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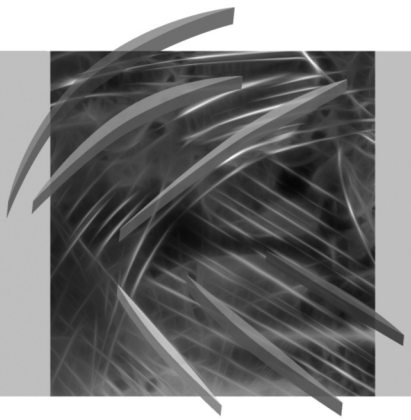

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Information Systems in Business

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APPLICATION OF CONTACTLESS TECHNOLOGY ON THE PAYMENT CARDS MARKET

Abstract: The article describes the evolution and functioning of contactless technology applied to payment card systems, with particular reference to the solutions offered under the American Express-MasterCard-Visa Agreement. The benefits of contactless payments to all market participants, including card issuers, cardholders, and merchants have been discussed on the basis of results of time efficiency study. Further different strategies for implementation of contactless technology by payment card organizations as well as market achievements of most important solutions have been presented.

Keywords: contactless, payment cards, RFID, NFC, EMV.

1. Introduction

Since the 1970s payment cards have been based on a presently outdated technology of the magnetic stripe. Increasing number of fraudulent transactions with the use of cards has extorted many technological changes in order to increase the safety level. Microprocessor cards have begun to be perceived as a destination solution. A real milestone in the history of microchip card development was 1999 when the three card organisations – Europay, MasterCard, and Visa – have established EMVCo [Contactless News 2007] to manage the interoperable EMV standard to authorise credit and debit card payments [Ward 2006]. In 2004 JCB (Japan Credit Bureau) also accepted the EMV standard, owing to which EMV became the global standard for the migration of the payment card sector to the microchip technology. However, banks in the United States of America, the largest payment card market in the world, have not decided to migrate to the EMV technology. Microchip cards have many advantages over those with the magnetic stripe, such as higher security level and longer usage time; however, they are much more expensive to produce. The main incentive to migrate to the microchip technology is to increase security and limit fraudulent transactions.

Despite the great expansion of the electronic payment market during last two decades, cash constantly dominates in the retail payments in the most important

western economies [McKinsey 2009]. Therefore, another crucial development in electronic payments was needed, besides migrating to the EMV standard, in order to replace cash in the low-value transactions. The new opportunity to considerably limit cash turnover appeared together (along) with the dynamically developing contactless technology, enabling remote reading of integrated circuits via radio waves [Hancke 2008].

2. Development of contactless technology

Contactless technology has derived from RFID (Radio Frequency Identification) and its popularity in an economy is currently gradually increasing. The roots of radio frequency identification technology can be traced back to World War II. In 1948 H. Stockman published his article [Stockman 1948] which initiated the concept of passive RFID systems. Advances in RFID communication systems continued through the 1950s and 1960s. Scientists and academics in Japan, Europe and the United States did research and present papers explaining how RF energy could be used to identify objects remotely. Companies began commercializing anti-theft systems that used radio waves to determine whether an item had been paid for or not. In 1972 T.A. Kriofsky and L.M. Kaplan patented induction system transmitter-receiver (patent number US 3859624), and M.W. Cardullo claims to have received the first US patent (US 3713148**)** for an active RFID tag with rewritable memory in 1973. The same year, C. Walton, a California entrepreneur, received a patent (US 3752960) for a passive transponder used to unlock a door without a key. In the 1970s, Los Alamos National Laboratory was asked by the Energy Department to develop a system for tracking nuclear materials. This system was commercialized in the mid-1980s and was used in automated toll payment systems. Those systems have become widely used on roads, bridges and tunnels around the world.

The end of the 20th century was a period in which RFID has become part of everyday life and business. Since that time thousands of companies are working on the development and applications of RFID technology. Some of the biggest retailers in the world such as Wal-Mart, Target, Albertsons, Metro, Tesco, Marks & Spencer, Procter & Gamble, Gillette said they planned to use EPC technology to track goods in their supply chain. Today, 13.56 MHz RFID systems are used for access control, payment systems and contactless smart cards [Roberti 2007].

The basis of RFID system is a tag which consists of a microprocessor (a chip equipped with memory and software) and an antenna. Each tag can be appointed with a unique identifier, through which it is recognized by the system. Technical parameters of tags, including memory of the microprocessor, are varied depending on appliance and they also can work in a wide range of radio frequencies. Tags can contain far more information than a simple ID [Chrobak 2010]. They can incorporate additional read-only or read-write memory which a reader can then interact with.

Read-only memory might contain additional product details that do not need to be read every time a tag is interrogated but are available when required.

We can divide tags into two classes: active and passive. Active tags require a power source – they are either connected to a powered infrastructure or use energy stored in an integrated battery. Passive tags do not require batteries or maintenance. The tags also have an indefinite operational life and are small enough to fit into a practical adhesive label. The tag reader is responsible for powering and communicating with a tag. The tag antenna captures energy and transfers the tag's ID. The sizes of tags may vary significantly, and the smallest tags have been miniaturized to the size of 0.05 × 0.05 mm [Hancke 2008].

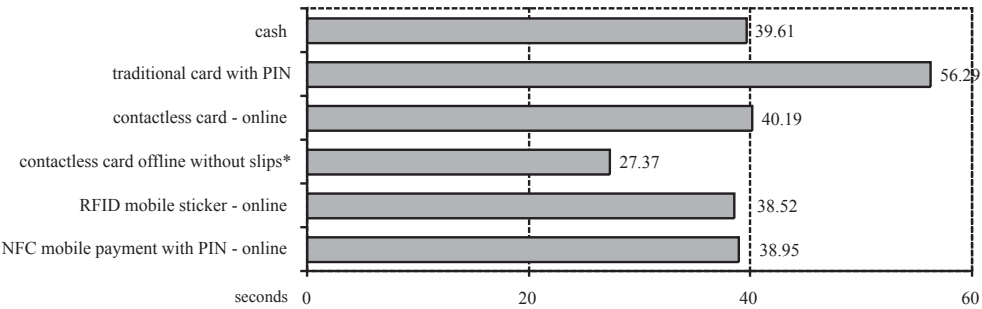
It should be noted that NFC (Near Field Communication) technology used in mobile phones is based on RFID. The main difference between the contactless cards and NFC technology is that contactless cards use mainly passive microchips, while NFC uses active microchips. For example, mobile phones which use NFC technology can work like contactless card; however, it can also act as a reader and activate tag placed on the advertising poster or magazine and read the information from this tag [Cheney 2008].

3. Importance of contactless technology for retail payment market

Many suppliers of payment solutions as well as MasterCard and Visa payment organizations, which have started to use the contactless technology to payment cards systems, were promoting them as the fastest method of payment. However, at the beginning these statements were justified only by estimates performed by American Express based on data from the transactions at pharmacies and CVS/pharmacy chain [Smart Card Alliance 2005], which should be treated only as an approximate without any scientific methodology applied.[1] Incontrovertible evidence confirming advantages of the contactless cards was obtained in November 2009, when the team consisting of M. Polasik, J. Górka, G. Wilczewski, J. Kunkowski, K. Przenajkowska and N. Tetkowska conducted an empirical study on time efficiency of payment instruments at Points-Of-Sale [Polasik et al. 2011a]. The results cover a wide range of payment methods, from traditional cash and standard cards to contactless cards, RFID stickers and mobile payments (NFC and remote). All payment instruments are compared under the criterion of the duration of payment transaction from the consumer and merchant perspective, as well as for the "pure" payment process. The measurement of more than 3,700 payment transactions was undertaken with the help

[1] The early estimates conducted in the USA suggested that a contactless card payment in the online mode lasts up to 21 seconds shorter than a cash payment and 14 seconds shorter than a traditional contact card payment. However, these numbers were not confirmed by any detailed empirical studies [Smart Card Alliance 2005].

of a novel research technique based on a digital chronography of video material recorded by cameras installed in the biggest chain of convenient stores in Poland.[2] In Figure 1 the results for five selected payment methods are presented and the durations of payment transactions apply to the customer perspective of the process.



* Due to the lack of a sufficient number of observations for contactless cards in an offline mode without printing paper slips, the time for this payment method was estimated on the basis of simulation procedure.

Figure 1. The average duration of purchase transaction by payment methods in seconds – A consumer perspective

Source: [Polasik et al. 2011a].

Taking into account the time a customer takes to do their shopping (a total time spend by customer on purchase transactions),[3] using the contactless card in the online mode is as fast as paying with cash[4] and 16 seconds quicker than concluding the transaction with the traditional card with the PIN code. However, this does not mark the limit of the technical capabilities of contactless cards. If the transaction is concluded in the offline mode and no payment slip is printed at the POS terminal, the payment process will be even shorter. Consequently, an offline contactless payment will take on average 12 seconds fewer than a cash payment and as many as 29 seconds fewer than a payment made with the traditional contact card with the PIN code. Another interesting conclusion important for further development of payment instruments is that proximity mobile payments, such as RFID stickers and NFC (tested in online mode), are as fast as contactless cards and there also have proved to be time efficient [Polasik et al. 2011a].

The key feature which determined a practical use of contactless payments is that their technical advantages of speed can considerably benefit all participants of

[2] Video material was recorded in Żabka Polska SA convenient stores. Realization of the study was supported by MasterCard Europe and IT company MCX Systems Ltd.

[3] Time was measured throughout the whole purchase process, starting with the customer approaching the cash desk and finishing with the customer leaving the shop.

[4] The difference in the average duration of transaction between cash and contactless card in online mode is statistically insignificant from the consumer perspective (see: [Polasik et al. 2011a]).

the payment system. The most important advantage for customers is that contactless transactions are comfortable and time-saving and that they help them to manage their money. For merchants, the speed of contactless payments helps shorten queues at counters, increase turnover, and reduce the cost of accepting cash payments. As card issuers (banks), acquirers and payment organizations they can benefit from the increase in commission on servicing their present and new clients as well as from the reduction of costs of cash withdrawals from cash machines and at bank branches. Moreover, banks can benefit from new applications of payment cards, such as public transport tickets or city cards that have not been operated by them until now. Finally, the public sector is also interested in the promotion of contactless cards as it perceives them as an opportunity to limit the shadow economy and facilitate the control of business entities due to a decrease in cash turnover [Polasik et al. 2011b].

4. The functioning of EPP contactless cards

4.1. The American Express-MasterCard-Visa Agreement

The contactless technology is developing very dynamically in many sectors of economy. The payment market has already seen the application of several technologies and contactless communication standards. Many of these solutions are used only locally and within a limited scope, e.g. only in public transport. However, the main direction of the development of versatile contactless payment systems is determined by the biggest card organisations, i.e. American Express, MasterCard, and Visa, which began to implement this technology on a large scale in their cards. Moreover, these organisations avoided a war of standards and decided on broad cooperation in terms of contactless technology, owing to which they could benefit from the scale effect and accelerate the development of this young market. It was as early as in 2005 that MasterCard International and Visa International contracted an agreement the purpose of which was to use a common communications protocol for contactless payments [Rae 2005]. This protocol is based on the MasterCard® *PayPass*™ ISO/IEC 14443 Implementation Specification [Smart Card Alliance 2005]. The agreement led to that the market opened for a common standard for all entities in the value chain of contactless payments. In 2007 MasterCard assigned the *PayPass* ISO/IEC 14443 Implementation Specification v1.1 to EMVCo, the organisation governing the EMV standard and owned by JCB, MasterCard Worldwide, and Visa International [Contactless News 2007].

Nowadays American Express, MasterCard, and Visa (and partly also JCB) offer common solutions supporting the same radio communications standard – ISO 14443 A/B. Contactless cards communicate with the terminal at the frequency of 13.56 MHz. Owing to the application of a common standard, costs of introducing contactless cards are much lower and their popularisation is easier as one terminal is able to accept contactless cards issued by both American Express, MasterCard, and

Visa. Moreover, using one protocol for contactless transactions allows terminal and payment card providers to develop and test interoperable products, due to which they can reduce costs of their implementation and accelerate the process of introducing this offer to banks and merchants. In this work we use the EPP acronym (ExpressPay, *PayPass*, and payWave) for the family of interoperable contactless payment systems based on ISO 14443 A/B (cards and gadgets) and ISO 18092 (mobile NFC instruments), supported by three major card organisations: American Express, MasterCard, and Visa under brands: ExpressPay, *PayPass*, and payWave, respectively [Polasik et al. 2011b].

During the operation, a card has to be placed (taped) near a terminal at a distance of several centimetres for about one second. The completion of the transaction is signalled by beeps and flashes of four LEDs (a procedure defined in the ISO standard). The total time of a payment process depends on whether the terminal is offline or online. Offline terminals need only several seconds to process the transaction, whereas online terminals take longer as the operation depends on the type of communication connection used to authorise the transaction with the bank server. However, this is much faster than other card transactions, mainly because no PIN or signature is required of a customer (see Figure 1). A lack of PIN code is replaced by special system of limitation procedures.[5]

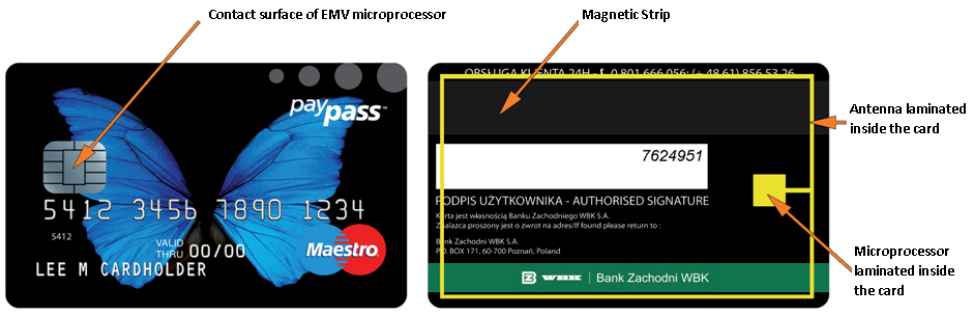
The development of the contactless payment market has become slightly hampered due to that American banks have not decided to migrate to the EMV microchip card standard and retained the magnetic stripe technology. Such a strategic decision resulted in that card organisations have developed two separate contactless payment schemes and that two basic kinds of EPP cards can be distinguished: (a) Magstripe Image (MI) cards, sometimes also called Pure Contactless[6] cards, and (b) Dual Interface[7] (DI) cards, operating as the EMV microchip.

[5] The safety of usage of contactless card is achieved by introducing a system of limits on contactless transactions, which guarantees that only a small amount of money will be forfeited in case the card is lost or stolen. The limits vary, depending on the country. In the USA the limit on a single contactless transaction is 25 USD, whereas in most European countries it equals 20 EUR and 15 GBP in Great Britain. In Poland the limit has been fixed at 50 PLN. If the amount exceeds the limit, the transaction can be concluded in the contact or contactless mode, depending on the type of card. Generally, when the amount exceeds the limit, a traditional contact payment (with the use of microchip or magnetic stripe) is made. Depending on the card, sometimes it is also possible to make a contactless payment when the amount exceeds the limit; however, in the case of large amounts, the customer has to authorise the transaction with the PIN code or with their signature. A bank can establish a maximum limit on the cumulated value of offline contactless transactions, e.g. 150 EUR) or on the number of offline transactions (e.g. five payments).

[6] "Pure Contactless" refers to that the microchip embedded in the card communicates with the terminal solely in the contactless technology.

[7] "Dual Interface" means that a single microchip embedded in the card (and operating in the EMV standard) possesses two interfaces: a contact and a contactless one.

In the Magstripe Image (MI) cards the magnetic stripe and a contactless microchip with an antenna are embedded in the card. However, this is not an EMV chip and it does not have a connector to conclude contact transactions. MI cards are issued mainly by banks in the United States and in those countries which have not fully migrated to the EMV standard. Dual Interface (DI) cards are issued mainly in Europe and Asia, and are often referred to as hybrid cards. They have both the magnetic stripe and an EMV contact chip with an RFID/contactless antenna. The very name, Dual Interface, derives from that the EMV microchip has two interfaces – a contact and a contactless one – which enable concluding transaction. Irrespective of whether the card communicates with the terminal in the contact or the contactless mode, the process of realising and settling transaction after the authorisation is similar in these cards. Figure 2 represents the design of a contactless Dual Interface card, based on the first contactless EPP card issued in Poland.



Note: Magstripe Image cards do not have an external connector to contact the microchip as it is completely embedded inside the card. Dual Interface cards have one EMV chip which uses two interfaces – a contact and a contactless one.

Figure 2. Design of a contactless card – the front side and the back side

Source: Graphic design based on materials provided by BZ WBK SA.

4.2. Strategies for the EPP implementation by MasterCard and Visa

It shall be noticed that there is a major difference in the functioning of contactless cards issued by Visa and MasterCard. The technological difference between contactless cards issued in the United States and in other countries (including European ones) has created a problem with using cards operating in one technology (MI or DI cards) in the areas where the other system works. Initially, the two major payment organisations adopted a different approach towards interoperability. The MI cards issued by Visa (Table 1) were accepted only by MI terminals, i.e. only in the United States. Consequently, they were domestic cards. MI cards always operate in the online mode, whereas DI card transactions are concluded in the offline mode within the

contactless limit,[8] owing to which they are very fast. Due to that Visa DI cards are compatible with MI terminals and can be accepted in most terminals in the United States albeit in the online mode. So far, Visa's Policy concerning Visa payWave cards issued in the United States has resulted in that cardholders travelling to Europe or Asia, where the EMV standard has already been introduced, could not make contactless payments with their cards although the Visa logo could be found on the terminal. In order to tackle this problem, in July 2008 Visa began to migrate the contactless MI cards to the EMV standard by equipping them with the additional

Table 1. The modes of contactless payments made with VISA and MasterCard cards

Card	Type of cards	Contactless terminal for Magstripe cards	Contactless terminal for EMV cards
VISA	Visa payWave (Magstripe Image – mainly the USA*)	Magstripe mode	not accepted – migration*
	Visa payWave (Dual Interface – mainly Europe and Asia)	Magstripe mode	EMV mode
MasterCard	MasterCard *PayPass* (Magstripe Image – mainly the USA)	Magstripe mode	Magstripe mode
	MasterCard *PayPass* (Dual Interface – mainly Europe and Asia)	Magstripe mode	EMV mode**
	Maestro *PayPass* (Dual Interface – mainly Europe)	not accepted*** Poland	EMV mode**** Poland
– online transaction – offline transaction			

* The process of migration of American Visa payWave cards and terminals to the qVSDC technology began in July 2008 and is scheduled to finish at the end of 2012. Then, the cards will operate in the online mode. ** The choice between the online and offline mode depends on the issuing bank. *** In Poland Maestro PayPass cards operate also in the Magstripe Image mode (an exception from the rule). **** In Poland Maestro EMV PayPass cards can operate in the online mode (an exception from the rule).

qVSDC[9] function and introducing new POS contactless payment terminals that accept the qVSDC (still, these cards and terminals will not fully operate in the EMV standard). This will increase the certainty of acceptance of contactless cards in the

[8] As a rule, transactions using Visa payWave DI are conducted offline, except for some specific situations, such as paying motorway tolls, when they can be conducted online and do not require to be authorised with the PIN code.

[9] In the United States, Visa used the simplified version of qVSDC to adapt it to the EMV contactless technology, i.e. in order to accelerate qVSDC transactions, the transfer of some data required in the EMV technology was eliminated. Since July 2008 qVSDC is used in new Visa payWave cards issued in the United States. Based on [Davis 2005].

United States. Moreover, the Visa payWave cards issued in the United States will be accepted all over the world, even in contactless EMV terminals. Scheduled to finish as late as in 2012, the migration process of American Visa payWave cards and contactless terminals is going to be long and costly.

Since the very beginning, MasterCard has adopted a different policy in respect to interoperability of contactless cards and established the rule that if a contactless reader bears the MasterCard *PayPass* logo, the transaction has to be completed, irrespective of the country in which the contactless card was issued (see Table 1). The situation is slightly different in the case of Maestro *PayPass* cards.[10] The solution to the problem of technological difference is that an MI card is accepted by an EMV terminal only in the Magstripe Image and in the online mode. MasterCard's interoperability policy requires more work while implementing EMV contactless cards (the ability to emulate the Magstripe Image mode) and means the necessity to adapt EMV terminals to accept MI cards. Consequently, customers may have unquestionable comfort and certainty that while they are travelling, their card will be accepted all over the world, wherever EPP cards are used.

The idea to use the RFID technology in payments resulted in the development of a new type of payment instruments. The new attractive form of contactless cards can become an additional factor contributing to their popularisation, especially among young people, who are early adopters of payment innovations. Alternative cards and gadgets can work using the magnetic stripe data transfer technology (Magstripe Image) in the case of stickers and in the EMV contactless online mode, for example, for the *PayPass* watch (see Figure 3). The use of a non-standard contactless card (gadget) makes it impossible to equip it with the traditional magnetic stripe or the contact EMV chip (which has to be placed on an ID 1 plastic card of the standard shape specified under ISO 7810).

Figure 3. Alternative forms of contactless payment cards

Source: [Polasik et al. 2011b].

[10] Terminals accepting Maestro *PayPass* cards have to bear the Maestro logo. As a rule, Maestro *PayPass* cards are always EMV cards and are not accepted by Magstripe Image terminals, except for the Polish market. The choice of the online or offline mode depends on the card issuer.

Visa's and MasterCard's contactless payment implementation strategies concerning the permissibility of conducting online transactions differ in the approach to technology, contactless limits, payment gadgets, and NFC mobile payments. Visa requires that contactless transactions concluded with Visa payWave cards should always be performed offline. The advantage of this strategy is the guarantee that the payment time will be as short as possible. However, operating solely in the offline mode makes it impossible to conclude a transaction over the contactless limit, which is one of the biggest differences between Visa payWave and MasterCard *PayPass* cards. With higher value transactions, a Visa cardholder always has to use a contact EMV processor and PIN authorisation. As for now, Visa decided not to issue alternative payment cards outside the USA (where offline mode is not possible). Consequently, MasterCard *PayPass* is the only payment system within which contactless payment gadgets are issued in Europe.

MasterCard has adopted a different strategy regarding the implementation of the contactless technology. If a transaction exceeds the contactless limit, the MasterCard *PayPass* technology allows to effect it in the contactless mode but it has to be authorised with the PIN code. Owing to this, a customer always concludes the contactless transaction, regardless of the amount, which wins their trust in the contactless technology and facilitates the customer service process in a shop. For example, a customer can make a contactless payment in a shop where the average transaction amount considerably exceeds 100 EUR, thus requiring an online operation. Still, transactions up to 20 EUR are performed offline, if both the POS terminal and the issuer permit such a method.

5. The development of contactless card market

The first major implementation of contactless cards as payment instruments took place in 1997 with the launch of the Octopus system to manage public transport fares in Hong Kong [Lefebre 1999]. However, the first major pilot scheme aimed at introducing contactless payment cards in banking was the MasterCard's *PayPass* programme, launched in the United States in December 2002. This event contributed to the popularisation of contactless cards on major global markets [Polasik et al. 2011b]. The evolution of the contactless payment market all over the world has resulted in its division into two main areas relying on different standards: (1) systems implemented by international card organisations and (2) solutions based on the SONY FeliCa technology. Moreover, there are many local solutions which are incompatible with one another and have a limited payment function as most of them have evolved from public transport fare systems.

The international card organisations – American Express, MasterCard, and Visa – decided to cooperate in the area of contactless technology, thus avoiding a war of standards (see: Section 4.1). Based on ISO 14443 A/B, their solutions are interoperational with one another (with some exceptions), owing to which they rapidly

produced a positive scale effect. The EPP cards issued by these three organisations have dominated the global contactless payment market in terms of the number of cards and POS terminals that accept them. So far, most contactless cards have been issued on the American market which is about to reach the critical mass enabling widespread use and acceptance of contactless payments. Much fewer contactless cards have been issued in Asian countries where these instruments often have to compete with solutions based on the FeliCa technology. The development of EPP cards in Europe has been delayed, which leads some analysts to the conclusion that the retail payment sector is focused on the migration to the EMV standard. Poland is an example of a market where the joint implementation of the EMV standard and contactless payments helped lower costs of this process and accelerate the development of contactless cards. At the beginning of 2010 MasterCard was the world leader with 70 million contactless cards issued, followed by Visa (27 million) and American Express (10 million).[11] However, due to many new implementations in Europe and Asia, another major card organisation – Visa – may vie for the palm. 2010 saw particularly high dynamics in the number of contactless EPP cards issued and the dominant position of this standard in the world, promoted due to the agreement of the largest card organisations, seems to be unassailable [Polasik et al. 2011b].

The first applications of the FeliCa technology also took place in public transport. At the beginning of 2010 FeliCa functioned primarily in Japan, where 100 million cards have been issued, followed by Hong Kong (20 million), and Singapore (4.5 million). Although the Japanese market has been dominated by the FeliCa technology, most systems functioning on that market are not interoperational, due to which it has been fragmented and its potential cannot be fully exploited despite a large number of payment instruments (cards and mobile devices) issued. It seems that it is the incompatibility of systems, especially in cross-border transactions, which constitutes the main obstacle to the development of contactless payments in Asia [Polasik et al. 2011b].

6. Conclusions and further studies

Contactless payment cards make an example of the one of the most successful applications of the contactless technology. They have been used by more than 200 millions of consumers around the world and this market is rapidly growing. A unique feature of the payment solutions based on the contactless technology is the unusual transaction speed, much higher than in the case of payments made with traditional cards. The empirical research has proved that contactless cards have been the first electronic payment instruments in history capable of competing with cash in respect to the duration of the payment process. Moreover, due to that contactless payments can be made offline, they take the least time to complete the payment operation as

[11] Estimates of Polasik et al. [2011b] based on [Crotch-Harvey 2010].

compared to all payment instruments available on the market. Not only can the use of contactless cards shorten the duration of payment but also lead to a factual reduction in queues and service costs as well as to an increase in sales for merchants.

Contactless cards are a competition for cash, which in the horizon of several years can contribute to the appreciable reduction of cash turnover. However, the greatest feature which determined the practical use of contactless payments is that their technical advantages can considerably benefit all participants of the payment system. Nowadays success of the contactless cards is foregone conclusion due to large investments in contactless terminal networks and support of Visa and MasterCard, as well as the enthusiasm of many customers. Popularisation of contactless cards may become faster through equipping cards with additional functionalities, such as a city card and a transport card usability which should stimulate the development of this form of payment.

Real revolution can happen with the development and popularisation of NFC mobile payments. As for now, mobile payments are in an early phase of development and have not been implemented on a large scale except for Japan [Bradford, Hayashi 2007]. It is also possible to imagine systems in which payments will be settled up solely on the basis of the consumer's biometric data and thus will not require issuing any payment instruments. However, such solutions are a question of distant future.

***

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ZASTOSOWANIE TECHNOLOGII ZBLIŻENIOWEJ NA RYNKU KART PŁATNICZYCH

Streszczenie: Niniejsza praca ma na celu przedstawienie uwarunkowań oraz głównych kierunków rozwoju płatności zbliżeniowych w Polsce i na świecie. W pracy zaprezentowano historię powstania technologii RFID oraz obecny stan rozwoju rynku płatności zbliżeniowych. W oparciu o wyniki badań wykazano zalety rozwiązań płatniczych bazujących na technologii zbliżeniowej, wynikające przede wszystkim z niezwykłej szybkości i prostoty realizacji transakcji, a także z możliwości konkurowania z gotówką w obszarze płatności niskokwotowych. W pracy opisano również sposób funkcjonowania zbliżeniowych metod płatności w punktach sprzedaży, w szczególności w odniesieniu do rozwiązań oferowanych przez porozumienie American Express-MasterCard-Visa. Przedstawione zostały różne strategie wdrażania technologii zbliżeniowej przez największe organizacje płatnicze oraz konsekwencje tych strategii dla funkcjonalności poszczególnych rozwiązań.