REPUBLIC OF AZERBAIJAN

On the rights of the manuscript

ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

ASSESSMENT OF PROPSECTS OF APPLICATION OF INNOVATIVE PAYMENT INSTRUMENTS IN THE DIGITAL ECOSYSTEM IN AZERBAIJAN

Specialty:	5306.01 – Technological innovations economy
Field of Science:	53 – Economic sciences
Applicant:	**Tamerlan Hafiz Rustamov**

BAKU - 2025

The dissertation was performed at the Institute for Scientific Research on Economics of the Ministry of Economy of Azerbaijan Republic

Academic supervisor: PhD in Economics
Khayaladdin Rasul Tagiyev

Official opponents: Doctor of Economic Sciences, Professor
Ilham Alici Aslanzade

PhD in Economics, Associate Professor
Allahyar Niyaz Muradov

PhD in Economics, Associate Professor
Tarana Mutallim Ahmadova

ED 2.38 Dissertation Council of the Higher Attestation Commission under the President of the Republic of Azerbaijan operating under the Azerbaijan Technical University

Chairman of the
Dissertation council _____ (signature) Doctor of economic sciences, professor
Vilayat Mammad oghlu Valiyev

Scientific secretary of the
Dissertation council (signature) PhD in Economics, Associate Professor
Fargana Gazanfar gizi Musayeva

Chairman of the
scientific seminar (signature) Doctor of economic sciences, professor
Alovsat Kharaca oghlu Aliyev

EXECUTIVE SUMMARY

The relevance of the topic and the degree of its development. In an era where digital transformation is rapidly expanding, the digital ecosystem is a broader concept that encompasses all the subjects and objects involved in the digitization process, the relationships between them, as well as the direct and indirect participants in these relationships.

The digital payment ecosystem refers to a system that ensures the secure and efficient execution of payment transactions between economic entities in the digital environment. It includes the core components of the ecosystem, such as payment systems, payment services, payment service providers, infrastructure components (information technology infrastructure, payment systems, payment terminal networks, etc.), payment instruments and payment means, as well as payment service users. It is a self-regulating system that integrates all these elements.

The payment ecosystem consists of payment service providers, the infrastructure created for executing payment transactions, payment service users, the technical service providers that ensure the interaction between them, and the legal framework that guarantees the ecosystem's secure and efficient operation.

If the participation of a payment system is a necessary factor in the digital payment ecosystem, this requirement is not expected in the digital ecosystem. In this sense, payments can be made among payment service users served by a single participant in the ecosystem. Therefore, the digital ecosystem is characterized in a broader form.

Deeper digital transformation in the financial-banking system reaffirms the need for a digital payment ecosystem and its key component, innovative payment instruments, which provide a safer and more effective way of settlements between economic agents, are stable and develop on a regular basis based on best practices.

In the digital ecosystem, launch of customer-bank relations on a digital horizon and application of innovative payment instruments in remote issuance of payment orders without coming to the bank have their own features and advantages. Widespread use of innovations in payment instruments ensures fundamental changes in the short and long term, formation of new business models and habits, and as a result, digital

payments become a daily norm.

Innovative payment instruments reduce the shadow economy. Opening of bank accounts for payment instrument users and registration of every payment transaction prevents illegal transactions in the economy and provides strong fight against possible frauds.

Access of the population to financial services expands in direct proportion to wider use of innovative payment tools; it is one of the crucial factors in higher financial inclusion.

Innovations in the field of payment instruments push launch of new payment solutions and create favorable conditions for the application of the digital bank concept in financial markets. In their turn, innovative payment instruments have an upward effect on increasing the speed of processing of payment transactions multifold. Innovations make the payments ecosystem more competititve, allow reducing expenses of the banking system (operational, administrative and other), and use human resources more efficiently.

When it comes to the level of research on the topic, it should be noted that during the digital transformation period, research and studies on innovative payment instruments and their application areas are conducted as a novelty. In this field, certain research has been carried out by Z.F.Mammadov, A.D.Huseynova, X.R. Tağıyev.

The perspectives for the application of innovative payment instruments have been reflected in the works of foreign scholars such as P. Samuel, C. Helbreyt, N. Jonker, K. Arango, V. Taylor, Allen N. Berger, Iftekhar Hasan, E. Roger, etc.

Object and Subject of the Research: The main object of the research is the innovative payment instruments in the digital ecosystem in Azerbaijan.

The subject of the research is the analysis of the characteristic features of various payment instruments applied in the digital payment ecosystem, the disclosure of the advantages of innovations in the field of digital payment instruments, as well as the analysis of these instruments according to different criteria, and the evaluation of the prospects for applying innovative payment instruments.

Goals and Objectives of the Research: The main goal of the research is to disclose the characteristics of innovative payment

instruments in the digital ecosystem and to evaluate their application prospects. In this regard, the following objectives are set for the research:

- ✓ Generalizing the theoretical-methodological aspects related to payment instruments and the application of innovations in this field, and revealing practical examples.
- ✓ Disclosing the results achieved in the field of payment instruments through the application of innovations.
- ✓ Identifying the main directions for legislative reforms to expand the application of innovative payment instruments.
- ✓ Disclosing the factors that will affect innovations in the payment instrument field within the ecosystem.
- ✓ Evaluating the application prospects of innovative payment instruments from various perspectives.
- ✓ Disclosing the latest trends in international practice to ensure the secure and efficient execution of digital payments and to develop them based on advanced international experience.
- ✓ Identifying the measures to be taken to expand the use of innovative payment instruments in our country.

Research Methods: During the research process, economic-statistical analysis, classification, comparative analysis, logical generalization, goal-oriented systematic approach, forecasting, and other methods were used.

The main propositions presented for defense:

1. The main directions of legislative reforms to expand the application of innovative payment instruments.
2. The latest trends in international practice regarding the application of innovative payment instruments.
3. The explanation and evaluation of the characteristic features of payment instruments in terms of various factors, including the application of innovations.
4. The steps to be taken for the normalization of the application of innovative payment instruments in our country.

Scientific novelty of the research work.

Specific features of payment instruments are classified and advantages of the application of innovations in payment instruments disclosed based on the research work. In addition, the following is

achieved in the scientific novelty:

1. Assessment of prospects of application of innovations in payment instruments based on various indicators and criteria;
2. Conducting comparative economic justification of digital payment instruments;
3. Identification of a positive relation by means of the calculation of the coefficient of correlation between the value of consumption and the value of domestic payment card operations, thereby proving that the rise in the value of cashless settlements in transactions with payment cards within the country supports economic growth;
4. assessment of reforms in the legislation and their effects in order to expand the application of innovative payment instruments;
5. substantiation of the impact of recent development trends on the application of innovative payment instruments in best practices;
6. identification of reforms to be conducted in Azerbaijan on wider application of innovative payment instruments in Azerbaijan and issue of specific proposals.

Theoretical and practical significance of the research Theoretical significance of the research is that the study of and features of the application of digital payment instruments, explaining advantages of innovations in payment instruments, comparative analysis of prospects of innovative payment instruments, as well as theoretical and practical statements on the steps taken to expand innovative payment instruments in international practice may form a basis for related reforms in our country and other countries.

The practical significance of the work is that, stated theoretical provisions and practical recommendations applied in practice may be used by the Central Bank of the Republic of Azerbaijan, the driving force of the digital payments ecosystem in the country, out of ecosystem participants banks, electronic money institutions and payment institutions, that are financial intermediaries, and various merchants and the population. At the same time, it is found expedient to be used in elaboration of strategic documents that determine outlook for growth of digital payments in the country. Theoretical methodlogical basis of the paper and practical materials may be proposed to be used in scientific researches and in teaching.

The information base of the research is comprised of materials from the Committee on Payments and Market Infrastructures of the Bank for International Settlements (BIS), which serves as a global driver of digital payments, as well as central banks of different countries and the Central Bank of the Republic of Azerbaijan. Additionally, it includes scientific works and articles by leading researchers and experts in this field.

The formation of the information base is also significantly influenced by the strategic documents adopted by the Central Bank of the Republic of Azerbaijan.

The implementation and approbation of the research Key theoretical and practical outcome of the research work was discussed in forums and seminars held by the Azerbaijan Banks Association and Azerbaijan Fintech Association, local and regional scientific conferences organized in the country and abroad. Results of the research were reflected in total of 3 theses and 12 articles, also 2 textbook in accordance with the requirements. The articles were published in and beyond the country.

The name of the institution the dissertation was performed in. The research work was performed at the Institute for Scientific Research on Economic of the Ministry of Economy of Azerbaijan Republic.

The structure of the dissertation structural sections of the. The structure of the dissertation should serve to uncovering the topic. Guided by this principle, the dissertation was structured as follows: introduction, three chapters, outcome and a reference list. The research paper consists of 134 pages, 26 tables, 5 figures and 9 charts. The research paper consists of 252,772 characters (first chapter 58,821 characters, second chapter 108,318 characters, third chapter 49,425 characters). The reference list includes 94 items.

TABLE OF CONTENTS OF THE DISSERTATION

1.3. View of economic theoretical schools on the application of innovative payment tools in the digital payment ecosystem

Chapter II. Assessment of prospects of the application of innovative payment instruments

2.1. Payment instruments in the digital payment ecosystem and their comparative analysis

2.2. The legislation on the digital payments ecosystem and payment instruments

2.3. Assessment of prospects of application of innovative payment instruments

Chapter III. Outlook for the improvement of application of more innovative payment instruments in Azerbaijan

3.1. Steps taken in international practice to expand the application of innovative payment instruments

3.2. Steps to be taken on expansion of the application of innovative payment instruments in Azerbaijan

Outcome

Reference list

Acronyms

THE MAIN CONTENT OF THE RESEARCH

In the first chapter of the dissertation, the payment instruments and their historical development stages are discussed, along with the advantages of applying innovations in payment instruments. Additionally, the chapter explores the perspectives of economic schools of thought regarding the implementation of innovative payment instruments within the digital payment ecosystem.

1.1. The payment instrument and its historical development

Deepening of the social division of labor during the periods when different types of economy prevailed, exchange relations between people representing different layers of society (craftsmen, farmers, etc.) led to the use of different means and values that acted as payment instruments in settlement of mutual obligations between people and economic agents.

Currently, first metal coins are considered predecessors of coins that play a role of a common equivalent. If we look at history, first metal money was used as coins 26 centuries ago. It is reported that metal money

was first used in China and ancient Lydia.

Paper money was first applied in China in the X century. It was first issued to circulation in North America (Massachisets) in the XVII century and in Russia in 1769 during the reign of Catherine the Great.

Settlerments in the economy between various participants are made in cash or cashlessly. With the improvement of cashless payment instruments and means and further acceleration of realization of these payments the definition 'cashless payments' is replaced with 'digital payments' or 'electronic payments' in modern economic literature and best banking practices.

Digital payments are defined as transfer of funds for mutual settlements between two or more economic agents, using payment tools and means without use of cash, in a faster, more effective and safer way, with the application of innovative solutions.

According to the Directive 2007/64/EC of the European Parliament and of Council of 13 November 2007 on 'Payment services in the internal market', **payment instrument** means any personalized device(s) and/or set of procedures agreed between the payment service user and the payment service provider and used by the payment service user in order to initiate a payment order[1].

In Turkey, a payment instrument means a payment card, mobile phone, a code or a similar personal instrument[2], the legislation of Russia defines a payment instrument as an electronic payment instrument and determines it as an instrument and (or) a method[3]. The Malaysian legislation also discloses it as an instrument[4].

A payment instrument is both a set of tools or procedures used to issue a payment order, and an effective tool used to enhance financial inclusion. The payment instrument is also a data carrier. Chips in payment cards can play the role of a 'smart data carrier'.

Depending on the level of development of modern technologies, a

---

[1] *Directive 2007/64/EC of the European Parliament and the Council of 13 November 2007 on payment services in the internal market amending Directives 97/7/EC, 2002/65/EC, 2005/60/EC and 2006/48/EC and repealing Directive 97/5/EC*

[2] *The Central Bank of Turkey "Law on payment and security settlement systems? Payment services and electronic money institutions" 2013*

[3] *Федеральный Закон "О национальной платежной системе" 2011*

[4] *"Financial Services Act" Malaysia 2013*

payment instrument may be applied in various tools and means (e.g. mobile phones). The payment instrument can also be used as a convenient advertising tool in formation of a new customer segment. A payment instrument is a tool that makes our daily life even more convenient and provides additional benefits (bonus, insurance, fast transit at the airport and efficient use of leisure time, concierge, etc.).

1.2. Advantages of application of innovations in payment tools

The word innovation comes from the Latin word 'novatio' – 'renewal' (or 'change') and the suffix 'in' is translated from Latin as 'in the direction of'. 'Innovatio' is translated as 'in the direction of changes'[5]. The term appeared in scientific research in the XIX century.

Innovations in payment instruments passed a historical period spanning centuries, from coins to the biometric identification based digital payments. The first related significant innovative step was the introduction of a payment instrument under the Diners Club brand name, considered the predecessor of modern payment cards, in 1949. This innovative product began to be issued in different years as paper, metal mass, silver, gold and finally as plastic mass. Finally, it began to be issued under the name of 'virtual payment card' in a digital form.

The history of innovative payment instruments in our country begins in 1997 with the issuance of the first payment card under the MasterCard brand by the 'International Bank of Azerbaijan' OJSC. An important development in this area was the creation of the option of making mobile phone based digital payments in 2019 without a payment cards involved.

One can distinguish the following main types of innovations[6]:

- ❖ product innovation – presentation of a new product or service significantly improved in terms of its intended use or characteristic features;
- ❖ process innovation – implementation of a new or significantly improved production or delivery method;
- ❖ marketing innovation – implementation of new marketing methods likely to lead to significant changes in product design or packaging, product placement, promotion and evaluation;
- ❖ organizational innovation – implementation of new

[5] *Hüseynova A. "Elm və innovasiya fəaliyyəti:ölçmə və qiymətləndirmə" Bakı-Tuna, 2020*

[6] *Oslo Manual "Guidilines for collecting and interpreting innovation data" 3rd Edition, 2005*

organizational methods in the organization's business practice, work process organization or external relations.

Advantages of innovations in digital payment instruments can be grouped as follows:

- the 'Spider web' principle and deeper network connections;
- making digital payments in a more effective way;
- higher security in digital payments;
- stronger financial inclusion;
- possibility to make payments in different ways (mobil phones, watches, car keys, rings etc.);
- low operational cost of banks;
- eliminating the definition of borders in digital payments;
- launch of alternative payment systems and channels.

1.3. View of economic theoretical schools on the application of innovative payment tools in the digital payment ecosystem

Joseph Schumpeter, the Austrian economist, revealed the basis for scientific integration of innovations into economic processes in his book titled 'The Theory of Economic Development' published in 1942[7]. The concept 'Creative destruction' or 'Schumpeterian storm' described by the author reflects the process of transformation, which constantly changes the economic structure from inside, continuously destroying the old element in the system and forming a new one.

The neoclassical theory of innovation emerged after Schumpeter. The main figures of this theory, M. Kaleçki, B. Tivss, G. Mensh, evaluate innovations as the main impulse of development arising from new consumer products, new production and transportation methods, new markets, and new organizational forms in industry.

The scientific research titled 'Time Efficiency of Point-of-Sale Payment Methods: Empirical Results for Cash, Cards and Mobile Payments' co-authored by Michal Polasik, Director of the Centre for Digital Economy and Finance of the Nicolaus Copernicus University provides speed of transactions maintained at the the biggest chain of convenience stores in Poland with various payment instruments[8].

[7] *Ricardo J. Caballero "The New Palgrave Dictionary of Economics", Second Edition, UK, 2008*
[8] *Michal Polasik "Time Efficiency of Point-of-Sale Payment Methods: Empirical Results for Cash, Cards and Mobile Payments" Poland, 2013*

According to the analysis, a payer spends 39.61 sec and a merchant 33.34 sec during cash operations. The entire payment process completes within 28.86 sec. In contactless payments this period reduces to 27.37, 27.51 and 24.26 sec respectively. Operations with payment cards with signature or with PIN take more time than those with cash (in terms of the merchant 49.02 and 51.41 sec respectively). From the payer's standpoint operations with contactless cards take about 20 sec less.

According to the research by N.Jonker, the representative of the Payment Systems Department of the Dutch Central Bank, debit cards are considered more advantageous in terms of their use, security and transaction speed compared to cash, credit cards and e-money. The study suggests that, operational cost has a critical effect on payment habits[9]. Expansion of acceptance points on debit cards and electronic money has a positive effect on the number of electronic payments.

The Bank of Canada (authors Carlos Arango and Varya Taylor) analyzed cost of operations with payment instruments in the study titled 'Merchant Acceptance, Costs, and Perceptions of Retail Payments: A Canadian Survey' in 2008[10]. The analysis suggests that, merchants spend $0.25 on cash operations, $0.19 on PIN-based debit card operations and $0.82 on credit card operations. Payment card operations create additional spending items, like processing of payments and chargeback.

According to researches by David B.Humphrey and Iftekhar Hasan in electronic retail payment instruments, transition to electronic payment systems in European countries allowed saving $32B worth funds in 1987-1999[11]. Note that, it accounted for 0.38% of aggregate GDP for 1999. It was also found out that, full-scale use of the electronic payment system and development of the card infrastructure in the country may allow saving funds amounting to 1% of GDP.

According to Humphrey, the co-author of the article titled 'What does it cost to make a payment', e-payments cost varies between one-third

---

[9] Nicola Jonger "Payment instruments as Perceived by Consumers-a public suevey" De Nederlandsche Bank, DNB Working Paper? 2005 №53, September.

[10] Carlos Arango and Varya Taylor "Merchant Acceptance, Costs, and Perceptions of Retail Payments: A Canadian Survey" Bank of Canada, 2008

[11] Duca J. V. and Van Hoose D. D.Recent Developments in Understanding the Demand for Money // Journal of Economics and Business, 2004, No 56, pp. 247-272

and one-half of cost of paper-based payments[12]. Full transition from paper-based payments to electronic payments may allow saving more than 1% of GDP if to skip operational costs. According to the analysis by the Australian Government, wide use of e-payments may lead to saving of potential $2B worth funds (25 pp rise of GDP).

According to the report 'Innovations in retail payments' by the Bank of International Settlements, innovations in payments can reduce transaction costs, introduce lower service charges, increase reliability, improve service level, mitigate risks etc. Innovations can also provide access of unbanked population to payment services.

In 2013 the Moody's Analytics with the support of the Visa Inc. conducted an extended study on the impact of e-payments on economic growth in 56 countries, which concluded that, due to the use of e-payment instruments in those countries in 2008-2012 economic growth stood at $983 billion. Over those years with the rise in the value of e-payments GDP increased by 0.8% in emerging market economies and by 0.3% in advanced economies. Over the years in question global GDP increased by 0.2% in real terms.

1% rise in the rate of use of payment cards leads to 0.056% increase in consumption and 0.035% increase of GDP. As a result the value of consumption increases by 0.056% and GDP by 0.035%. High share of consumption in GDP due to cashless payments is indicative of the positive role of e-payment systems in economic growth[13].

In the second chapter of the dissertation, titled "Assessment of the perspectives for the application of innovative payment instruments," the payment instruments and their comparative analysis within the digital payment ecosystem are discussed. The chapter also explains the legal framework governing the digital payment ecosystem and payment instruments. Additionally, an evaluation of the prospects for the application of innovative payment instruments is conducted.

2.1. Payment instruments in the digital payments ecosystem and their comparative analysis

As mentioned, in international practice the definition a payment

[12] *Dadid Humprey, Magnus Willesson, Goran Bergendahl "What does it Cost to Make a Payment?" USA, 2003*

[13] *"The impact of Electronic Payments on Economic Growth" Moody's Analytics, February 2013*

instrument covers tools accepted as a payment instrument, e.g. payment order, direct debit applied based on the same mechanism with the direct debiting instrument.

Payment instructions delivered in the form of payment documents and direct debits are delivered to the bank within 3 (three) business days from the day of writing (skipping the day of writing). Payment documents delivered to the bank upon deadline are not accepted for execution. As a rule, payment documents are compiled in the currency of payment transactions.

According to Article 972 of the Civil Code of the Republic of Azerbaijan: "in the course of carrying out cashless settlements, settlements by payment orders, letters of credit, encashment orders, checks, payment cards, settlements in electronic form, as well as settlements in other forms provided by law, banking rules established in accordance with the law and customs of trade applied in the banking practice shall be permitted".

According to Article 959 of the Civil Code of the Republic of Azerbaijan, the bank shall deposit monetary funds received to the account of client not later than the day following the day of receipt by the bank of respective payment document, provided that the law or the contract of bank account do not provide for a shorter period. The bank shall, upon client's order, issue or transfer the from the account monetary funds of the client not later than the day following the day of receipt by the bank of payment document, provided that the law, banking rules established in accordance with the law or the contract of bank account do not provide otherwise.

According to Article 974.1 of the Civil Code, the content and the form of a payment order and settlement documents presented together with it shall conform to the requirements stipulated by law and the banking rules established in accordance with it. In the event of non-conformity of a payment order, a bank may clarify the order's content.

The direct debit payment instrument is used for debiting the payer's payment account in favor of the payer based on the payment order submitted by the payer to the bank, based on the prior consent of the payer to the payee and the financial institution with the bank account. One of its main distinguishing features is that the payment transaction is initiated

based on the payee's initiative.

As a payment instrument, direct debiting is mainly used for mass and regularly riterated payments (utilities, cable TV, mobile communication, etc.).

According to statistic data, in 2018 direct debit accounted for 3% (EUR8 389 billion) of the value of total operations with payment instruments and 18.4% (25 766 million units) of the number of operations in the EU. 40% of total value of payment operations processed across the EU with direct debit was processed in Denmark, 20% in France and 6.3% in Estonia.

According the 'Regulation on payment transactions and payment instruments', when conducting a settlement with the direct debit established as a payment instruction the issuer bank provides the payment in favor of the payee on the payment order provided by the payee on the basis of the instruction previously issued by the payer.

During settlements with direct debits, the payer should include necessary information on the payee that enables to identify him/her in the order he/she delivers to the issuer bank. Otherwise, the issuer bank does not receive the order for execution.

In the XVI century, cheques as a payment instrument were already used as an interbank means of payment in economically developed European countries of those times (Low Countries). In the XVIII century in England and after the civil war in the United States of America low regulation of bank notes pushed the use of cheques in Anglo-Saxon countries.

In our country cheques and cheque operations are regulated by Articles 986-1 and 986-21 of the Civil Code. Cheque consists of an unconditional written order of the drawer of a cheque to the bank to make payment of an amount specified therein to the holder of a cheque. According to the Civil Code, cheques may be in the name of certain persons or bearer cheques.

Payment cards are payment instruments used for payment for cost of goods, works and services, card-to-card transfers, as well as cash withdrawals.

The first mass issued payment card – the Diners Club was issued to circulation by the non-bank financial institution. At the next stage the

American Express, the Bank of America and the Chase Manhattan Bank began to issue payment cards. The issue of Visa and MasterCard branded cards began in 1970s.

Under the 'Regulations on issue and usage of payment cards', payment cards are issued and acquired by banks operating in the Republic of Azerbaijan and the national operator of postal communication.

Table 1. Payment cards and application of related innovations

Types of payment cards	Debit, credit, pre-paid, corporate, digital
Payment terminals	imprinter, POS-terminal, ATM, self-service, mobile phones etc.
Access facilities	PC, mobile phone, landlines etc.
Payment transaction types	P2P, P2G, P2B etc.
Technology applied	Physical contact, contactless, manual-key entry
System operators solutions are based on	Banks, non-bank payment service providers, central banks, international payment systems
Main goals	High effectiveness and security, maintaining competititveness, high profitability, stronger financial inclusion, earning a new customer segment, timely provision of liquidity etc.

Source: *Developed by the author based on the analysis of payment card information*

Electroninc money is the payment instrument provided to a payment service user in the amount of received money, stored electronically, enabling payment transactions and accepted for payment by third parties.

Although the idea of e-money first emerged in 1983, its practical use dates back to Holland to the establishment of the DigiCash in 1990.

E-money is either card- or network-based. Card-based e-money is in the form of a payment card. Cardbased e-money is like a pre-paid card with a chip on it (Proton (Bel¬ium), Chipknip (the Netherlands), Goldkard (Germany), Moneo (France), Octopus (Hong Kong), Minipay (Italy) etc). Network-based e-money is placed digitally in the server of e-money institutions (PayPal, Moneybookers, Neteller (England), CP Books, Monetka (Czechia), Ewire (Denmark), Web-money, Yandex (Russia), E-gold (the USA) etc)

Article 1.09 of the Law of the Republic of Azerbaijan 'on E-commerce' determines e-wallet as software that allows storing funds transferred by individuals and legal entities and conduct e-payments at

their instructions, not considered a bank or a credit institution.

Table 2. Comparative analysis of payment instruments

Features	Payment order	Direct debit	E-money	Payment card
Used by legal entities and individuals	*	*	*	*
Additional requisites required (intermediary bank, SWIFT data, requisites of the treasury authority etc.)	*	*		
Limited identification			*	*
Paper-based or e-processing	*	*		
Payment order issued by the payer	*		*	*
Payment order issued by the payee		*	*	*
Limits on transaction amount			*	*
Transfers	*		*	*
Domestic and int'l payment transactions	*	*	*	*
E-storage of funds			*	*
Application of a centralized platform	*	*	*	*
Participation of the payment system operator instead of a bank			*	*

Source: *Developed by the author based on analyzed information.*

Common features that unite payment instruments include traditional participants, availability of payment instruments, provision of liquid funds, transition to the digital world and taking measures to ensure safety.

2.2. Legislative framework for digital payment ecosystem and payment instruments

The implementation of cash and non-cash settlements in the country, the forms of non-cash settlements, and general provisions on each form of settlement are regulated by the Civil Code of the Republic of Azerbaijan, relevant laws, as well as regulatory legal acts of the Central Bank adopted pursuant to them and other regulatory acts.

Despite the formation of a legislative framework in the field of digital payment ecosystem, the reforms to be implemented in this area in order to expand the application of innovative payment instruments can be summarized as follows:

✓ Adaptation of the activities of non-bank payment service providers (payment institutions, electronic money institutions, etc.) to the current ecosystem realities and development trends;

✓ Involvement of new participants in payment systems;

✓ Amendments to the Law "On Non-Cash Settlements";

✓ Regulation of the activities of payment aggregators and facilitators;

✓ Regulation of competitive relations between the bank-fintech ecosystem;

✓ Optimization of the process of opening a remote payment account and identification of payment service users;

✓ Formation of a legal framework that will ensure effective regulation of tariff policy in transactions with payment cards;

✓ Adapting the level of security in digital payments to current requirements.

2.3. Assessment of prospects of application of innovative payment instruments

The author assessed prospects of application of cheques, payment orders, direct debits and e-money in terms of clearer determination of the role and significance of innovative payment instruments. Assessment indicators included availability of payment instruments, period of processing of a payment transaction, submission of the payment order, use of innovative payment technologies and other factors. The assessment based upon domestic and international experience. Where possible, payment instruments were evaluated on a scale of '1-5' points on the indicators. Unless otherwise noted, the payment instrument with the highest rating on a scale of '1-5' has superior features. The average indicator was generated from the assessment of the indicators.

Various indicators were used in the assessment:

❖ Possibility for remote payment transactions;

❖ The scope of application of payment instruments;

❖ Payment systems of application;

❖ Submission of the payment order;

❖ Completion of the payment transaction;

❖ Limits imposed on the payment transaction amount;

❖ Use of innovative payment technologies;

❖ Technical problems in processing of payment transactions;

The advantage generated from the assessment is fully adjustable to the policy pursued both on a national and international level. The Central

Bank in its newly adoped strategy on the development of digital payments identified the formulation of the normative legal framework on the issue and use of e-money and expansion of introduction of this payment instrument to the economy as one of the priority targets. In parallel, further expansion of contactless payments in the payment card market has been identified as one of the critical measures with the target set to increase the weight of contactless payment cards in total payment cards from 39% in 2020 to 70%.

Table 3.

Average indicator of payment instruments on indicators

Payment instrument	Payment order	Direct debit	Cheque	Payment card	E-money
Possibility for remote payments	3.5	3.5	2.5	5	5
Scope of application of payment instruments	5	5	5	5	4
Payment systems of application	3	3	2	4	4
Submission of payment orders	3	3	3	5	5
Completion of payment transaction	4	4	4	5	5
Limits imposed on payment transaction amount	3	3	3	1	1
Use of innovative payment technologies	1	2	0	5	5
Tech. problems in payments	2	2	2	1	1
Average indicator	**3.06**	**3.06**	**2.69**	**3.87**	**3.75**

If to look at the international experience, according to the information presented in the annual 'Worlds Payment Report' published in 2021 by Capgemin's research institute, the value of total cashless payment transactions worldwide in 2025 will amount to $1842.2 billion, 3.8 times more than the indicator in 2016[14]. During the analyzed period, there will be a drop in transaction turnover made with other payment instruments except for payment cards and electronic money. In general, the share of non-traditional payment transactions will increase from 8.8% in 2016 to 25.2% in 2025.

As a result of the assessment, taking into account that payment cards are in the forefront as an innovative payment instrument and statistical figures on transactions payment cards are more accurate, it is important

[14] [14] "Worlds Payment Report 2021" Capgemini Research Institute, 2021

to calculate the correlation coefficient between the value of cashless payments made within the country and the volume of consumption across the country. Hence, it is also possible to see how consumption and the country's economy in a broad sense interact with digital payments, and how efficient the use of digital payment instruments is.

It should be taken into account that consumption is one of the constituent elements of the calculation of the GDP for the country by the cost method. Accordingly, measuring the effect of the value of cashless payments with payment cards on consumption within the country will allow determining the effect of this turnover on GDP.

Initially, the correlation coefficient between the value of domestic cashless payments with payment cards and the value of consumer spending was calculated based on 14-year statistics (2009-2022). To calculate the correlation coefficient, one needs to find sample standard deviation and then the covariance for each variable.

$$S_i = \sqrt{\frac{\sum(X_i - \overline{X_i})^2}{n-1}} \qquad (2.1)$$

$$S_k = \sqrt{\frac{\sum(X_k - \overline{X_k})^2}{n-1}} \qquad (2.2)$$

$$S_{ik} = \frac{\sum(X_i - \overline{X_i})(X_k - \overline{X_k})}{n-1} \qquad (2.3)$$

$$r = \frac{S_{ik}}{S_i * S_k} \qquad (2.4)$$

It is known that sample standard deviations of both variables (2.1 and 2.2) are found, and after calculating the covariance between these variables (2.3), it is possible to calculate the correlation coefficient of these two variables (2.4)

Since the number of data is small and manual calculation does not take much time, the correlation coefficient is calculated as follows:

$$S_i = \sqrt{\frac{(145.09 - 306.4)^2 + (166.08 - 306.4)^2 + \cdots \ldots + (515.41 - 306.4)^2}{14 - 1}}$$
$$= 119.45$$

$$S_k = \sqrt{\frac{(1.16 - 37.25)^2 + (1.38 - 37.25)^2 + \cdots \ldots + (237.7 - 37.25)^2}{14 - 1}} = 65.15$$

$$S_{ik} = \frac{(145.09 - 306.4)(1.16 - 37.25) + \cdots \ldots + (515.41 - 306.4)(237.7 - 37.25)}{14 - 1} = 5725.4$$

$$r=5725.44/119.45*65.15=0.74$$

The calculations display that, the correlation coefficient between the volume of consumption in Azerbaijan on 2009-2022 and the value of cashless settlements in transactions with payment cards equals to 0.74. That is, there is a positive relation between these two economic variables. The economic essence of this is that the rise in the value of cashless payments increases consumption accordingly. In this regard, it has been proven that the rise in the value of digital payments in our country actually increases consumption and thereby contributes to the rise in economic growth in our country.

In the third chapter of the dissertation, the steps taken in international practice to expand the application of innovative payment instruments are explained. Additionally, measures to be undertaken within our country to broaden the opportunities for implementing innovative payment instruments are outlined.

3.1. Steps taken in international practice to expand the application of innovative payment instruments

As an example of the reforms carried out to expand application of innovative payment instruments we can show formation of a legal framework for new services with the improvement of the legislative framework (most recently in payment services), introduction of a licensing approach (Australia, Sweden), creation of incubation and acceleration centers, including laboratories, to expand activities of fintechs (Singapore, Japan, Germany, etc.) and the formation of advisory centers for the provision of financial services (e.g. Innovation Center and Regulatory Clinic in England).

At the same time, tightening of anti-fraud measures based on modern technologies, the formation of new payment systems infrastructure, the introduction of the sandbox regime and the adoption of the ‘digital bank’ concept attract attention.

The following requirements are complied with when applying various instruments and means to expand the use of innovative payment intsruments:

- Formulation of the legislative base;
- A regulatory-supervisory authority can intervene the payments ecosystem within a certain frame;
- Rights and responsibilities of financial institutions and citizens are determined clearly;
- Liquid funds are provided timely;
- Data security is safeguarded;
- Maintaining free competitive environment and formation of the competitive ecosystem;
- Wider access to financial services etc

According to the BIS, three main tools – an innovation center, a sandbox regime and acceleration play an important role in speeding up the implementation of innovations in the country. Innovation centers provide support, advice or effective organization of management to organizations whose activity is regulated by the legislation or currently not intended to be regulated, on the regulatory legal framework, aspects of the supervisory policy or legislative issues. The sandbox regime is a controlled testing environment. At the same time, it is characterized by the provision of exemptions from a number of legal norms or relaxation of requirements in the part related to the powers of the regulatory-supervisory authority. The accelerator reflects the development of certain scenarios based on the agreement between fintech suppliers and regulatory and supervisory authorities[15].

The regulatory sandbox was first introduced in 2015. The regulatory sandbox pioneer was the Financial Conduct Authority (FCA), Great Britain, in 2015. This regime allows institutions to test new products, technologies and business models in a controlled testing environment.

Sandbox is a framework that allows financial market regulators to test the innovations, innovative inrsitutions want to bring to financial markets in a regulatory environment under their control in a real

[15] *Bank for International Settlement "Policy responses to fintech: a cross-country overview" By Johannes Ehrentraud, Denise Garcia Ocampo, Lorena Garzoni, Mateo Piccolo, January 2020*

environment within pre-defined limits (time, number of consumers, volume of transactions, geographical area, etc.).

The establishment of digital banks and the formation of their legal basis in the legislation play an important role in terms of expanding innovative payment instruments. Digital banks are known under different names, such as Greenfield bank, inventive bank, incumbent bank, neo-bank, fintech bank, etc.

A digital bank is a bank that offers remote banking services more effectively with innovative technologies and solutions.

According to the BIS, a digital bank is defined as a deposit-taking institution that is a member of a deposit insurance scheme and delivers banking services primarily through electronic channels instead of physical branches[16].

3.2. Steps to be taken on expansion of the application of innovative payment instruments in Azerbaijan

In addition to the reforms carried out on the development of the digital payment ecosystem and introduction of innovative payment instruments, the following reforms should be focused on in order to expand the application of innovative payment instruments in the country in the upcoming strategic period:

- **Introduction of the digital bank concept –** in the legislation, the digital banking concept should be adopted to provide all banking services and products in digital form at a distance without physically approaching the bank branch. Within this concept, a separate licensing procedure and prudential requirements should be defined, giving a new concept of digital banking.
- **Acceleration of the process of formation of platforms** – A horizontally integrated product and service chain is the presentation of products and services of organizations represented in the same or different fields on a single platform. As a rule, these platforms are shaped by expanding the traditional basket of products and services provided by banks or by applying innovative technologies, including open banking technology, based on relevant changes to the legislation.

[16] *Bank for International Settlement "Policy responses to fintech: a cross-country overview" By Johannes Ehrentraud, Denise Garcia Ocampo, Lorena Garzoni, Mateo Piccolo, January 2020*

❖ **Fintech involvement in state projects** – requirements for involvement of financial institutions within the framework of implementation of digital payment solutions in distribution of social payments, subsidies and dotations and other funds by the state should be revised. Implementation of this process with innovative payment instruments, ensuring the participation of a large number of banks, as well as the involvement of fintechs along with banks should be among priority directions.

❖ **differentiation of direct and indirect participation in payment systems** – direct and indirect participation in the AZIPS and the LVPCSS, operated by the Central Bank, should be distinguished to reduce transaction costs and promote innovation in transactions conducted with payment instruments, and non-bank payment service providers should be identified as indirect participants.

❖ **Discounts in the AZIPS the LVPCSS on remote banking services** – payment documents generated over electronic banking services in both payment systems should be recognized separately. As a next step, more favorable service fees should be applied to payment documents sent through these channels.

❖ **Formation of a competitive tariff policy** – When establishing the tariff policy in payment systems and payment platforms operated by the Central Bank, the tariff policy applied in platforms created by the private sector, mainly fintechs, should be taken into account.

❖ **Strenghtening financial literacy** – higher financial literacy in the society allows the population representing innovators and early adopters to increase, to acquire knowledge on the use of innovative payment instruments from an early age. Adopting a single financial literacy strategy covering various sectors of the economy, including digital payments, can be one of the important steps in this direction.

❖ **Simplification of electronic signature and enhanced customer authentication** – the requirement to apply an enhanced electronic signature limits the use of innovative payment instruments. Thus, complexity of the process of obtaining an enhanced electronic signature, service fees discourage bank customers from using this type of payment instruments. The determination of the requirement for enhanced customer authentication as defined in the EU directives creates favorable

conditions for innovative digital instruments. Expanding the scope of application of enhanced customer authentication in e-banking will encourage expansion of innovation, while ensuring the application of traditional payment instruments – payment orders and direct debits in the digital environment.

❖ **Eliminating dependency on traditional payment instruments** – in the new generation legislation, the concept of payment instrument is defined in a broader form and includes a set of personalized instruments and procedures, it will ensure the application of more innovative solutions compared to payment instruments that have been applied in the banking system for many years.

In parallel with the implementation of the new strategy, the measures listed above will play an important role in expansion of the application of innovative payment instruments in our country based on related best practices.

The main provisions of the dissertation, outcome and proposals are reflected in the following articles and theses of the author published:

1. X.R.Tağıyev, T.H.Rustamov, M.R.Tagiyev Assessing the Impact of COVID-19 on Digital Payments in Azerbaijan // The Romanian Economic Journal no. 83, June 2022, page 88-97
2. T.H.Rustamov, X.R.Taghıyev The effect of spider web principle on the application of innovative payment instruments //5th Cultural Informatics, communication&studies conference Turkey 2022, page 58-61
3. T.H.Rustamov, X.R.Tağıyev, S.R.Quliyev Rəqəmsal platformalaşmada innovativ ödəniş alətlərinin rolu // Elm və İnnovativ Texnologiyalar Jurnal, № 223, Bakı 2022. Səh 85-100
4. T.H.Rustamov Ağıllı şəhər, ağıllı kənd konsepsiyası çərçivəsində rəqəmsal ödəniş ekosisteminin tətbiqi // Azərbaycan Dövlət İqtisad Universitetinin Elmi Xəbərləri Cild 9, Bakı iyul-sentyabr 2021, Səh. 56-75
5. X.R.Taghıyev, T.H.Rustamov, A.A.Hasanzadə Analysis of payment card fraud transactions and measures to prevent them // Economics Innovations, Vol. 23, Issue 2 (79) 2021, page 172-184
6. T.H.Rustamov Azərbaycanda innovativ ödəniş alətlərinin tətbiqinin

genişləndirilməsi üzrə atılacaq addımlar // "Konfrans materialları" Sumqayıt Dövlət Universiteti, № 10, Sumqayıt 2021. Səh 440-445
7. T.H.Rustamov Digital banking and its essence. The Azerbaijani Model // Economics Innovations, Vol. 23, Issue 3 (80) 2021, page 306-318
8. T.H.Rustamov, X.R.Tağıyev Azərbaycanda rəqəmsal ödənişlərin iqtisadi inkişafa təsiri //"Təhlükəsiz infotelekommunikasiya sistemləri: nəzəriyyədən tətbiqə" mövzusunda Beynəlxalq konfransın materialları Bakı, 2021, səh 8-11
9. T.H.Rustamov, X.R.Tağıyev, G.M.Mahmudova, S.İ.İsayeva Sandbox rejimi və maliyyə bazarlarına təsiri // Azərbaycan Dövlət İqtisad Universitetinin Elmi Xəbərləri Cild 9, Bakı yanvar-mart 2021, Səh. 57-75
10. T.H.Rustamov Directions in the development of the payment service market // Journal of Payment Strategy&Systems Volume 10 Number 2, 2016, page 181-193
11. T.H.Rustamov, X.R.Tağıyev, R.M.Mahmudov, S.R.Quliyev Birbaşa debetləşmə aləti, tətbiqi emxanizmi və xüsusiyyətləri, ölkəmizdə tətbiqi üzrə mövcud vəziyyətin təhlili // Azərbaycan Dövlət İqtisad Universitetinin Elmi Xəbərləri Cild 4, Bakı iyul-sentyabr 2016, Səh. 128-141
12. X.R.Tağıyev, T.H.Rustamov, Z.S.Süleymanov Azərbaycanda elektron pulun istifadəsi və inkişaf perspektivləri // Azərbaycan Vergi Jurnalı №4 2015, Səh. 159-172
13. T.H.Rustamov The modernisation of payment systems in Azerbaijan: Examination of the new regulatory framework // Journal of Payment Strategy&Systems Volume 8 Number 1 March 3, 2014, page 13-22

The dissertation defense will be held on 12 September 2025 at **16:00** at the meeting of the ED 2.38 Dissertation Council operating under the Azerbaijan Technical University.

Address: AZ 1073, Baku city, H.Javid avenue 25

The dissertation is available for viewing at the library of Azerbaijan Technical University.

Electronic versions of the abstract are posted on the official website of Azerbaijan Technical University (www.aztu.edu.az).

The abstract was sent to the necessary addresses on “04” August 2025.

Seal signed: 30.06.2025
Paper format: 60x84 1/16 .
Volume 1 c.v. (43920 characters)
Circulation 20.

In the "AA - Polygraph" production and commercial association
printed using ready-made slides.

Contact: capevi@internet.ru Tel.: +994552012809