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## **Payment cards as an innovative way of paying for transport services**

### **Summary:**

This paper focuses on the issue of payment cards as an innovative way of paying for transport services in Ukraine. Evaluation of the share of cash outside the banks in the money supply in Ukraine in 2013–2017 has been analyzed, as well as the dynamics of the main indicators of functioning of the payment cards market of Ukraine during 2012–2017. The main tendencies of the development of the payment cards market in Ukraine are considered, in particular the dynamics of the number of holders of payment cards and their issuing banks, the development of electronic payment infrastructure, types of payment cards issued by Ukrainian banks and the dynamics of the structure of transactions using payment cards by volume and quantity. Based on the analysis, conclusions were made on the development of cashless payments by payment cards in Ukraine.

### **Key words:**

payment system, cash, cashless payments, payment card, innovations

### Introduction

Rationalization of the payment system requires a significant reduction in cash transactions in favor of cashless settlements. The development of national cashless settlement systems is in the public interest of Ukraine. The development of payment systems by using plastic cards aims to reduce cash transactions in Ukraine and expand the scope of non-cash payments, attracting large amounts of cash to the banking system. Modern payment systems are an important part of the economic and financial infrastructure of any country. Efficient and secure payment systems are critical to the functioning of the economy. Ukrainian cardholders are increasingly moving away from cash withdrawals at ATMs to cashless payment for goods and services, in particular for transport services. This trend is correspondent to the experience of more developed markets, including Poland. In this context, the study of the use of a payment card as an innovative means of payment for services of transport organizations deserves special attention.

The purpose of the article is to analyze the functioning of the domestic payment cards market, to determine its advantages and disadvantages and to substantiate the use of payment cards, in particular contactless, transport, as an innovative means of payment for transport services.

The problem of payment cards in the ukrainian system of cashless settlements has been devoted many researches as well as studies of economists, such as: V. Kravchuk, O. Premierov, I. Smirnov and others. The majority of research are focused on the study of general trends in development and the current state of the payment cards market in Ukraine. Less attention is paid to the analysis of the problems of using the newest card payment instruments, in particular non-contact, transport cards, which determines the relevance of this research.

Therefore, the subject of this article is relevant, and has an important theoretical and practical significance.

### Cashless payment systems in Ukraine

Cashless payment systems are based on payment cards. Therefore, the development and implementation of high-tech card payment instruments with the purpose of dynamically developing the market of banking services and ensuring the functioning of the system of mass electronic payments is an important part of the strategy of banks development in Ukraine.

The electronic payment market is changing rapidly. The processes of globalization and changes in the structure of the financial services sector require the continuous improvement and development of the electronic payment market. The rates of distribution and use of non-cash payment instruments differ significantly by country according to the peculiarities of the electronic payment market. In particular, legal, economic, technological and social factors influence the readiness to accept and use cards as means of payment, as well as determine the level of innovation in this area. However, it is necessary to highlight the main features of modern electronic payment systems.

Innovation and globalization are two of the main factors behind the emergence and change of payment instruments. Innovation is a major factor affecting the value of money transactions, costs and revenues from the use of new approaches to interaction between consumers and payment service providers, innovations that reduce the cost of consumers for payments for commercial, in particular transport, and financial transactions. Furthermore, innovations increase opportunities for conducting cashless operations in a more efficient and safer way, determine the demand and supply of new payment tools and services. At the same time, globalization and the expansion of cross-border activities create conditions for the rapid spread of these innovations around the world and lead to an increase in the interdependence of payment electronic systems of different countries<sup>1</sup>.

### Development of cashless payment systems in Ukraine

The main results of the development of cashless payment systems are the growth of consumption, increase in productivity and employment, reduction of expenses for conducting payment transactions and reduction of the share of the shadow economy. At the same time, cash use is accompanied by significant costs for all ecosystem entities, including retailers, transport organizations and consumers.

These advantages stimulate the use of electronic payment instruments. Payment cards, new types of electronic and mobile payments play an increasingly important role and actually replace cash. An increase in the number of transactions with payment cards, both in absolute terms and in percentage of GDP, is observed in most states, including Ukraine. One of the most characteristic features of modern payment systems is the decrease in cash use and the growing popularity of electronic payments. E-commerce offers significant benefits to both users and traders, transport organizations and may significantly alter economic activity and the social dimension in the future. Recent innovations in payment cards, in particular NFC PayPass, can become an important factor in the further expansion of cashless agreements<sup>2</sup>.

In Ukraine, the infrastructure of payment cards, the amount and number of non-cash transactions have sharply increased in recent years. The achieved scope of the payment cards market of Ukraine can further facilitate the use of payment cards, mainly for cashless payments.

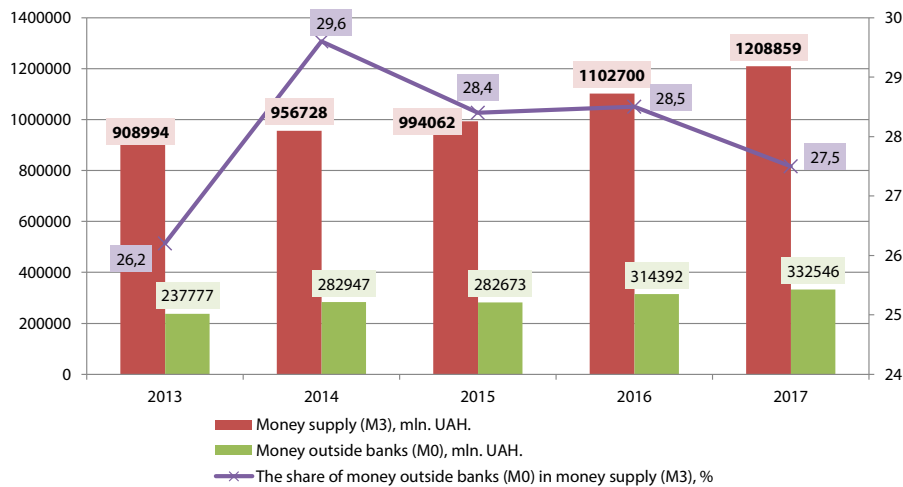
In Ukraine, as in other countries, the development of the payment cards market is determined by competition with other types of mass payments, as well as investment in the infrastructure of the payment system. In addition, payment cards are the main retail non-cash payment instrument, and direct bank transfers, electronic money and PayBox payment terminals are used relatively often. However, cash remains the main means of conducting retail business operations and the main competitor of payment cards in the payment market. Thus, as of January 1, 2012, the share of cash in the total amount of money is 27.5% (Fig. 1). At the same time, the share of transferable accounts in banks that can be used for retail payments is relatively low at 22.2%<sup>3</sup>. The use of cash is stimulated by a high share of the shadow economy, as a significant proportion of contracts are currently made by the business unofficially. In addition, illegal payment of wages in cash is widespread and is carried out in envelopes. Retail stores, and transport companies also prefer to use cash, as it allows them to evade taxes.

<sup>1</sup> V. Kravchuk, O. Premierova, Card payment market of Ukraine: International experience and national regulation. Analytical report, Kyiv 2012, p. 4.

<sup>2</sup> I. Smirnov, Y. Klymenko, Trends in the development of the payment card market in the banking sector, 2012.

<sup>3</sup> Official site of the National Bank of Ukraine.

According to preliminary calculations of the Ministry of Economic Development and Trade of Ukraine in 2017, the shadow economy constituted 32% of the official GDP, which is 3% less compared to the indicator of 2016 (35%)<sup>4</sup>.

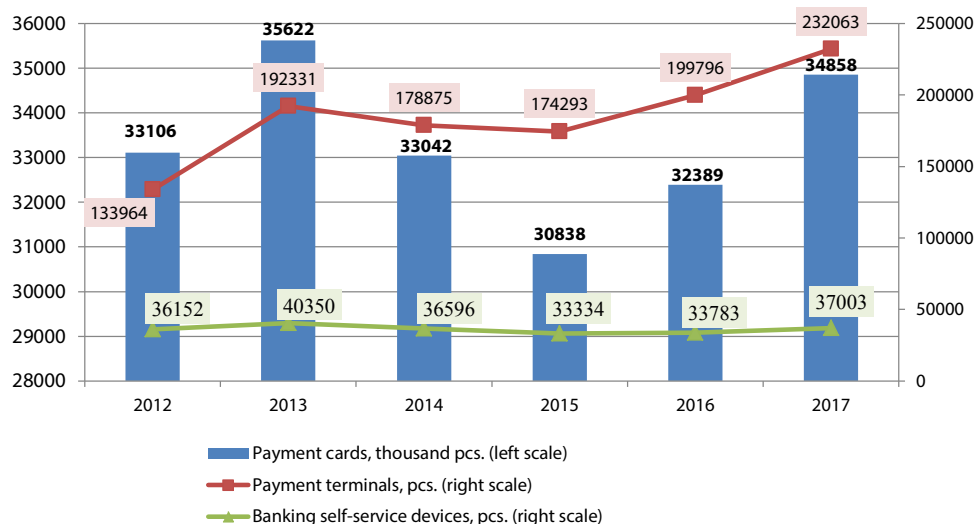


**Figure 1. Money supply (M3), monetary aggregate M0 and its share in the money supply in Ukraine in 2013–2017**

Source: own study based on statistical data from the official site of the National Bank of Ukraine<sup>5</sup>.

The high share of cash in money supply reflects the relatively low role of cashless payments in Ukraine. Nevertheless, there has been rapid growth of non-cash payments in the market of cards in Ukraine in recent years. Banks are increasingly offering cards under wage and social assistance projects, as well as marketing projects for the distribution of payment cards<sup>6</sup>.

Over the past six years, the payment infrastructure has been varied (Fig. 2). Due to the crisis of 2014–2015, many banks cancelled or reduced credit limits for payment cards, and reduced their marketing efforts. Consumer demand has also fallen, and banks have restricted the issuance of payment cards, and consumers have ceased to use some of the cards. In 2016–2017, the number of active cards grew, as banks resumed marketing research in the area of distribution of bank payment cards.



**Figure 2. Infrastructure of electronic payments in Ukraine**

Source: own study based on statistical data from the official site of the National Bank of Ukraine.

<sup>4</sup> General tendencies of the shadow economy in Ukraine. Ministry of Economic Development and Trade of Ukraine, p. 3.

<sup>5</sup> The official site of the National Bank of Ukraine.

<sup>6</sup> V. Kravchuk, O. Premierova, op.cit., p. 41.

The number of payment terminals and banking self-service devices for the analyzed period changed in the same way as the number of payment cards (Fig. 2). By 2015, the number of payment terminals had decreased due to the economic crisis. The reason for this was<sup>7</sup>:

- the closure of many trading organizations;
- reduction of household incomes and suspension of the majority of bank credit programs;
- due to the economic downturn, some trade organizations began to work in the shadow economy, refusing to accept card payments.

According to the NBU, in 2017 in Ukraine there were 752 thousand units (37.7%) more noncontact banking payment cards (in 2016 by 542 thousand and 37.4%) - their number as of January 1, 2018 amounted to 2,721 thousand items (Table 1).

**Table 1. Types of payment cards issued by Ukrainian banks by types of stored information, thousand pcs**

Total	Total	With a magnetic stripe	With a magnetic stripe and a chip	Contactless	With a chip	Contactless
2013	35622	33277	1536	–	623	17
2014	33042	30009	2370	1090	416	0
2015	30838	27586	2766	1406	194	45
2016	32389	27994	3876	1987	74	6
2017	34858	27202	7407	2721	24	24

Source: own study based on statistical data from the official site of the National Bank of Ukraine.

Thus, contactless cards are gaining in popularity. The participation of international companies "MasterCard", "Visa", and National Payment System "Ukrainian payment space" projects on introduction of cards for transport services payment promote this type of innovation.

For 2013–2017, payment card holders withdrew much more cash than before. At the same time, the share of cash withdrawals from the card significantly decreased. As a result, in 2017, the share of cashless payments amounted to 39.3% in volume and 74.8% in number (Table 2).

**Table 2. Dynamics and structure of the amount and number of transactions using payment cards issued by Ukrainian banks in 2012-2017**

Years	Number of transactions					Number of transactions				
	Total	Non-cash payments		Cash		Total	Non-cash payments		Cash	
		Mln. UAH.	%	Mln. UAH.	%		Mln. pcs.	%	Mln. pcs	%
2012	741480	91583	12,4	649897	87,6	1073	348	32,4	725	67,6
2013	916027	159138	17,4	756889	82,4	1339	584	43,6	755	56,4
2014	1019035	255194	25,0	763841	75,0	1573	879	55,9	693	44,1
2015	1232796	384795	31,2	848001	68,8	1965	1287	65,5	678	34,5
2016	1610260	571275	35,5	1038985	64,5	2513	1775	70,6	738	29,4
2017	2124678	834957	39,3	1289721	60,7	3091	2311	74,8	780	25,2

Source: own study based on statistical data from the official site of the National Bank of Ukraine.

<sup>7</sup> V. Kravchuk, O. Premierova, op. cit., p. 42.

## **Payment for transport services: experience of Western European countries**

Taking into account the experience of Western European countries, in particular Poland, the growth trend of non-cash transactions by payment cards will continue in the future, especially with the efforts of MasterCard, Visa and the National Payment System "Ukrainian Payment Area" to promote payments at outlets and in public transport<sup>8</sup>.

In our opinion, the strategic direction for the development of cashless agreements is the transport infrastructure. Automation of payment for transport services is an important direction for the development of transport companies<sup>9</sup>. On the one hand, the use of cashless settlements enables cities to reduce their cash circulation by public transport, and, on the other hand, makes it easier for passengers to pay for transport services.

Thus, in today's economic and financial crisis, the implementation of electronic tickets for national transport operators, city public transport companies and the intellectual transport system of Ukraine is relevant. On May 7, 2017, the Verkhovna Rada of Ukraine adopted Law No. 1812-VIII "On Amending Certain Legislative Acts of Ukraine on the Introduction of an Automated Registration System for the Payment of Fares in Urban Passenger Transport"<sup>10</sup>.

Most Ukrainian cities plan to introduce a system of automated collection of payment for transport services. At the same time there are cities, which have outbidded others in the implementation of electronic tickets<sup>11</sup>.

However, both the authorities of Ukrainian cities and carriers in particular are not ready to introduce an automated fare collection. Therefore, it is necessary both to develop and implement an automated collection of transport services at the national level and the conceptual, technical and organizational support of local authorities is expected.

The structure of tariffs and a system of subsidies should be revised and unified at the national level to simplify the scheme and direct subsidies to the recipients.

Innovations enable transport organizations to provide better and more convenient transportation services to customers who can take advantage of new innovative technologies and solutions, including a precise timetable, such as in Poland, cost-effective tariffs, better forecast for vehicles, etc.

On the other hand, transport service providers can optimize their activities to meet customer needs and be more cost-effective. Transport service providers can reduce their own costs and increase their revenues. Thus, an increase in revenues of transport organizations may be due to the better structure of tariffs, the automated collection of payment for transport services and the targeted system of distribution of subsidies to beneficiaries.

True information on demand for transport services helps to optimize costs for both the state and municipal authorities for the transport sector of the economy, which will achieve better results at lower costs and improve the quality of transport services to customers.

Considering the development of contactless technologies around the world, NFC mobile phones, various carrier devices and contactless bank cards, it seems advisable to use bank cards as an alternative to paying for transport services. The availability of infrastructure for accepting bank payment cards in public transport will be a catalyst for increasing the issue of contactless cards, which in the short term will allow the use of bank cards as a one-time trip. Moreover, cashless fares can act as a marketing tool in attracting tourists to cities.

As transport cards will be widespread among city residents, it is wise to have the technical ability to use the card data for other purposes. These transport cards will be used to pay for parking, bicycles hire, museums, theaters and other services provided to the city residents and guests. In order to ensure compatibility not only between transport organizations, but also other participants of the ecosystem, in particular

<sup>8</sup> Market of payment cards in Ukraine, 2018.

<sup>9</sup> Pay a travel by contactless card MasterCard is now possible at all stations of the Kiev Metro, 2018.

<sup>10</sup> On amendments to certain legislative acts of Ukraine regarding the introduction of an automated payment system for the payment of fares in urban passenger transport, <http://zakon.rada.gov.ua/laws/show/1812-19>. (28.01.2019).

<sup>11</sup> E-ticket system in Ukraine, p. 10.

transport service users, banking institutions, local and state authorities all sides of the ecosystem must adhere to the standards and global guidelines for the introduction of new services, including agreements by contactless payment cards<sup>12</sup>.

For citizens who are entitled to privileged trips by public transport, transport cards should include special fares.

An automated fiscal collection system should be built using contactless cards with adequate security against cards counterfeiting. This system should provide flexible ways to replenish transport cards. However, the cost of creating an additional transport card infrastructure should be minimized through the active use of remote service channels, in particular the Internet and mobile devices.

Since there may be problems with the use of mobile communication channels, an automated payment system should decide when paying a fare, that is, the best way is to use transport cards as stand-alone transport purses.

Disadvantages of using the system based on the principles of scanning QR-codes, which are intended to receive a one-time payment, are:

1) QR-based systems require on-line connections, and in view of the lack of stability of mobile communication channels in land transport, problems with the speed of the responses of transport servers may occur;

2) the cost of the equipment, which is capable of receiving QR-codes, much higher than the analogues that do not have this function;

3) tickets based on QR codes, without an on-line system, are easy to falsify. In order to check one-time paper tickets, it is also advisable to exclude different devices. Paper tickets use can neither verify the authenticity of the ticket, nor can it determine whether the document has been used. In the automated system of collecting fares with several carriers use of paper tickets does not allow to create a system of income distribution after the provision of services<sup>13</sup>.

Thus, in 2012-2017, the dynamics of issue and use of payment cards in Ukraine significantly changed. The use of payment cards in Ukraine is growing despite the economic and banking crises of 2014-2015. Payment cards are one of the non-cash payment instruments in Ukraine.

In 2012–2017, the balance of use of payment cards shifted towards cashless payments, as the number of cash withdrawal operations decreased in 2014-2015, and an amount of cash increased more slowly than the amount and number of cashless payments in 2012-2017. As a result, the share of cashless payments by the amount reached 39.3% on January 1, 2018, and by the number of non-cash payments since 2014 exceeded 50% and increased to 74.8% as of January 1, 2018.

Currently, the payment instrument market is divided between international payment systems, in particular MasterCard (68.3%), Visa (30.4%), as well as the National Payment System "Ukrainian Payment Area" (1.3%).

The launch of a joint project of the NBU together with MasterCard, Visa and "SPACE" for travel fares in public transport is another step towards widespread introduction of electronic agreements. The development of innovative convenient and interesting payment instruments for consumers will enable citizens to formulate cashless payments habits that are characteristic of developed countries, in particular Poland.

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## Conclusions

Proposals for the transition from cash use to the development of cashless payments for transport services would reduce the volume of cash. The directions of development of cashless settlements are the introduction of the latest innovative technologies and use of contactless payment cards for fare payment in public transport.

Public transport in Ukraine is limited mainly to three traditional vehicles: trams, trolleybuses and buses in most urban areas. Public transport, taxis and buses in taxis mode are widely used. In the over-

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<sup>12</sup> For travel in the Kiev subway now you can pay by contactless payment cards "PROSTIR".

<sup>13</sup> Overview of the payment cards market and payment infrastructure of Ukraine for 2017. National Bank of Ukraine, 2018.



whelming majority of cities of Ukraine payment for services of transport organizations is carried out by a paper ticket or cash. However, cards are used in Ternopil and other Ukrainian cities.

So, in 2017, a system of electronic tickets was introduced in Ternopil. The introduction of Ternopil public transport payment, which is spread in the world, with the help of innovative systems, in particular an electronic ticket (Ternopil social card), contactless bank payment cards and NFC devices, is a progressive project for the community of Ternopil towards the creation of a city-based passenger transportation system.

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## **Karty płatnicze jako innowacyjna metoda płatności usług transportowych**

### **Streszczenie:**

Niniejszy artykuł koncentruje się na problematyce kart płatniczych jako innowacyjnej metody płatności za usługi transportowe. Przeprowadzono analizę udziału środków pieniężnych poza bankami w podaży pieniądza na Ukrainie w latach 2013–2017, jak również dynamikę głównych determinantów rozwoju rynku kart płatniczych na Ukrainie w latach 2012–2017. Zostały określone główne tendencje rozwoju rynku kart płatniczych na Ukrainie, w szczególności dynamika liczby posiadaczy kart płatniczych i ich banków wydających, rozwój elektronicznej infrastruktury płatniczej, rodzaje kart płatniczych wydawane przez ukraińskie banki, dynamika struktury transakcji z za pomocą kart płatniczych według objętości i ilości. Na podstawie przeprowadzonej analizy sformułowano wnioski dotyczące rozwoju płatności bezgotówkowych za pomocą kart płatniczych na Ukrainie.

### **Słowa kluczowe:**

system płatności, gotówka, płatności bezgotówkowe, karta płatnicza, innowacje