THE EVOLUTION OF THE INTELLIGENT CARDS AND THE ROMANIAN MARKET

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Abstract

This paper will try to describe the close relationship between the economic evolution and technology, especially how the technical aspects of debit/credit cards interact with the economical aspects. There are approached concepts related to smart card and especially the use of cards in different economic purposes.

Since the introduction of the first cards there has been an accelerated growth of the use of smart cards. One of the essential growth factors has been the progress in the electronic industry and the accelerated development of the software companies, which allowed the emergence of interactive financial services such as e-banking, mobile banking, smart cards being considered the access key to these modern services.

Keywords: Smart cards, credit cards, debit cards, card market in Romania, card payments

Considering the economic environment in general and the banking one in particular the battle for new market shares is fought on the field of innovation, dynamics and responsiveness to all that is new. Having to choose from a very generous offer, the Romanian customer will become more demanding to his bank and will use more and more complex choice criteria.

This is why in the former traditional field of banking those who want to succeed will have to consider the existing achievements of the world market and to adapt their offer to the ever growing and changing demand. Thus, the information system employed by the banks and the extension of the use of new technologies will make the difference in the near future. Talking about Internet banking, alternative distribution channels, commercial web sites, and smart cards is no longer fiction but becoming a way of life, the essence of home banking

Smart Cards

Nowadays smart cards are based on the discovery made in 1974 by the independent researcher Roland Moreno. They are similar in shape and size with the classical magnetic stripe cards but, as their name says, they contain an integrated circuit, a microchip that interoperates with the compatible terminals.

Achievements in the information technology have led to the diversification of payments services in the banking world and made important changes in the currency circulation. In this

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context, electronic funds transfer and the emergence of "currency" based electronic payment cards, were the elements that have revolutionized traditional payment systems.

Ongoing development of the electronic commerce and especially the need for security and authentication information of people, made necessary the development of safer and more efficient equipment, that can be able not only to retain information, but also to perform complex functions in the decision making regarding the sophisticated authentication procedures to prevent fraud [1.Pirjan A. 2010].

Smart cards can be compared, in a way, to a kind of miniature computer; they are composed of a processor and memory "operating system". Unlike classical magnetic stripe cards, the new intelligent cards can store up to 100 times more information, benefiting from a superior long life of up to five years and especially of increased security.

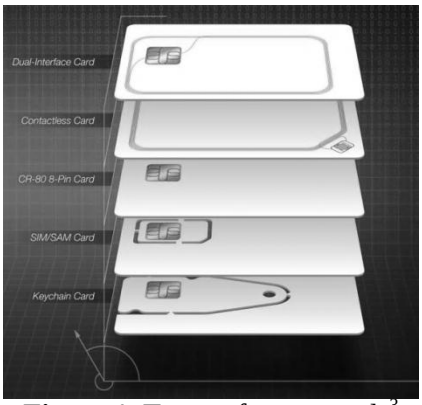

Figure 1. Types of smart cards[3]

Smart cards contain a chip able to store and process data. An embedded microprocessor controls all the information on the card, which operates under the control of an, usually unique, operating system that is used only by the manufacturer of that type of card. Cards containing a microprocessor benefit from increased protection against fraud and can be used in applications involving large amounts of data or requiring higher security. An application, for example, could be the storing of cryptographic keys and the card chip could function as a secure hardware device. Different card emitters have chosen different cryptographic systems in order to protect the privacy of their data by using either well known and public algorithms or proprietary less known and publicized variants of strong and modern algorithms [2.Tabusca A. 2011].

Consumers use smart cards to buy products and services, and vendors to gather data about customers and apply various schemes of discounts based on customer loyalty. In industry, these cards are used to pay energy, gas or public transportation or for the everyday shopping.

Smart card will load the monetary value available on that account and will download the extent of the payments that are made. Loading is made from a bank ATMs, EFTPOS terminal

[3] Figure source www.cardlogix.com

(Electronic Fund Transfer Point of Sale). Smart card can be combined with biometric data - fingerprints, hand geometry, voiceprint, in order to uniquely identify the owner.

Smart Cards on the banking market

The card has entered the banking market as an instrument of payment, being the modern equivalent of a wallet. Some smart cards are designed for special purposes, such as mobile networks or to run applications related to healthcare. Worldwide, there are used two types of smart-card technology:

- With contact: that allows transactions to be initiated only when the card is inserted in a card reader;
- Non-contact: using radio signals that can be captured through a device nearby.

While a magnetic stripe card can store up to 200 characters, microprocessor cards have a storage capacity of several tens of kilobytes. This allows them to store identification information of the holder, security keys, and information that can be divided for independent access.

The introduction of smart cards reduces and almost eliminates the possibility of fraud. Smart cards work safe, both online and off-line, during on-line transactions, card readers in shops are directly related to the bank that released the card. In an off-line transaction card reader device itself can perform the authorization by security key. Traditional magnetic track reader can only read or write information that is transmitted to a processing center at the end of the day that is why the discovery of the fraud is late.

Advantages that are brought by the usage of the smart cards are:

- Greater safety and security;
- Less investment in infrastructure, because it does not require online connections to all points accepting;
- Ability to integrate multiple applications on the same support.

The main disadvantages that can be found are:

- If it is lost, the money are more or less lost, which is not the case with a magnetic strip card, where money is deposited in an interest bearing account;
- Non interest-bearing money;
- Money are not listed as bank liquidity, which means that in case of the generalization of this card there will probably appear a bank's liquid asset erosion.
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Smart cards have a number of features that include:

- Are resistant to hacking attempts and protect personal information;
- Isolates problems sensitive to security (especially those related to authentication or digital signature)
- Provide portability of information included in computers and systems, independent of the architecture of these systems.

The risk for them is minimized, at least because the microprocessor card can be used only by the legal owner, often they are programmed to block or destroy the information stored if there is something wrong or repeated access errors appear. The stored value on the smart card

cannot be double spent because the chip contains specific filter programs that do not allow this, each spending irreversibly diminishing the balance registered on the card.

The main technological features of smart card systems are structured in four areas of information storage:

1. Non-confidential area - which includes elements of authentication of the issuer, the number of the account holder etc.
2. Confidential area - that includes the available balance;
3. Inaccessible area - which stores the personal identification number (PIN) or other encoding respectively decoding keys;
4. Record area - that captures details specific to each transaction, which are summarized in an "agenda".

Worldwide the smart card usage has grown from almost 400 million units in 1999 to 6135 million units in 2011 and it is expected to get close to 7000 million units.

Sectors	**Cards - Millions of Units**							
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012 - forecast**
Telecom	1390	2040	2650	3200	3400	4000	4600	5100
Financial services	336	410	510	650	750	880	1010	1200
Government / Healthcare	60	90	105	140	160	190	240	300
Transport	20	20	30	30	40	65	80	95
Pay TV	55	65	85	100	100	110	125	140
Other	27	30	65	65	70	75	80	90
TOTAL	**1888**	**2655**	**3445**	**4185**	**4520**	**5320**	**6135**	**6925**

Table 1. Evolution of smart card usage worldwide[4]

As results from Table 1, the usage of smart cards in the financial sector has registered a spectacular growth, if at the beginning of 2000 we were talking of around 100 million units nowadays that number is 10 times bigger that is why for 2012 the forecast is around 1200 million units of smart cards in the financial sector.

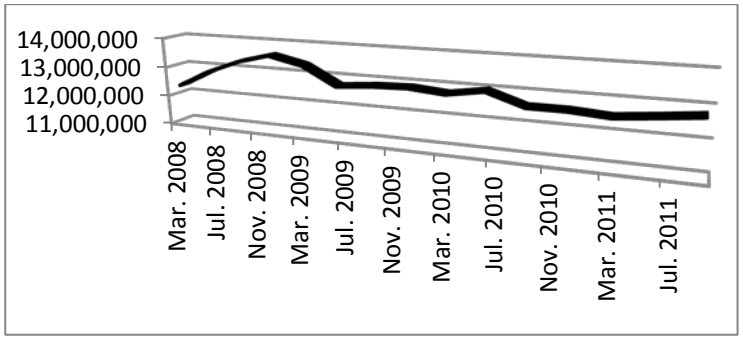

Figure 2. Number of valid cards in circulation (units)[5]

[4] Data issued by Smart Card Alliance

In Romania the usage of the banking cards used, as seen in figure 2, has registered a fall in June 2009 but after this the card market trend was a slightly positive one, that is why nowadays the number of valid banking cards in use is close to 13 million units.

Electronic wallet

An electronic payment system is a set of operations generated by converting real currency in electronic currency and vice versa, and the latter transfer between system users.

Due to the explosion of the internet use worldwide, with some countries even stating the right to be connected to the internet through written law, like Finland for example [3.Tabusca SM. 2011].

In an electronic payment system there are involved at least three entities: a buyer, a seller and a bank at which the two have opened accounts; these run transactions in the multitude of protocols of the operating system in three steps, in general.

The first step is to charge the buyer account with electronic money by converting the funds available in the real current account from the bank. The second stage is the purchase and payment of sales and the third involves the seller and the bank in whose account the funds are deposited electronically.

Any electronic payment system consists of two levels: the user and the system level. The user level is above the system and consists of all users and transactions between them. The system level consists of all electronic devices through which transactions are finalized. These devices are the electronic wallet and a POS application, which suggests the seller cash register.

An electronic wallet is a smart card that replaces cash or checks and has several advantages, such as: the ease of carrying it, it's cheapness, it's safeness in terms of functionality, the possibility to include debit or credit facilities.

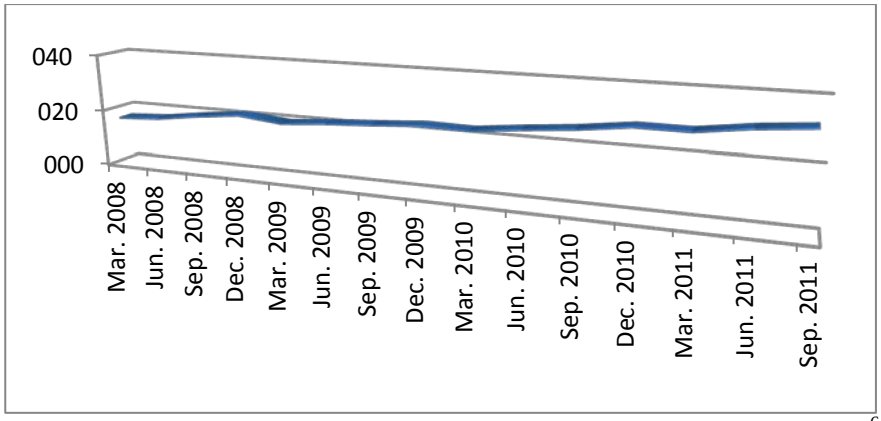

Figure 3. The evolution of transactions done with cards (million)[6]

[5] Data source Romania National Bank Interactive Database
[6] Data source Romania National Bank Interactive Database

In our country the number of transactions increased in a sustained way that is why nowadays we can speak of about 34 million transactions, which is a promising figure.

Electronic wallets are issued only to customers who have accounts opened at certain banks. The bank opens an account that focuses all operations in the electronic wallet system.

Loading the wallet imply that when an owner recharges his electronic wallet, it debits the amount from the current account using an ATM, a computer or phone or mobile. The bank, in turn, will credit its account balance. Since the transaction is on-line, it is easy to check if the holder has sufficient credit for charging, thus eliminating the problems of guaranteeing the payment.

Purchasing goods and services supposes that when the owner buys a product or service wallet, his card is debited. The POS terminal records the credit of the merchant in an internal electronic safe or directly on the card. At the end of each banking day, the merchant communicates to the bank the electronic cash that he obtained and the bank transfers the amount from the account holder into the merchant's account. Electronic wallet also permits the option of working off-line, and to be used as means of payment for selling machines, public phones machines or charging for parking cars.

Thus there are three types of electronic wallets:

1. Disposable - contains a default value and becomes unusable after the consumption of that value;
2. Rechargeable - the card has zero balance at the beginning and then is loaded with electronic value, and when consumed it can be recharged using ATM or other electronic devices;
3. Multifunctional - that has attached functions of debit or credit, in addition to the initial e-wallet function.

The advantages of smart card usage

The use of intelligent cards has a number of advantages for all participants: customer, merchant, bank.

The client, as a cardholder has three major advantages: First, and most important its convenience, the owner is not being forced to wander whether or not he has money on it, simply uses the card.

Another key factor was the ease with which cards can be used, that can have access to cash at any time of day and night from an ATM without having to resort to services of a bank pushed the card as the main payment instrument in the world. Another advantage available to the holder is that he can purchases things, with certain types of cards, without having the necessary amounts, within a limit and the payment is made later.

Another advantage of using the card is physical security, knowing that in this way substantially reduces the possibility of loss or theft. Beside this, issuers add different services attached to cards in order to make them attractive.

The main advantage for *the trader* is the increased turnover due to the possibility of serving customers who have both cash and those who prefer the card. In developed countries cards acceptance as a method of payment is a condition of survival in a competitive market. With the increasing number of cardholders, merchants began to accept more and more brands of cards, thus attracting more clients.

The fact that cardholders made purchases much higher than if they had used cash was a factor that leads to increasing the sales volume. The absence of risk is another advantage for the trader, by eliminating the cash usage; the handling costs of large amounts of money can be reduced or even eliminated. Also, the development of a system of selling on credit is difficult and costly for small merchants, the acceptance of cards eliminating this problem.

The banks take advantage of this system in order to eliminate the payment of handling large amounts of cash with all the disadvantages and costs related to it (security, counting, storage, transport).

Banks can use the cards as an easy way to give credit and encourage customers to borrow, interest on such loans being a source of income. This instrument of payment can attract customers who do not live near the bank.

Typically, bank customers were those who lived or had their work place near the banks, the appearance of cards eliminating this disadvantage. Also, cardholders are potential customers for other banking products. It is obvious a relationship of interdependence between the three parties involved.

As there are many merchants that accept cards, so they become more favorable to card owners because increasing the number of cardholders contributes to the sales volume for merchants. A larger number of merchants who accept cards and also a large number of cardholders mean revenue growth for the issuing bank through charges, which are set independently by each bank.

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