in many countries of the first payment systems designed to conduct interbank payments for large amounts in real time (wholesale RTGS systems) and systems with calculation of the net positions of system participants at the end of the transaction day of the payment system (clearing payment systems).

In Kazakhstan, a similar stage of reforming the payment system began after the independence in 1991, as a result of which 2 main payment systems of Kazakhstan were launched - the Interbank Money Transfer System, which transfers funds between system's participants in the National Bank of the Republic of Kazakhstan, and the Interbank Clearing System, designed for making regular payments in small amounts. [6]

Thus, at the first stage of the modernization of the payment system, the emphasis was placed on payment systems serving enterprises and the interbank market for large payments.

2. The next direction in the reform of national payment systems is the emergence of payment systems designed for retail payments - systems for making electronic payments in an instant mode (systems of fast payments) and card systems (national "switching" systems for processing card transactions).

The defining characteristic of a fast payment system is the ability to make a guaranteed payment almost immediately and at any time. According to the Bank for International Settlements, the speed of implementation of fast payment systems around the world is about the same as it was with the wholesale RTGS systems [15]. Dozens of countries have already implemented fast payment systems, and several others are under development and planning.

Also, in many countries, active work is underway to create their own national card payment systems. In the market of the financial services industry, the first local card systems began to appear in 1970-1980, they worked only in the national currency. Today, there is a rapid development of national card systems (UnionPay, RuPay, NSPK) and their entry (expansion) to the other markets. The payment environment of countries has changed significantly since its inception with the development of technology, emergence of new payment service providers, creation of new risk management standards and changes in the needs and expectations of the end users.

Considering these changes and the importance of the payment system for the financial system and the economy of the country, in Kazakhstan as in other developed countries the **Program of National payment system development**<sup>3</sup> was adopted in order to develop the infrastructure of the national payment system, the main components of which are Instant Payments System and Interbank payment card system (local system for processing card transactions), which are designed to provide retail electronic payments to the population.

Further, an analysis of the processes of reforming wholesale and retail payment systems will be presented in more details, reflecting the main trends.

## **2. First stage. Creation and development of wholesale payment systems.**

### **2.1. RTGS systems**

In developed countries, large-scale payment systems began to be massively introduced by the 1980s. In almost all countries since the 1990s, the modernization of wholesale payments has begun with the introduction of real-time gross settlement (RTGS). In 1990 there were less than 10 RTGS systems, while in 2017 there were already about 176 countries using RTGS systems or equivalent. The hours of operation of RTGS systems have also been extended over the past decade, with RTGS also operating several hours on weekends and holidays in some jurisdictions [13].

The presence of a full-fledged RTGS system in the country is an indicator of the development and reliability of the banking system functioning in the state. In such systems, the speed of transfer of payment information is high; all payment documents are received and processed electronically in a matter of seconds. Each

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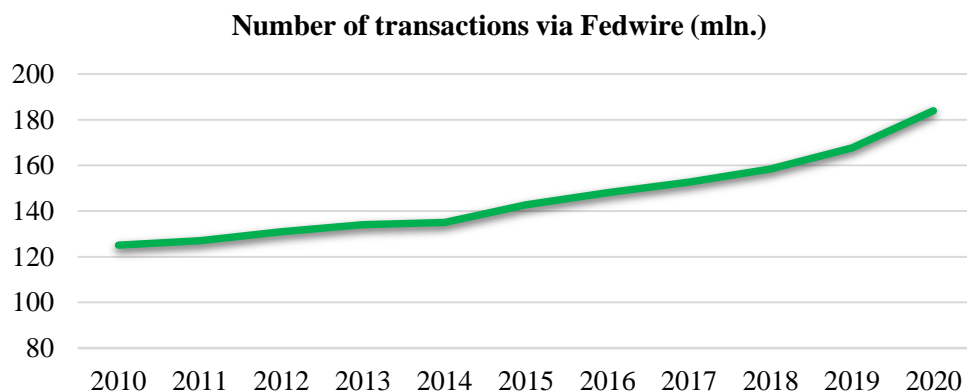
<sup>3</sup> The program was approved by the Resolution of the Board of the National Bank of the Republic of Kazakhstan No. 133 dated November 30, 2020.

payment is processed and calculated individually, its finality and irrevocability is guaranteed, and credit risk is minimized. All over the world, RTGS systems process huge flows of payment information in financial markets. Due to the great importance of these systems, the central banks of developed countries are currently updating their RTGS systems.

One of the largest gross settlement systems is the **American Fedwire** (Federal Reserve Wire Network). It carries out transfers related to interbank settlements in the money market, payments in favor of companies and individuals, settlements on transactions with securities. This system is owned and operated by the US Federal Reserve System (FRS). The Fedwire system runs on a fully automated platform, providing “real time” settlements [3].

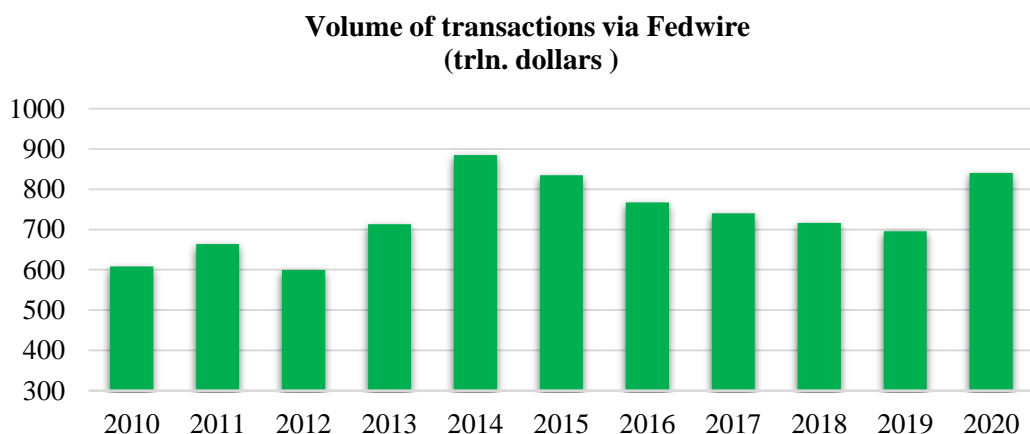
The spread of the wholesale payment systems in the world was accompanied by an increase in the number of the transfers and average sums of the transactions. For example, in 1987-2000 the number of transfers via FedWire grew by an average of 7.4% per year. Figures 1, 2 show the number and volume of transactions carried out through Fedwire in 2010-2020. At Fedwire, the peak was reached in 2020 when about 184 million transactions worth \$840.5 trillion went through the system. However, the system processed the largest volume of payments in 2014 (\$884.6 trillion) [11].

**Figure 1.**



Source: Based on the data from the Federal Reserve Bank

**Figure 2.**



Source: Based on the data from the Federal Reserve Bank

**In Europe** the process of reforming payment systems in the late 80s and early 90s took place in connection with the accelerated economic integration of the member countries of the union. In 1992, the Economic and Monetary Union (EMU) was created, in which the presence of RTGS in the country as a central element of the national payment system was a prerequisite for the participation.

Thus, in the European countries RTGS was given the role of the basic platform of the payment mechanism. Already in 1995, a political decision was made to create the **TARGET** (Trans-European Automated Real-Time Gross Settlement Express Transfer System) system, connecting the Central Banks of the EU member countries, as well as the European Central Bank for making money transfers in euros. The payment infrastructure in the euro area is characterized by the parallel existence of various European payment systems. The 16 national RTGS systems are interconnected by communication lines and together form a payment mechanism supported by the European Central Bank. The TARGET system used interfaces and networks that linked national systems and the main central network. This system was built on the infrastructure of the SWIFT system. One of the main tasks was to create common terms for all the participating countries, so all the credit institutions received right to make payments through TARGET [23].

In the course of further reformation of the European payment systems **TARGET was modernized** and on November 19, 2007 a **new system TARGET2 was launched**. Transactions are processed in euros using funds held in the Central bank's account. In the TARGET2 system, all the banks operating in the euro area, regardless of the country in which they are located, offer uniform services, as well as uniform tariffs. The system provides full technical consolidation on a single common platform provided by three central banks (Deutsche Bundesbank, Banque de France and Banca d'Italia). The technical interface for the participants is harmonized based on SWIFT [23].

**The Indian RTGS system** was introduced by the Reserve Bank of India in March 2004. Afterwards, it was upgraded to the next generation RTGS (NG-RTGS) capable of operating on the basis of ISO 20022 standards and with enhanced functionality (liquidity management function, scalability, etc.). NG-RTGS is one of the first systems to migrate to the ISO 20022 standard [20].

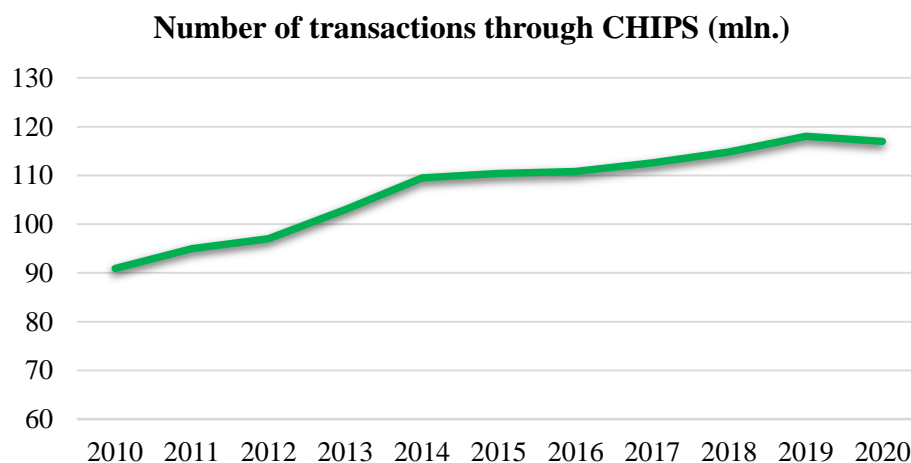
Transactions are settled in real time on a gross basis in the books of the Reserve Bank of India. RTGS also settles multilateral net settlement files originating from ancillary payment processors of Clearing Corporation and National Payments Corporation of India. RTGS accounts for most of the transactions carried out in Indian payment systems. The system is available for client transactions from 7 am to 6 pm and for interbank payments from 7 am to 7.45 pm. From December 14, 2020 RTGS is available 24 hours a day. The introduction of RTGS 24x7 contributes to the integration of Indian financial markets with international ones, development of international financial centers and provides Indian corporations and institutions with more flexible payments [20].

The decision to grant access to RTGS is made based on criteria established by the Reserve Bank of India. Organizations must meet the following requirements: (i) be a member of the Indian Financial Network / Structured Financial Messaging System / SWIFT network; (ii) maintain bank current and settlement accounts in the Reserve Bank of India; (iii) maintain a general ledger account in the Reserve Bank of India [22]. Membership in RTGS is open to all licensed banks and any other organizations as agreed by the country's main bank. Members who do not meet the established requirements may receive restricted access. RTGS is available to customers through a web portal and private electronic network, and transactions can also be initiated at the location of the participants themselves. These features make the system reliable and easy to use. From July 1, 2019 the Reserve Bank of India has eliminated transaction processing fees and other fees imposed on banks for all outgoing transactions made using RTGS [20].

## 2.2. DNS systems

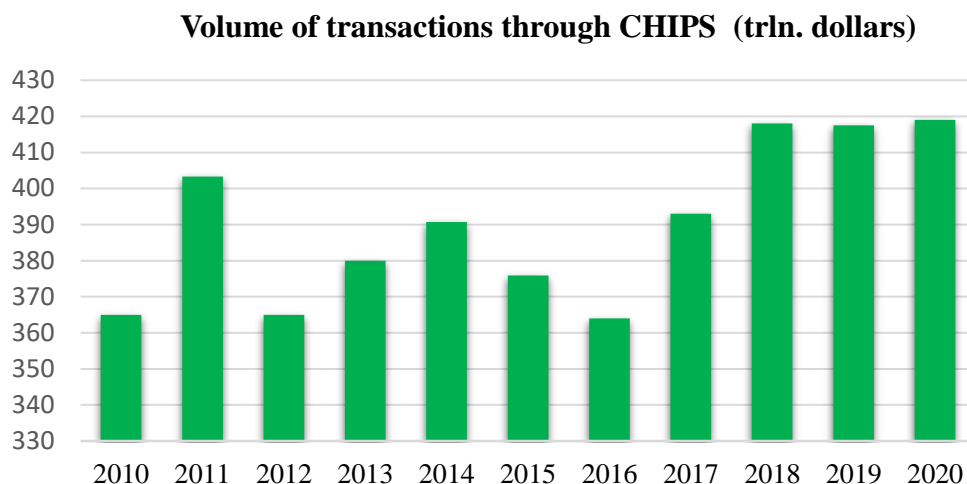
**In the United States**, the main part of large-scale money transfers is also carried out by the **CHIPS system** (Clearing House Interbank Payments System) pertaining to the net settlement system (**DNS**). CHIPS is a private settlement system for cross-border money transfers in US dollars. This high-value payment system has approximately 50 direct participants and is Fedwire's private sector partner. CHIPS accounts for about 96% of all the global dollar transactions: interbank settlements (short-term loans, support of correspondent accounts, etc.), various commercial client payments [3].

**Figure 3.**



Source: Based on CHIPS data.



**Figure 4.**

Source: Based on CHIPS data.

On the territory of **Europe**, the representative of the net settlement system is **EURO1** launched at the end of 1998 by the European Banking Association. The EURO1 system, developed based on the experience of implementing the technological solutions of the SWIFT platform, is designed to transfer large payments (up to 500 million euros). The system is operated by the clearing company of the European Banking Association - EBA Clearing, founded by 52 largest European and international banks. Currently, 51 banks are direct participants in the EURO1 system. EURO1 was built to develop a pan-European payment area with euro settlements, as well as to provide European credit institutions with their own wholesale systems along with RTGS operated by the Eurosystem. EURO1 has been designed to settle on a net basis in order to provide greater liquidity than the RTGS system. The system processes an average of more than 180,000 payments per day, totaling around 200 billion euros. Besides, at the system level 95% of the transactions are calculated in real time [8].

Banks generally prefer to use TARGET2 for more important payments due to the benefits of RTGS (robust operational risk management framework, efficiency and security provided by real-time central bank money settlement). In turn, EURO1 is a net settlement system used to make less urgent payments (domestic or transnational) in large amounts. Compared to TARGET2, the private system managed by EBA Clearing is characterized by liquidity efficiency due to the netting payments [8].

Large-value payment systems based on deferred net payment (DNS) continue to be used despite the development of RTGS systems, which are more secure. DNS systems have compensated for the lower level of security by building robust risk management structures that greatly reduce financial risk. The fact that EURO1 and CHIPS continue to function together with the RTGS system may be explained by the “dual” structure of the high value payments market, characterized by the coexistence of two systems operated by a public institution and the private sector.

### 2.3. Hybrid systems

The next important step in the development of interbank settlement systems was the creation and implementation of hybrid (hybrid) payment systems that combine the properties of real-time gross settlement systems and "netting". The system has improved operational characteristics - saving liquidity and instant completion of the transaction.

**The Central Bank of Egypt** successfully launched a hybrid RTGS system on March 15, 2009. It is based on the latest business concepts in the field of wholesale payment systems and most modern technologies. Settlements in the system are final and irrevocable. Since the system is hybrid, settlements are carried out both on one-time payment requests and on the results of netting by clearing houses. The Central Bank of Egypt provides banks with free daylight overdraft. Treasury bills (through intraday repos with the Central Bank) and deposits of commercial banks, except for overnight deposits, are accepted as collateral in the system. RTGS supports a variety of liquidity optimization mechanisms to facilitate the timely execution of cash orders throughout the trading day. All the banks registered with the Central Bank of Egypt are direct members of RTGS. The operating mode of the system is from 8.30 am to 4.30 pm every working day [5].

The Egyptian system uses SWIFT's "Y Copy service", which is a safe and secure environment for transferring funds. Thus, all the messages sent through the system fully comply with the SWIFT messaging formats. More than 57 billion Egyptian pounds (more than 9 billion US dollars) of payments are processed daily in the system, indicating that RTGS is a systemically important element for the Egyptian economy. During the first 12 months of operation of the system, settlements were made in the amount of 13 trillions of Egyptian pounds (more than 2.5 trillion dollars). This means that the amount equal to the country's total GDP passes through the system in 20 working days.

Payment documents may be stored in the system for processing at a later time during the day or thereafter. All the transactions related to bank accounts at the Central Bank must go through the system. Hybrid RTGS operates in a highly secure environment with automated disaster recovery systems. The system fully complies with the key principles of the systemically important payment systems of the Bank for International Settlements, and proper supervision is carried out to ensure such compliance [5]. The Central Bank of Egypt, as the main catalyst for change in the Egyptian financial market, monitors market trends in the field of payment systems in order to maintain and further develop the country's payment infrastructure.

In **Germany** in 2001 during the reform of payment systems the latest electronic system **RTGS<sup>plus</sup>** replaced EIL-ZV. Formed by the merger of two German clearing systems, Europe Link System (part of the platform for TARGET) and Europe Access Frankfurt, RTGS<sup>plus</sup> is considered one of the largest, technologically advanced European systems designed for making large payments. The Germany's Central bank as well as German commercial banks took part in its

creation. RTGS<sup>plus</sup>, being a representative of hybrid systems, makes money transfers on a gross basis using "netting" to save liquidity [7].

Thus, important stages in the development of payment systems in the category of large payments are associated with the emergence of RTGS systems, their subsequent updating and upgrading to "hybrid" systems, a feature of which is the combination of real-time money transfer with a netting mechanism.

#### **2.4. Payment systems in Kazakhstan. Experience of Kazakhstan.**

At the end of 1991 the payment mechanism of the former Soviet Union consisted of cash in the economy's retail sector and a system of deposit-based money transfers between enterprises based on the payment orders (credit instruments) and payment claims (debit instruments). Individuals could also pay for some government-provided services, such as housing and utilities, by transferring money from Savings Bank accounts.

The payment systems inherited from the former centrally planned system and supported by the State Bank of the former USSR were not suitable for a market economy. Under the socialist model, economic relations were regulated by the central planning bodies. The payment system and indeed the entire banking system essentially performed the functions of accountants keeping financial records of the centrally planned economic activities. This payment mechanism was unreliable, inefficient and unsuitable for the new market economy.

In 1994 the National Bank of the Republic of Kazakhstan was given the task of modernizing the payment system in order to speed up the passage of payments between banks and their customers, as well as to expand the list of payment documents used. In 1995 on the basis of the National Bank the first clearing house in the country, the Almaty Clearing House, was organized, which worked according to the method of multilateral netting. During the day, second-tier banks exchanged payment obligations. The banks made final settlements once at the end of the trading day for the net position of each participant. Thanks to this, the banks had liquidity in their accounts during the day. The disadvantage of this system was that the participating banks at the end of the day had to exchange payment orders on paper.

Since 1996 the Almaty Clearing House has been reorganized into the Kazakhstan Interbank Settlement Center - a state-owned enterprise on the right of economical jurisdiction (hereinafter - KISC), the founder and authorized body of which is the National Bank. Improvement of the regulatory legal framework, installation of modern equipment and software made it possible to work with electronic payment orders that do not require confirmation on paper [6].

A key moment contributing to the acceleration of the passage of interbank payments was the creation of the first prototype of the wholesale payments system - in August 1996 on the basis of KISC - that performs settlements on a gross basis and has the characteristics of an advanced real-time gross settlement system (RTGS). Before building this system, the practice of the countries of the European Union was studied, and the experience of Switzerland (SIC system) was taken as the basis for the Kazakhstani system of wholesale payments. The National Bank

and all the commercial banks became users of the centralized system. In a short time, the system of large payments gained great popularity due to electronic document management that does not require paper confirmation, due to the speed and reliability of money transfers, as well as high level of security [6].

The next significant historical moments in the process of improving payment relations in Kazakhstan were:

- approval of the fundamental Law “On payments and money transfers”, which regulates the issues of making payments and money transfers on the territory of the Republic of Kazakhstan and development of the appropriate regulatory legal framework;

- centralization of correspondent accounts of the second-tier banks in the National Bank in the period from October to November 1998. This transfer allowed the National Bank to quickly perform the functions of a settlement bank and increase efficiency of control functions over the banking and payment system, to transfer auxiliary accounting of correspondent accounts to work in real time.

As a result of almost a decade of work to improve the legislative framework in the area of payment systems, technical and technological modernization, bringing the payment systems of Kazakhstan closer to international standards, as well as in connection with the need to meet the growing needs of the banking and financial sectors in an efficient and secure payment system with final settlements on the same day, in February 2000 the Interbank System of Money Transfers (ISMT), which is a system of gross settlements in real time, began to operate on the basis of the Kazakhstani wholesale payments system [6].

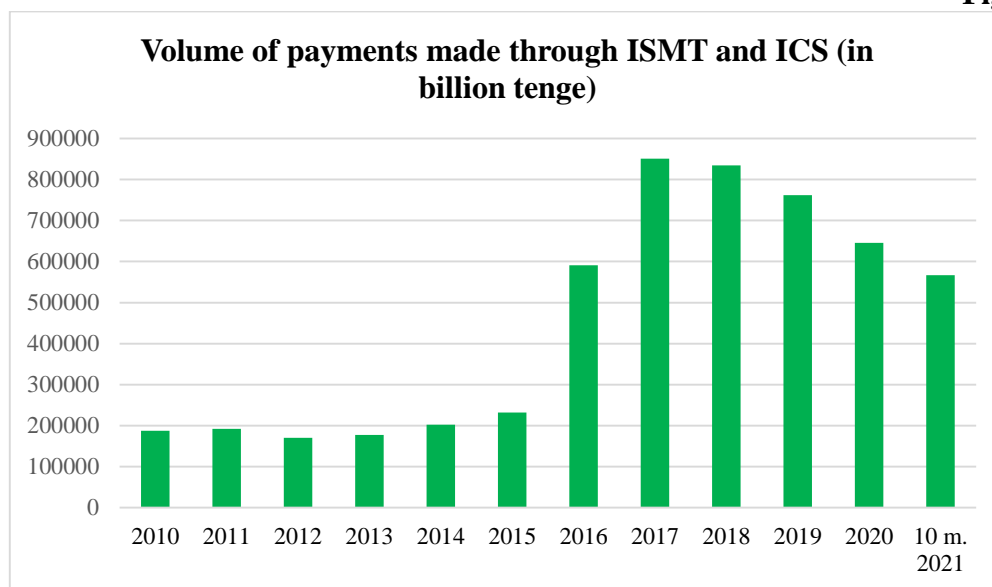
At the same time, since 1995 the activities of regional clearing houses have also undergone significant changes. By 1999 these chambers at the regional branches of the National Bank were replaced by a system of multilateral netting of counter obligations (similar to the American automated clearing house), which operates without preliminary deposit of funds with the final calculation of users' net positions in ISMT. The system was called the Interbank Clearing System (ISC) [6].

In 2009-2010 in order to improve operational reliability and production efficiency of the national payment systems, National Bank successfully upgraded the technical infrastructure of the payment systems and transferred them to a new software and hardware platform. New versions of the ISMT-2 and SMK-2 payment systems are characterized by a high level of security and a significant increase in throughput, cluster software allows the servers of the main and backup centers of payment systems to function as a single whole.

At the same time, on the new platform in mid-2010s international standards for the bank account number and bank identification code ISO 13616: IBAN and ISO 9362: BIC were introduced in payment systems, which made it possible to improve the system for identifying banks and their customers in the payment systems of Kazakhstan, to ensure automation and acceleration of processing payments, and create prerequisites for possible future integration processes.

Interbank Money Transfer System and Interbank Clearing System are of strategic importance for Kazakhstan's payment infrastructure. In 2020, 92% of non-cash payments were made through ISMT and SMK. Over 10 years the volume of transactions carried out through these systems increased by 3.43 times from 187.7 trillion tenge in 2010 to 645.5 trillion tenge in 2020. For 10 months of 2021 48.2 million transactions were carried out through ISMT and QMS for the amount of 628.6 trillion tenge.

**Figure 5.**



Source: Based on the data from the National Bank of the Republic of Kazakhstan.

Summing up the results of the formation and development of the payment services market in Kazakhstan over the past twenty years, it should be noted that extensive work has been carried out to reform payment relations as part of the transition from a centralized economy to building a high-tech and reliable payment mechanism, which is an important link between all the subjects of the modern market economy. As a result of the consistent methodological work, study of the best world practices and application of the latest information technologies, the national payment systems functioning in the country today contribute to the effective implementation of the National Bank's monetary policy, contribute to ensuring financial stability and meet requirements of the international standards.

### **3. Second stage. Creation and development of the retail payment systems**

#### **3.1. Card systems**

The use of cards as a payment method originated in the United States in the 1920s when individual firms, such as oil companies and hotel chains began issuing them to customers to make purchases at the sale outlets. The first universal credit card that could be used across institutions was introduced by Diners Club International in 1950. Another card of this type, known as the travel and entertainment card, was created by American Express in 1958. Under this system,

the credit card company charged the cardholders an annual fee and billed them periodically. Collaborating merchants from all over the world paid their credit card issuer a service fee of 4-7% from the total amount.

Today bank cards are widely used for cashless payments through POS terminals and other online or offline channels, as well as for cash withdrawals and other transactions through ATMs. Interbank and cross-border transactions would not be possible without international card associations connecting banks and financial institutions. Card systems set standards, license banks and other financial institutions to issue cards with their brand, resolve disputes, provide technical and operational support to their members, as well as commercial services, process transactions with clearing and settlement. The largest payment systems are Visa, MasterCard, American Express, Diners Club.

In practice, the level of development of the infrastructure for card payments or payments based on electronic money transfers varies from country to country. In some governments large international card systems dominate, in others local and regional payment systems win the competition. Local payment systems created by banks to service the cards they issue are not always convenient, since they do not accept other systems' cards. There is a need for a single card payment system working with the cards of the banks participating in the system. The first two decades of the 21st century were marked by the creation of national card payment systems.

**In the early 2000s in China** different commercial banks independently engaged in the issuance and promotion of payment cards under different brands. The Bank of China issued the Great Wall card, the Industrial and Commercial Bank of China issued the Peony card, and the China Construction Bank issued the Dragon card. Until 2002 China did not have a unified card system or national bank cards, accordingly, processing of the interbank transactions, organization of clearing and settlement were carried out by the commercial banks. In March 2002 **UnionPay was founded by the State Council and the Central Bank of China** to create a single platform for processing bank cards. As a key institution in China's bank card industry, UnionPay has established and launched a nationwide clearing and settlement system for interbank transactions. In cooperation with partners, commercial banks and sales representatives, China UnionPay has set standards, created a single Chinese brand of bank cards, and has been promoting it in the market of non-cash payments [1].

In August 2003 UnionPay issued the first UnionPay card with a number beginning with "62", the UnionPay card issuer identification number established by the International Organization for Standardization (ISO). In January 2004 UnionPay POS terminals were installed for Hong Kong merchants, it was the first step towards overseas expansion. Since 2004 the number of cards issued by UnionPay has grown rapidly. With 2.3 billion UnionPay cards issued in 2010, China UnionPay became the largest player in the global bank cards market in terms of the number of cards in circulation [1].

Another example of a national payment card processing **system is Troy system** established in 2016 by the Interbank Card Center **of Turkey (BKM)**. BKM was founded in 1990 as a result of the partnership of 13 public and private Turkish banks to develop and promote a unified infrastructure for card payments. Today through BKM banks can collaborate on network technologies while still competing at the product level. BKM's work resulted in the common ATM platform, common POS terminal management system and the Troy card itself. The main activities of BKM are processing of the card transactions, development of the rules and standards for credit and debit cards in Turkey, formation of the internal rules and regulations, ensuring standardization in the field of payments, as well as establishing relations with international organizations and commissions [25].

**Troy system** was launched with the support of Turkish banks that are members of the Troy network or issue Troy cards. Troy represents a trusted local alternative to Visa and MasterCard targeting at over 90% of the Turkey's domestic transactions. Thanks to BKM, the Turkish banking market has remained relatively unfragmented facilitating rapid technological change. Working in the same payment system, participants compete in the implementation of innovations in the field of customer service.

Recently, there has been an increase in the use of payment cards in Turkey - from 30.6 million cards in 2016 to 89.6 million in 2020 with an average annual growth rate of 30.8%. This figure is expected to grow to 176.3 million by 2024. With the help of the Troy system Turkey plans to become the largest cashless payment market by 2023. With that in mind, Turkish financial authorities are introducing other initiatives to stimulate electronic payments, including a standardized national QR code (approved in August 2020) [25]. Such initiatives contribute to the rapid development of the country's payment market.

In Russia, the decision to build the **National Payment Card System (NSPK)** was made after the sanctions imposed by the United States, as a result of which the international payment systems Visa and Mastercard stopped servicing the cards of the Russian banks' customers. After the launch of the NSPK in 2014, all domestic payments with the cards of the international payment systems began to be processed in Russia.

By 2015, the legal foundations required to ensure the smooth operation of a completely new financial institution were established. The requirements imposed by the Law on the National Payment System and regulations regarding payment service operators oblige the settlement, operational and payment clearing centers to be located within Russia. This makes it possible to ensure the independence of "domestic" (local) payments from external political influences, and keep the entire information safe within the borders of the government. At the end of 2015 a new stage in the development of the national payment system began: it was during this period that the Mir national payment card was issued.

In Russia promotion of the national payment instruments takes place in various directions. Firstly, issuance of the "co-badged" cards is being implemented, the service of which is carried out by two payment systems at once,

i.e. it is connected to two processing centers. Currently the bilateral cards are issued under the brands of the Mir-Maestro, Mir-JCB, Mir-UnionPay, Mir-MasterCard, Mir-American Express. Also, Russia is actively working towards building and developing the payment space with the countries of the Eurasian Economic Union (EAEU). NSPK jointly with the national payment systems of the EAEU countries, not only develops technological services, but also develops platforms that provide mutual, cross-system acceptance of the national payment cards in the infrastructures of the banks. For example, in July 2017, the integration of the national payment systems of Russia and Armenia was successfully carried out, and as a result it became possible to service Armenian Cards (ArCa) in Russia and Russian Mir cards in Armenia [12].

India is one of the examples where the national card systems have been successfully implemented. India's retail payments industry has been developed thanks to the local **RuPay card payment system** launched in 2012 by the **National** Payments Corporation of India (NPCI). The NPCI in its turn was established under the leadership and support of the Reserve Bank of India and the Indian Banks Association (IBA) as an umbrella organization to promote the retail payment system in the country. NPCI started with 10 major founding banks as shareholders. Up to date, the number of NPCI shareholders is 67, including 11 state-owned banks, 19 private banks, 5 foreign banks, 10 cooperative banks, 7 regional rural banks. NPCI, as a non-profit payment company, works for the benefit of member banks and their customers by building the infrastructure for the operation of the pan-Indian systems that handle the growing volume of retail electronic payments. Banks in India using the RuPay domestic card system do not pay high commissions to the multinational payment companies [19].

As a result of the 2016 demonetization and the launch of the RuPay debit and credit cards, the number of users has increased, especially in rural areas of India, where the card payment was a novelty five years ago. In 2017, RuPay cards accounted for only 15% of the total cards issued in India. However, today about 635 million RuPay cards have been issued by 1,200 banks, and every second person in India has a RuPay card. Thus, in 2021, the market share of the RuPay cards has increased to more than 60% of the total number of the issued cards [19].

Over the years, NPCI's retail payment systems including RuPay have been widely recognized throughout the country and attracted interest in other countries. In order to distribute NPCI payment products abroad, a subsidiary company - NPCI International Payments Limited (NIPL) was established in April 2020. The main task of NIPL is the internationalization of RuPay and UPI. Today, outside of India RuPay cards are issued in partnership with such payment systems as Union Pay (China), JCB (Japan), NETS (Singapore), BC Card (South Korea), Elo (Brazil) and DinaCard (Serbia), Discover and Diners Club International [19].

### **3.2. Fast payment systems**

The use of the fast payment systems around the world can be called one of the most significant stages in the field of reforming payment systems in recent



times. A report prepared by the World Bank Group showed that about 60 countries currently have fast payment systems [13]. The basic principle for all the countries remains the same and is providing money transfers 24/7 in real time. Central banks play a key operational role in the fast payment systems such as TARGET Instant Payment Settlement (TIPS) in the European Union, Faster Payment System (FPS) in Hong Kong, Cobro Digital (CoDi) in Mexico, PIX in Brazil. In addition, some countries have payment systems similar to the fast payments, but which are not classified as "fast payments" as defined by the Committee on Payments and Market Infrastructure: "fast payments are defined as payments in which the payment messages and final availability of the funds to the payee are carried out in real time or close to real time on an ongoing basis (24/7)" [13].

Various studies show that the use of fast payment systems varies significantly across jurisdictions. These differences will increase as new systems emerge, driven by different conditions, needs, private and public concerns.

### **Great Britain**

FPS (Faster Payments Service) is a British interbank system for making small retail payments within a short period of time (an operating day is a few hours). The system was created as an alternative to the BACS<sup>4</sup> system to maintain competition in the interbank settlements market. The infrastructure of these systems is similar in functionality and is maintained by VocaLinc.

Mutual settlements are carried out 3 times a day. In most cases, transaction process takes up to two hours, but this period is not guaranteed. The maximum transaction amount is £250,000 (financial institutions may set more stringent limits at their own discretion). The mobile phone number is used as the payment identifier. The transition in November 2011 to a 24/7 operating mode provided an increase in the volume of transactions from \$27 billion per month to \$60 billion in June 2012.

Figures 5 and 6 show the number and volume of FPS transactions from September 2020 to August 2021. In 2020, FPS broke the record for the most payments processed in a year. In 2020, 2.9 billion payments were processed in the amount of 2.8 trillion US dollars (2.6 trillion US dollars in 2019).

### **European Union**

TARGET Instant Payment Settlement (TIPS) is a payment system launched by the ECB in November 2018. The system allows payment service providers to offer their customers the opportunity to make payments in real time and around the clock, every day of the year. Thanks to TIPS, individuals and legal entities can transfer money within seconds regardless of the opening hours of their local bank. TIPS currently only makes payments in euro. However, from May 2022 TIPS plans to launch instant payments in Swedish Krona.

#### **System's features:**

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<sup>4</sup>The Bankers Automated Clearing Services - electronic offset of credit and debit entries according to the order of the system participants, with direct crediting of the amounts to accounts or debiting them from accounts without the use of checks or other paper-based media

- Single Euro Payments Area - SEPA: Integrated Market for Retail Euro Payments;
- Based on SEPA Instant Credit Transfer (SCT Inst), a pan-European instant payment scheme;
- Developed as an extension to TARGET2;
- The Payment Services Directive (PSD 2) opens the door for non-bank payment providers (payment initiation service providers - PIS and account information service providers - AIS);
- Instantaneous payments.

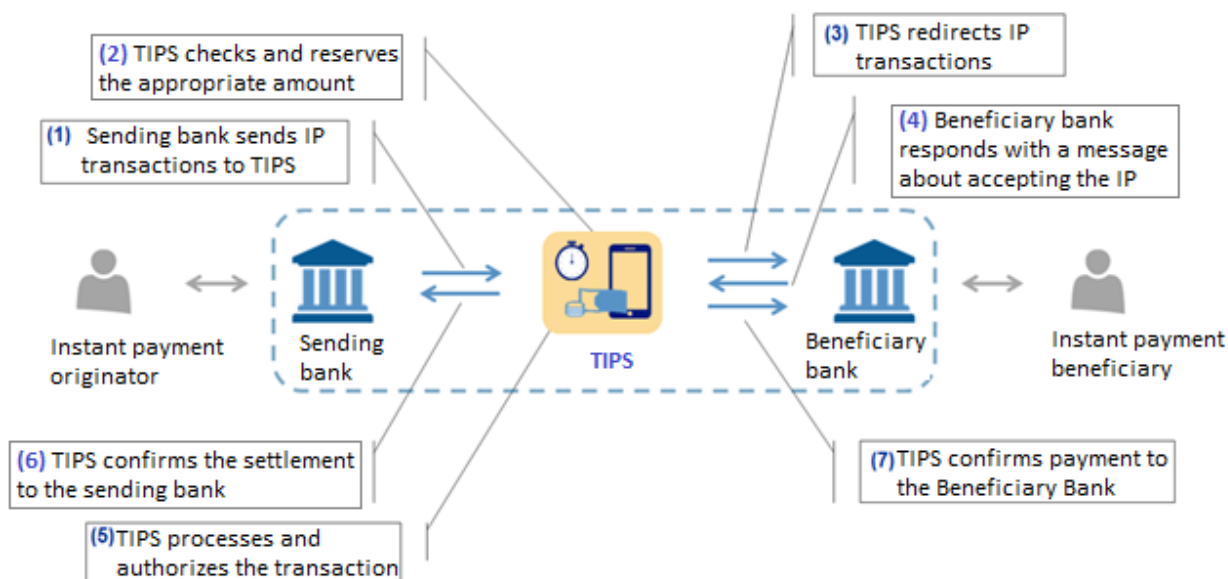
**Figure 6.**



In order to attract the banks' interest to participate in this system, the following pricing tools were applied:

- pricing works on a non-commercial basis on the principles of full cost recovery;
- there is no fee for the account activation or its maintenance;
- the price for an instant payment transaction is set at 0.20 euro cents (0.002 euros) until November 2020;
- The first 10 million payments made by each TIPS member before the end of 2019 are free.

The scheme for making a payment in TIPS is as follows.

**Figure 7.**

Participating banks can set aside part of their liquidity in a special account opened with their central bank from which instant payments can be made. Depositing funds to the TIPS account is possible only during the TARGET2 opening hours.

Because TIPS is settled in central bank money, participation in TIPS is contingent on having access to the central bank's money. For this reason, in order to open a TIPS account in euro, the bank must meet the same criteria as for the participation in TARGET2.

Payments are made only if there is enough money in the TIPS participant's account to complete the transaction, otherwise the transaction is rejected (funds guarantee for the settlement).

### **India**

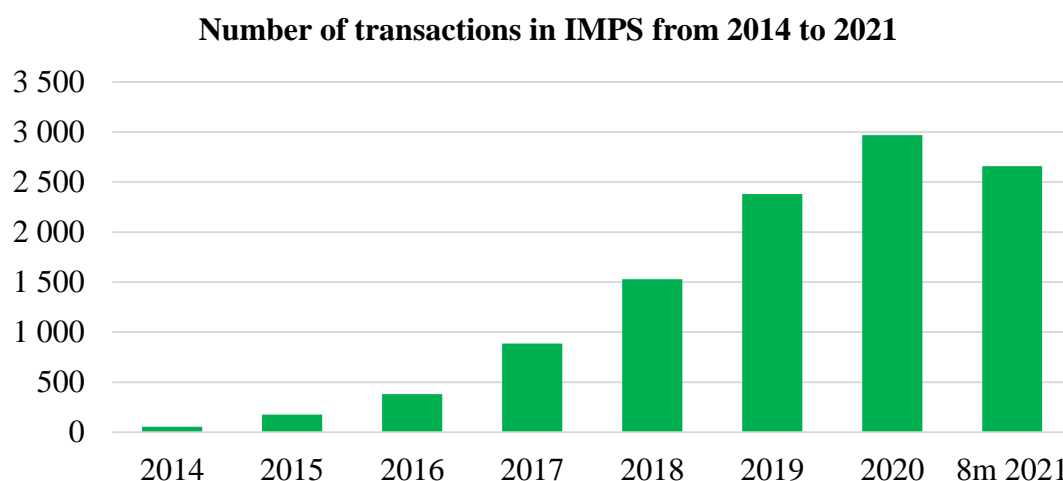
IMPS (Immediate Payment Service) is an interbank system of instant electronic transfers that allows you to transfer money 24/7 using a mobile phone, Internet and self-service terminals. Mutual settlements are carried out 3 times a day. The participants of the system are 641 banks. A feature of this system is its multi-channeling (you can initiate payments using payment terminals, mobile phone and the Internet) with the operation's confirmation by SMS [16].

The launch of the system in 2010 played an important role in the population's transition from cash to non-cash forms of payment (in 2010 for the first time in the history of India the volume of cash transactions yielded to the volume of non-cash transactions).

The system is currently showing a steady growth and is one of the most requested retail payment systems in India (Figures 9, 10). Thus, over the past 7 years the volume of the transactions in IMPS has increased by more than 55 times (6 billion US dollars in 2014 and 357.8 billion in 2020). Through IMPS for 8

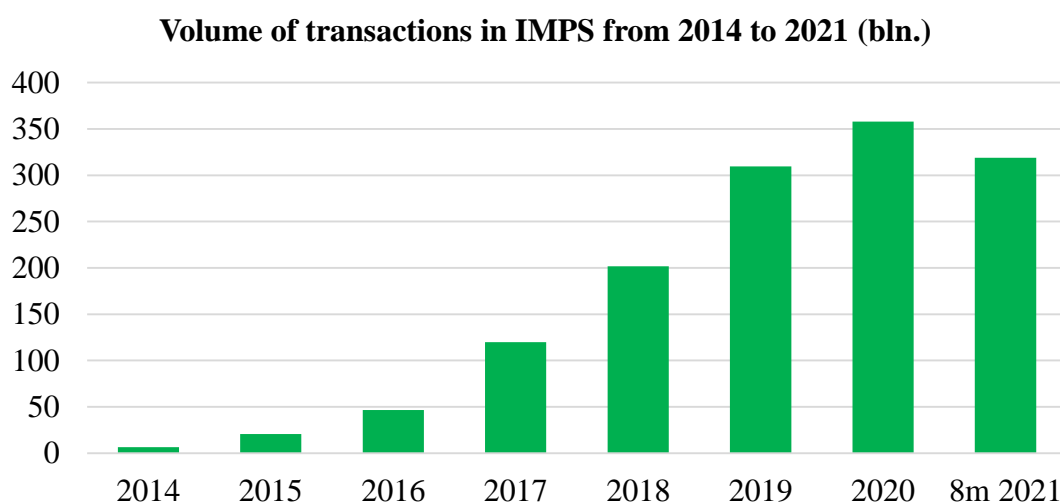
months of 2021 2.7 billion transactions were processed in the amount of 318.8 billion US dollars, which is 50% more than in the same period in 2020 (212.2 billion US dollars for 8 months of 2020) [16].

**Figure 8.**



Source: Based on data from the Reserve Bank of India.

**Figure 9.**



Source: Based on data from the Reserve Bank of India.

Also, one of the components of the IMPS system is UPI (Unified Payment Interface) which is a fast payment system based on standard APIs to simplify online payments. UPI was launched by the National Payments Corporation of India with the support of the Reserve Bank of India with the aim of developing cashless payments.

Registration in the system is carried out using the Aadhaar number (the identification system of the citizens and residents of India with the help of which a unique personal citizen number is assigned), credit or debit card or a bank account number. The system uses a unique UPI identifier, which can be generated for each transaction if necessary, and payments are made using simplified details (using a

unique UPI identifier), which is a part of the set of open APIs of various infrastructure systems in India, known as the Indian Stack [16].

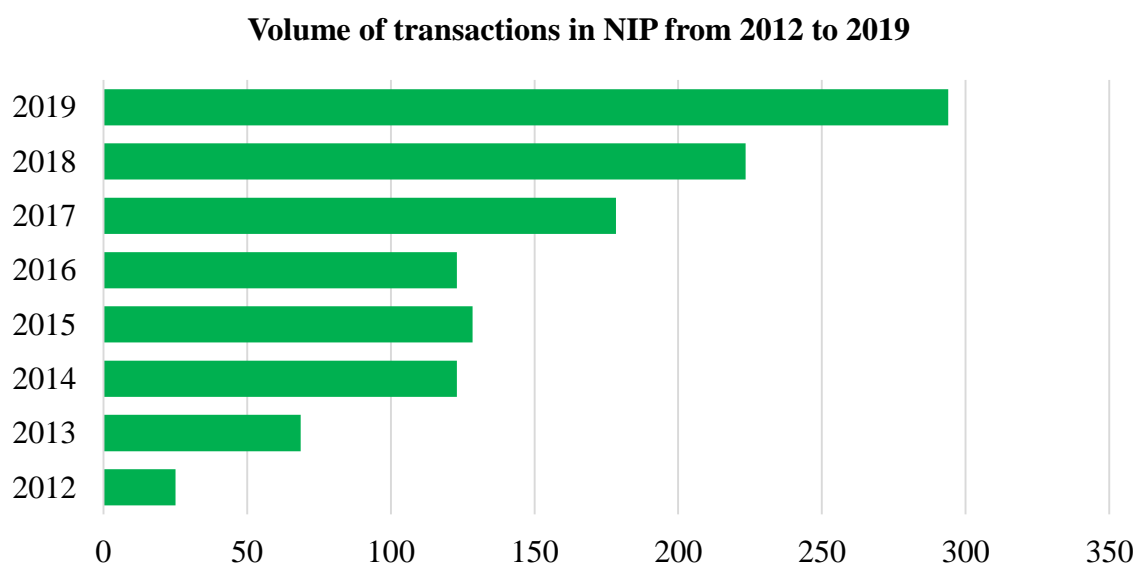
## **Nigeria**

Since 2009 there has been the work done in a comprehensive manner to increase the share of non-cash payments in Nigeria. NIBSS Instant Payments (NIP) was launched in Nigeria in 2011. In 2013 for the first time in the history of the country the volume of the non-cash transactions exceeded the volume of cash transactions (using payment terminals and checks) amounting to 11 trillion US dollars [18].

Since 2009 the financial regulator has been reforming payment systems. In 2009 the regulation of mobile money operators was introduced. A year later the national switching platform was launched and in 2011 NIP was launched . In 2012 "cash-free" policy was adopted, placing restrictions on cash transactions and requiring banks to conduct public education campaigns and stop providing cash collection services. The following year, the powers of banking agents were expanded. 2014 was marked by the launch of the biometric identification platform together with the help of the banks, while 2015 was marked by the strengthening of the regulatory standards regarding mobile money operators, as well as the development of the “cashback” rewards’ standards. Since 2017 it has become possible to process payments using QR code in NIP and a mobile phone number [18].

Figure 11 shows the volume of transactions in NIP from 2012 to 2019. In 2019 transactions amounting to 294 billion USD were carried out through NIP, which is 2.4 times more than in 2018. NIP accounted for 23.8% of total e-payments made in Nigeria in 2019 (total e-payments in 2019 was \$1.2 trillion).

**Figure 10.**



Source: Based on data from the Central Bank of Nigeria.

## **Australia**

Australia was almost one of the last to start developing and implementing a fast payment system, but this only served as an advantage allowing it to apply the experience of other countries and recommendations of the leading financial institutions.

Australia's New Payments Platform (NPP) owned and operated by NPP Australia Limited (NPPA) is essentially a clearing system for the fast payments. NPPA shareholders are direct participants in the system - nine banks, three aggregators (which provide connectivity for the smaller organizations) and the Reserve Bank [14].

The NPP infrastructure includes:

- a network that transmits messages about the payments' clearing and settlement between the participants, as well as between participants and the Fast Settlement Service (fast settlement system)
- payment gateways located in the ecosystem of each participant, which facilitate switching of the transactions through the network; and
- PayID payment service that allows customers to link their bank account with a simplified identifier such as a phone number, email address or business identification number.

The NPP service is supported by the Fast Settlement Service (FSS), created and operated by the Reserve Bank to settle payments with NPP in real time 24/7. When a payment is initiated through NPP, the payer's bank first receives confirmation from the beneficiary's bank that the payment can be received, and then transfers the money. Having received this confirmation, the payer's bank sends a settlement request to the FSS, and if there are enough funds on the account, the transaction is settled through the FSS, and the confirmation is sent to both the paying and beneficiary banks. All this happens in a matter of seconds [14].

In some respects the Australian system is at the forefront of the fast payment systems. The later start of the development of the system made it possible to draw lessons from the foreign practices and include the functions that are relevant today.

In the two years since its launch NPP and FSS have enabled customers of 91 organizations to make fast payments 24/7. In January 2020, 4.1 million users with registered PayIDs averaged 1.1 million payments per day worth \$1 billion. NPP is expected to continue to provide new payment services and innovations given a number of the features currently under development.

### **3.3. Cross-border payments**

Cross-border payments are both necessary for the state and business entities, and for individuals. While constant innovation makes domestic payments more efficient, cross-border payments still tend to be slower, more expensive and opaque.

Despite the widespread introduction and development of the fast payment systems, in many countries today sending money abroad is still time-consuming and costly. A few years ago in several countries of Southeast Asia in order to solve this problem joint work between regulators, payment system operators, bankers'

associations and banks was launched. On April 29, 2021 the Bank of Thailand and the Monetary Authority of Singapore in their joint statement announced the launch of the world's first cross-border fast payment system called PromptPay-PayNow [24]. By linking Singapore's PayNow and Thailand's PromptPay customers of the participating banks in both countries can transfer up to SGD 1,000 or THB 25,000 (\$750-800) daily between the countries using only a mobile phone number.

The process does not require a user to fill in fields such as the full name of the recipient and account details, as it is required for a conventional transfer. Transfers will be completed within minutes, which is a marked improvement over 1-2 business days required for the most cross-border money transfer solutions. The commission will be 3% - 5% depending on the volume of the transfer, which is significantly lower than the average rates for transfer services (about 11%). In addition, senders of money can check applicable currency exchange fees before sending their funds and exchange rates will be comparable to the market ones.

Thus, the launched service effectively solves the long-standing problems in the field of the cross-border transfers, specifically long time for the completion of a transaction and high costs.

The integration of PayNow and PromptPay systems is just the start of the big job of Thailand and Singapore's central banks of in this direction, the common goal of which is to involve other partners from the Association of Southeast Asian Nations (ASEAN) to expand this two-way communication to a network of the connected retail payment systems throughout the region. The team will work to attract members and increase the limits to facilitate business-to-business transactions. Today's integration of PayNow (operating on the basis of FAST) and PromptPay represents another key milestone towards improved digital payments. The integration of PayNow-PromptPay systems is also a key element of the cooperation under the ASEAN Payment Connectivity program, which was launched in 2019 and is closely aligned with the efforts of the G20, Financial Stability Board and other international bodies setting standards to ensure faster, cheaper and more transparent cross-border payments.

To promote the cross-border platform the Bank for International Settlements and the Monetary Authority of Singapore have published a plan called Project Nexus, describing how different countries can fully integrate their retail payment systems into a single cross-border network, allowing customers to instantly and securely make cross-border transfers using their mobile phones or other gadgets [4]. It is based on the experience of the successful connection of Singapore's PayNow and Thailand's PromptPay, and the experience of development and usage of the Unified Payments Interface (UPI) system of the National Payments Corporation of India (NPCI).

The Project Nexus plan provides for the creation of "Nexus gateways" that are designed to coordinate compliance, currency conversion, message translation, and payment ordering among all the participants. These gateways will be based on a common set of the technical standards, features and operational guidelines. The plan also includes the Nexus Scheme, which establishes a governance structure and

set of rules for the participating retail payment processors, banks, and payment service providers to make cross-border payments across the network. The Project Nexus is trying to create the equivalent of Internet protocols for payment systems, i.e. a model by which any country can join by accepting certain technical and managerial requirements. According to the Nexus plan, participating countries will need to adopt the Nexus protocols only once in order to gain access to a wider network of the cross-border payments [17]. This eliminates the need for countries to negotiate payment links on a bilateral basis with each jurisdiction.

### **European Payments Initiative**

Europeans are also working towards integration of the payment systems of the Union countries and improving cross-border payments. Today, 19 member states use euro as their currency, and the Payment Services Directive (2007) established the Single Euro Payments Area, which allows consumers and businesses to make payments in euros on the same terms in 33 countries.

In July 2020 a group of 16 banks from Germany, France, Spain, Belgium and the Netherlands announced plans to launch the European Payments Initiative (EPI), originally named PEPSI - Pan-European Payment System Initiative [9]. The purpose of the payment initiative is to create and implement a unified payment solution - including a payment card and a digital wallet - for the consumers and merchants throughout Europe. With these two products, all types of the retail transactions can be carried out: POS payment and e-commerce transactions, ATM cash withdrawals and card-to-card (P2P) transfers. The EPI payment initiative will be based on the European payment system TIPS (Target Instant Payment Settlement) launched at the end of 2018, with the help of which 24/7 real-time money transfers became available to the consumers of payment service providers [2].

Considering its important strategic goal the EPI initiative was supported by both the European Central Bank and the European Commission. The system being developed is designed to solve two important problems in the European payment area - issue of the fragmentation of European retail payment systems and of ensuring security and independence of the system. Some European countries have national payment systems that do not accept cards from other member countries of European Union. Also, with digitalization innovative products such as mobile wallets, available only at the national level, appear in the payment services market. According to the EuroCommerce Association, four out of five transactions in Europe are processed by the American companies Mastercard and VISA. The dominance of US companies in the European payments area makes it easy to charge high fees to consumers and merchants. The EPI team expects that the developed system will change the landscape of the EU non-cash payment market, displacing the international payment systems visa and MasterCard from the first positions, as well as increasingly popular Chinese payment networks (UnionPay, WeChat Pay) [9].

The creators plan that the system will work in trial mode as long ago as 2022 with the gradual expansion of its functionality. Until the end of 2021, participants



in the European market, banks or banking communities, as well as other payment service providers can apply and join the EPI. Today 31 European banks and credit institutions from 7 European countries, as well as 2 leading third-party acquirers - the German company Nets and the French Worldline - are already involved in the EPI. The growing number of the project's participants contributes to an increase in the transaction volumes, and to a decrease in the transaction costs, respectively, therefore, there will be more resources for the innovation. Experts counted that several billion euros would be needed for the successful implementation of the system, and at the moment investments amounted only to 30 million euros [2].

### **3.4. Program of National payment system development**

Central banks are at the center of the development and transformation of the country's financial and payments ecosystem. The eventual result depends not only on technology, but also on the measures implemented and the structure of the market.

For the steady development of the Kazakhstani payments market, it remains very important to determine specific actions and effectively implement steps to develop the infrastructure of digital payments, introduce new products based on the best international practices.

Thus, at present, the National Bank of the Republic of Kazakhstan is working on the implementation of the **Program of National payment system development**, approved by the Resolution of the Board of the National Bank of the Republic of Kazakhstan No. 133 of November 30, 2020. The program is a systemic document reflecting the comprehensive development of the country's payment market. The proposed initiatives affect changes in the activities of all subjects of payment relations - the regulator, banks, government agencies, non-banking organizations.

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The program is aimed at taking measures and launching solutions to eliminate existing problematic issues in the payments market and provides for the development of the national payment system by introducing such components as Instant payments system and Interbank payment card system.

Instant payments system is an interbank system designed to make fast real-time payments using simplified details (QR code, mobile phone number, etc.) with instant transfer of money in favor of the recipient. The system operates in 24/7 mode 365 days a year.

The second component of the national payment infrastructure - Interbank payment card system - will be aimed at processing card transactions within the

country. Today, more than 90% of the transactions with cards of the international payment systems take place within Kazakhstan. As a result of the introduction of this system, continuity and reliability of domestic operations will be ensured.

The Program also provides for the measures aimed at standardizing and ensuring operational interaction of the market participants (unification of the QR code format, transition to the format of the international standard for financial messages ISO 20022, development of Open API and Open Banking).

#### **4. Conclusion**

Long-term experience shows that the growth path of the national payment systems in the past strongly depended on the historically established model of communication technologies and government policy in the banking sector.

However, based on the historical data the global experience in reforming national systems can be divided into 2 main milestones.

Since the 1970s wholesale payment systems played an important role, handling large and urgent payments and significantly increasing the speed of the process of making payments. In the process of building and developing the payment infrastructure, RTGS systems have taken the role of a basic element in most of the national payment systems of the world due to the significant advantages they provide for settlements. With the development of technology, the architecture of the RTGS system like other payment systems has been transforming as new requirements for the system arise. Kazakhstan is no exception in this direction. There was the start of the work on reforming the payments market by the National Bank of Kazakhstan and building Kazakhstani payment systems after the declaration of the country's sovereignty as part of the transition to the market relations and building a new financial system.

As a result of the focused efforts made, the effective payments infrastructure was formed that meets the needs of the population, business and government in conducting monetary transactions. Thus, at the present moment payment systems of the National Bank of Kazakhstan (Interbank money transfer system and Interbank clearing system) operate on the territory of the Republic of Kazakhstan, ensuring the functioning of the country's financial system.

At the same time, as international experience shows at all times, the global payment industry has been experiencing a paradigm shift due to the changes in the economy, demographics and customer needs for faster, cheaper and more accurate payment tools.

Thus, a new stage in the reform of the national payment systems around the world is the creation and implementation of interbank systems that ensure retail payments and money transfers. So recently on a global stage fast payment systems and national card systems have been creating to process local card transactions.

Many countries followed each other to launch modernization programs on the payments infrastructures, to begin joint projects on the innovations study and their introduction. As providers of public infrastructures, central banks are

introducing new technologies to improve and strengthen the position of their payment systems.

For example, in the US, they are working on the FedNow fast payment system, which will provide real-time retail interbank services around the clock. The Bank of England is updating its bulk payment system to enable digital interaction, such as through "tokens".

For example, in the US there is the work going on the fast payment system FedNow, which will provide real-time retail interbank services around the clock. The Bank of England is updating its bulk payment system to enable digital interaction, for example by using "tokens".

In Kazakhstan in 2020 the Program of National payment system development was also adopted. Within the framework of this program the National Bank of Kazakhstan is working to reform the national payment system, the main components of which are the Instant Payment System and the Interbank Payment Card System (local system for processing card transactions), as well as the other activities related to the implementation of ISO 20022 standard in payment systems, unification of the QR code format and introduction of Open API and Open Banking in the financial market.

Thus, the general direction of the new stage of reforming the Kazakhstani national payment system is in line with the best international trends and meets the needs of the market. The planned implementation of the Program of National payment system development until 2025 will speed up payments within the country, increase share of the non-cash payments, increase transparency of the cash flows and ensure security of the payments market in Kazakhstan.

At the same time it should be noted that one of the new directions for the development of the payments industry in the international context increasingly becomes the work on the development of fast, convenient and cheap cross-border payments. The difficulty in organizing convenient, fast and cheap service for cross-border payments lies in the difference of the formats, standards used by the different national payment systems and exchange rates used when making a transaction in foreign currency. The Central Bank of Singapore is working towards the development of cross-border payments and in April 2021 together with the Bank of Thailand it launched the world's first cross-border fast payment system. European Union has also taken a course towards harmonization of the payment processes and reduction of barriers to the cross-border payments within the region. The most recent EU initiative is the EPI designed to address fragmentation of the European retail payment systems.

Thus, taking into account globalization and growth of the national economies, we believe that the next stage in the development of the national payment system is to build a service for making cross-border payments.

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