The Evolution of Smart Cards: The Moneo test

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'Smart cards represent the most significant change in consumer token technology in nearly 50 years, and we are only now beginning to recognise their fundamental importance to the new world of remote communication and trading. This is a technology for everyone and for every commercial and public sector activity'.

The development of e-commerce and related technologies such as the Internet played a potential role in the emergence of electronic methods of payment. This occurred when the Internet started to gain a significant position in the commercial marketplace in the 1990s. At the time, the conventional wisdom was that new secure payment systems needed to be developed. Moreover, technological breakthroughs and the increasing acceptance of e-commerce as a way of life and the increase in consumer spending over the Internet have helped the introduction of a new type of payment. Additionally, in the modern world, the widespread use of cash in the form of notes and coins was increasingly beginning to hamper the effective deployment of new forms of trading namely internet/e-commerce trade. These transaction processes, as with face-to-face transactions, would like immediate and anonymous payments. Furthermore, 'the digital transmission of goods and services, which makes up the majority of economic activity on the internet, has prompted calls for the development of payment technology which allow consumers to transfer value digitally in order to pay for these goods and services'. This new type of payment is e-money.

There are two different types of e-money. E-money can be either stored on a computer's hard drive, or on software contained on a personal computer (this is the digital cash), or can be stored on a chip card (namely the smart card).

E-money stored in software on personal computers' can only be used to pay for goods or services purchased on the Internet. ‘This system involves the transfer of digital coins in an encrypted format from one party to another. Unlike some of the smart card systems the coins must be validated each time by checking online with the issuer that they are authentic coins.

3 The issue of anonymity is a major issue. Being able to keep a record of the transaction will enable the Bank or the shopkeeper to reimburse the costumer, if necessary. Keeping records is also necessary to detect and avoid the fraudulent use of smart cards. But keeping a record of each transaction is costly.
5 E-money is essentially an electronic substitute for cash.
6 The implications of the fact that e-cash and in particular digital coins have to be validated are very important. First of all it is time consuming; the merchant in order to accept payment has to obtain an authorisation from the e-cash issuer. Moreover because e-cash have similarities to cash it can be regarded as absolute payment and then has other implications.

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and have not already been spent”\(^7\). The second type of e-money is smart cards. Smart cards are plastic cards that contain embedded computer microchips rather than or in addition to the conventional magnetic strip\(^8\) cards. The microchips allow data, including account balances, personal information, PIN numbers, shopping information and loyalty rewards to be stored on the card. In the context of payment systems, a smart card allows the consumer to turn money in a bank account into a digitally encrypted value stored on the card and vice versa.

‘Smart cards perform all functions of a traditional credit card, but provide greatly improved security. Smart cards are safer than credit cards; because you can’t just type a card number and expiration date into an online form or tell it to a sales agent over the phone. You must physically pass the smart card through a specialized card reader that communicates with the smart card’s built-in processor and data storage’\(^9\).

This is a summary of the reasons that led to the adoption of this type of payment, and of the different types of e-money and especially smart cards. The most important point is the application of smart cards universally and the most important and successful application of this payment method is the Moneo test in France, which will be analysed, in the next pages of this article.

‘Paris-France is leaping toward a cashless future with a nationwide launch this year (2003) of computerised ‘smart cards’, a concept that has so far failed to entice many American, British and German consumers\(^10\). Dubbed ‘Moneo’, the French electronic purse cards were introduced two years ago in a handful of small regions\(^11\). Moneo is the most heavily promoted\(^12\) electronic purse in France and France is the country\(^13\) with the highest a result of his or her cardholder’s use of the card. There are thus three separate contracts and three separate parties, each being party to two of the three contracts but neither of them being party nor privy to the third’. The effect of these three contacts is that a cardholder who tenders payment by means of a credit card has completed his contract with the supplier and thereafter that supplier must look to the card issuer for payment. This means that if the card issuer fails to pay the e-merchant, the e-merchant cannot then look back to the cardholder for payment.

\(^7\) Supra, n.5. Moreover, for more information on e-cash or digital cash see [http://www.digicash.com](http://www.digicash.com)

\(^8\) Magnetic strip cards are physically vulnerable. In comparison with smart cards, conventional magnetic strip cards can easily be duplicated. The information that credit cards carry is magnetically encoded and can easily be copied or forged. Furthermore, these cards can easily be damaged if they will be placed near to a magnet or magnetic device.

\(^9\) A. Mello, ‘How smart cards will revolutionize e-commerce’, ZDNet Tech Update, Jan 14\(^{th}\) 2002 (online) [http://www.zdnet.com/anchordesk/stories/story/0,10738,2838360,00.html [14/07/2003]]

\(^10\) For example: “In the UK, Mondex discontinued the Swindon pilot test after three years. In the end some 14,000 cardholders-this amounts to a penetration rate of 7.4%-were involved (Mondex International, 1998; Bohle et al., 1999, p.40) far fewer than the update of 25,000 that was originally predicted for the end of 1995 (Lewis, 1998). In Ireland consumer uptake in the Visa trial in Ennis is reportedly anything but lasting…As for merchants, while up to 250 retailers once accepted the card, only about 25 were still participating in March 2000 (Card Technology 2000b).

In the Manhattan test, near the end of the trial a mere one quarter of the original 675 merchants still remained in the program. According to Chase Manhattan figures, barely 8 to 10% of the cards issued in New York were used regularly (Washington, Post, 1998)’- L. Van Hove, ‘Electronic Purse: (Which) Way To Go?’, (online) [http://www.firstmonday.dk/issues/issue5_7/hove/index.html [21st February 2003]]


\(^12\) The developers of the Moneo test launched an important marketing effort. ‘Citizens of Tours were approached by the local media and by the distribution of leaflets explaining the Moneo experience. The official inauguration became a major event in France and was extensively covered by the French press, radio and television’- Development of the Electronic Purse in Europe and possible introduction in the Hellenic Banking system’, (online) [http://216.239.57.100/search?q=cache:6y_nbN4BH1X8C:www.hba.gr/7publ/meletes/ [21\(^{st}\) February 2003]]

The fact that French citizens appeared to be well-informed about how to use Moneo may be the key to its success.

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number of payment card transactions per inhabitant in the world. It is also the first country in Europe where all cards have been equipped with microchips. The trial introduction of Moneo started in Tours in 1999/2000 and it was followed by other parts in the country. The service was finally expanded to include Paris in November 2002. The Moneo test concerns approximately 850,000 consumers who are currently using the Moneo cards on a daily basis at 80,000 grocery shops, parking lots or vending machines. One of the special characteristics of the Moneo card is its anonymity which in turn means that there are no privacy or identity-theft concerns. On the other hand, the main disadvantage of the fact that the card is anonymous is that if a user of a card loses his/her card, the value stored in the card can be used by everyone who happens to find the card. That is why the Moneo cards have a 100 euro storage limit, trying to avoid too unpleasant losses. At today’s date, the Moneo cards are set to be available to all merchants and consumers by the end of the year 2003. It is worth noting that every French bank has now signed up for Moneo and the system is therefore promised to a bright future. In that test, the way that the Moneo card is used is simplest and easier.

‘Just like in earlier projects in New York or England, users can upload money from their bank accounts onto smart cards at special teller machines in banks and post offices. Conveniely, they can also refill the so-called stored value cards at any participating shop, supermarket, ticket booth or cinema, punching in a PIN number for security reasons. No PIN is required to dispense cash. Moreover, Moneo can be incorporated onto their existing credit cards—something that has never been tried outside of France.

Additionally, a very important benefit of the Moneo card is that it exists in two different forms, making its use even easier.

‘May be on a traditional bank card (CB) whose chip also integrates the functions of Moneo. In Island-of-France, some 2.5 millions CB carries already the Moneo logo meaning that the function porte-monnaie (purse) can be activated. The banks started besides to inform their customers of this possibility, invoiced on average 10 euros per annum. Either Moneo can be

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14 The Tours trial presents some interesting characteristics, such as the free Moneo card given by the banks to all young (under 18 years of age) that have not the required minimum age to receive a payment card, or they had no possibility of running a current bank account, the objective being to prepare the younger generation for the Euro’. Le Monde.fr, ‘Electronic porte-monnaie Moneo arrives to Island-of-France’, 6th November 2002,(online)

15 It is similar to cash, in the case of someone steals the cash from you. Additionally, ‘microprocessor cards (like Moneo card), don’t have visible account numbers. Before they can be used, the holder must enter a PIN that is stored on the card. Theoretically, it is possible to “hack” into a card. Most cards, however, can now store the information in encrypted form. The same cards can also encrypt and decrypt data that is downloaded or read from the card. Because of these factors, the possibility of hacking into a card is classified as a “class 3” attack. That is, the cost of doing so far exceeds the value of doing so’. E. Turban, D. king, J. Lee, M. Warkentin & H. M. Chung, ‘Electronic Commerce 2002 a managerial perspective’, International edition, (Pearson Education International, 2002), p.603

16 This is a very important issue of the test. Maybe with this move the banks are trying to make consumers more confident to use smart cards. Moreover, it will be more convenient to merchants because all banks will deal with the Moneo card. - see infra pp.8-9.

17 In Japan, 650,000 electronic purses known as ‘Edy’ cards are in circulation and can be used at 2,100 stores, mainly in Tokyo area. But unlike France, the cards can only be refilled at special machines or using devices that link up to personal computers.

18 Op cit, n. 11.

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only one simple porte-monnaie, a dedicated smart card which is “blue” if it is attached to the
bank account of the customer and “green” if it is not the case”\(^{19}\).

Moreover, feedback resulting from the Moneo test, shows that in that test the developers
and responsible bodies for the test are focusing on the fact that they will not do the same
mistakes as in past pilot projects and also they are optimistic about the success of the test.
Some of their views are given below.

‘We are not worried about whether it will take off here, the question is how long will it take-
two or 10 years?’\(^{20}\).

‘They have learned the lessons of past mistakes’. ‘We do think it has a chance to succeed in
France, whereas other initiatives had a zero chance’. ‘We all know that the future of money
is completely virtual’. ‘Moneo is a first step towards that’\(^{21}\).

The aims of the project are to ensure that the cards are widely accepted by the public, that
they can be used quickly, that there are no problems with refilling the cards and that they
carry low transaction fees for merchants\(^{22}\). For the Moneo card there is only an annual fee of
10 euro.

Furthermore, the reaction of both consumers and merchants in the Moneo is mixed. Some of
them agree in the application of the particular project but some of them strongly disagree.

As may be seen some of them are negative for the application of the test:

“Gregory Clau, 30, said only one customer has used the service since he installed it three
months ago at his locksmith shop near the Champs Elysees. ‘I don’t think anybody is
interested in it’ he said\(^{23}\).

However, others are very positive as far as the application of the Moneo test is concerned.
The dozen people a day who use Moneo to buy their Baguettes and cakes at Chatal
Plousseau’s Paris bakery might indeed disagree. ‘More and more people are using it’ said the
50-year-old Plousseau. ‘It’s efficient and eventually I will make less trips to and from the
bank carrying bags of coins’\(^{24}\).

In a lot of the parking meters in Paris the only way to pay is by the Moneo cards. This
reduced crime by stopping young persons smashing the machines and stealing the coins.

Furthermore, some of the merchants when the market that they trade is monopolist and
individualistic and it is not complex as in other past pilot projects as the Manhattan one are
not interested in using the Moneo card system in their shops. For example “Christine Berube
is refusing to offer the service at her tobacco counter in a dimly lit bar that serves up endless
glasses of cheap table wine and cups of coffee to mostly elderly regulars. ‘I think it’s useless’;

\(^{19}\) Le Monde.fr, ‘Electronic porte-monnaie Moneo arrives to Island-of-France’, 6th November 2002,(online)

\(^{20}\) According to Fersztand, the chief executive of BMS, the company that launched the project.

\(^{21}\) Op cit, n.12, according to Torris, the Forrester analyst.

\(^{22}\) A further new development of the Moneo test is that ‘Three French banks are testing handheld readers that
accept Moneo electronic purse payments, allowing merchants to take the e-purse transactions away from fixed
point terminals’, George Liberman, Head of French-based Xiring, making of the readers says that ‘Street vendors,
home delivery persons and merchants who don’t accept credit card payments are among others who could find the

\(^{23}\) Op cit, n.12.

\(^{24}\) ibid.

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the 46-year-old tobacconist said to nods of agreements from clients who draw heavily on their cigarettes. ‘I know how to count change quickly and don’t want to enrich the banks’.

Additionally, in Tours the Moneo card has met some resistance from the shopkeepers who have found the 0.9% commission to be paid on each transaction too high. This was especially the case for the “café-tabac” sector, which is highly individualistic and reluctant to accept new payment technologies, as Christine Berube notes above.

Moreover, in a bakery in a district of Paris, the first users are thinking positive about the use of this new payment mechanism.

“I insert it in the terminal of payment, I strike the amount and I validate, explains the cashier. You do not have to type of secret code...Here is, the amount is output”.

This shows how versatile and convenient is to use this payment mechanism. In order to pay for something an individual does not have to sign receipts but only to type a four digit PIN number. This method of transactions supports the argument that the environment in which Moneo is developing is adequate to support smart card payment mechanisms as far as technological issues is concerning. On the other hand, some consumers did not appreciate the automatic switch of the terminal from a normal payment card function to the Moneo mode for all small payments.

Even if the opinions and the reactions of consumers, merchants and responsible bodies are mixed the advantages of the Moneo test are very important and helpful in the development and the application of smart cards.

Contrary to an ordinary bank card and to digital coins, which calls upon a whole chain of checks and authorizations on line, then of mention of each purchase on the bank statement, the most important advantage in Moneo is based on the minimization of the communications. The information which is concerning the purchases of the users does not go up at the bank, only recharging procedures are notified. With Moneo the payments are more secure, fast and simple. The consumer does not have to sign the receipt but only to checks the amount entered by the shopkeeper, to validate the transaction and to withdraw his/her card. This makes the Moneo card especially and the smart card payment mechanism generally versatile, efficient and thus inevitable.

The fact that all French banks have signed up for Moneo is another advantage of the scheme. It is very important for the success of the test and for the merchants and consumers that each bank is supporting the application of the test, something that appears for the first time in such a pilot test. The justification for this might be the fact the French government supports the Moneo test. This means that a customer can use the card in every single terminal and also the cost of the transactions will be minimised. The merchants will not have to go through different processes in order to credit the money to their accounts.

25 ibid.
26 For further cardholders’ testimonials about the Moneo test see: (online) at http://www.cartes-bancaires.com/CBMag/15/en/enews/dossier_news.html [28th July 2003]
27 The technology of Moneo is of German origin, derived from Geldcard, amended to allow recharging express train. It rests on two chips, one on the card and the other on the reader installed in the tradesman. “The sedentary force of the system, it is the dialogue between these two chips”, ensures Pierre Fersztand, general manager of Moneo. This data exchange does not require the use of a secret code, except during rechargings’. —op cit, n. 19.
28 ‘Despite this drawback, the card holders in Tours use the Moneo Electronic Purse more often than the Proton users in Belgium: on average once or twice a week in Tours, once or twice a month in Belgium. The equipment of the transport sector (buses and parking meters), the easy reloading in the shops and the enthusiasm of the younger generation are considered the main factors supporting the penetration of Moneo in Tours’ especially and in France generally. —op cit, n. 14.
In addition the fact that all the French banks have signed up for Moneo will give consumers more confidence in using them. This in turn will give in the scheme and in the use of smart card payment mechanisms longer life expectancy. An analogy can be drawn with the use of credit cards. Twenty years ago only a few individuals were using them, but they have now become an inevitable mode of payment, each individual holding more than one at a time. Moreover, the same regulations and rules will apply if all the banks are working together for the utilisation of the Moneo card and this will probably lead to more adequate consumer protection.

Another important benefit is that Moneo can be incorporated into existing credit cards. Moneo is available in two forms. It can be incorporated on a traditional bank card whose chip also integrates the functions of Moneo. Or it can be only one simple smart card having the functions of Moneo. The fact that Moneo can be incorporated into existing credit cards means that consumers may be more confident to use it because there are already using credit cards on a daily basis. Also it might be the case that if the limit of credit in the credit card is overdue then the consumer can use the available e-money that is loaded in the smart card. This shows the versatility of the Moneo card and how can be accepted more easily by the public. The incorporation/utilisation of a microprocessor chip has proved to be another distinct advantage of the Moneo project, in so much as it may prove effective against fraud.

‘Chip technology enabled French banks to reduce credit card fraud by FFr 354.5m (or roughly 75%) since 1992, when smart cards fully replaced magnetic stripe cards. France has over 25 million smart cards in circulation, and the decline of fraud on their credit and debit cards has been accompanied by a larger number of card transactions at a wider range of acceptance points. At the same time, banks were able to move to approximately 95% off-line transactions, resulting in significant cash savings.’

This again gives more confidence to consumers and convenience to merchants to use this payment mechanism.

On the other hand, there is an important disadvantage of the Moneo test concerning Data Protection issues. BMS (Billetique Monetique Service) recovers a certain number of data and can use it for making profiles of consumers. BMS states that they are using the data only ‘to make statistical monitoring and to see whether there are anomalies’. This can raise issues of data protection. If for example this amount of data can be used in order to be sold to companies for direct marketing purposes then it can be said that it will contravene data protection legislation.

Furthermore we need to analyse the success of the Moneo Test.

First of all, the Moneo test applied not to closed environments but to larger regions. It started in some regions in France-like Tours-and is now expanding to the whole France. On the other hand in France because the application of the test is nationwide everyone who carries a Moneo card can use it in any place. The concept of the monopolistic market in comparison to the complex market appears in that point in conjunction with the role of governmental support. Even if the market of the application of the scheme is a complex one, when is backed by the government and its application is nationwide becomes monopolistic. This shows that

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29 However, there is a debate concerning whether the regulation of such schemes and in general e-money is necessary at the moment or not. For a further analysis see in the next issue of the Journal the second part of the article named, The Evolution of Smart Cards: Advantages, Disadvantages and Problems.


31 Op cit, n. 19.


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the use of that payment system is more effective, easy to use and versatile when applied in a national level even if the card is used for more than one purposes.

A second point that helps to assess the success of the test is that in the Moneo test appliances for recharging can be found in most places. In other past pilot projects like the Manhattan test merchants had to use different processes in order to credit their accounts. This was most inconvenient. In the French example, a single process was in place as every French Bank had signed up for the test\textsuperscript{33}. Additionally in the Moneo test the card were used in bakeries, transportation, tobacconists, bars and breweries, florists, pharmacies and bookshops and thus proving to be versatile towards the complex market in which it was being applied.

Another reason for the success of Moneo is that the developers of the pilot project promoted its function, and ease of use to consumers, making them confident in its use. The issue of confidence is very important and the French test was successful in this area as evidenced by the fact that most participants are increasingly using the Moneo card.

The Moneo Test has highlighted advantages and disadvantages. These are key information to be observed by future developers of similar projects. Moreover, the developers of such pilot projects must be aware of further developments in the use of smart cards which will help this payment mechanism to further develop and ‘take off’.

\textsuperscript{33} See for further analysis, op cit, p.8-9. The Manhattan test was proved to be superficial in comparison with the Moneo test which is more efficient and versatile.

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