An empirical evidence of the Electronic Purse's adoption: The case of Moneo

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Abstract

Electronic purse is one of the last birth of smart card application. It deals with small payment and will be complementary to the nowadays payment card. However, its adoption both by consumers and merchants has meet considerable obstacles which have impeded the diffusion process. This paper explores and models the processes and driving forces of the diffusion of the Moneo electronic-purse in the area of Aix-Marseille in the south of France. We propose to assess some endogenous and exogenous factors that can influence the intention of adoption of Moneo. This study aims to (1) Evaluate the process of adoption of Moneo (2) Analyze the technological, economic and social effects for the diffusion of Moneo (3) Determine the major factor(s) that influence the adoption of Moneo. We find that the introduction of Moneo in the area of Aix-Marseille meets some difficulties and seems to converge towards a failure if commercial policies are not revised. We also find that the economic and technological factors greatly influence the Moneo adoption.

Keywords: Diffusion of innovation, Electronic purse, Smart card, Adoption, Network externalities, Social influence.

JEL Classification: A12; C13; L63

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1. Introduction

During the last 4000 years, there had been only four major innovations through which one can carry out payments. These four major innovations are: coins (4000 years ago), checks (800 years ago), notes (more than 100 years) and cards (more than 50 years) [5]. This last innovation has known a fantastic growth these last ten years due to the development of the 'chip'. It is the smart card[1]. Many innovative applications related to the smart card cover several sectors such as telecommunication, transport, finance, health, etc. Currently, the financial applications offer several means of payment. Among these means, electronic purse seems to be a good solution to solve the problem of the low value transactions and will be complementary to the existing payment card. It simultaneously offers advantages to the consumers and to the merchants. However, its adoption both by these two groups met at some problems preventing massive and fast diffusion of the electronic purse. Therefore, the purpose of this paper is to explore and model the processes and driving forces of the diffusion of the electronic-purse as smart card application niche. We propose a model in which the exogenous and endogenous factors can influence the intention of electronic purse's adoption both for consumers and merchants. Then, we provide empirical data based on the set up of the Moneo electronic-purse in the area of Aix-Marseille in the south of France. This study aims to (1) Evaluate the process of adoption of Moneo (2) Analyze the technological, economic and social effects for the diffusion of Moneo (3) Determine the major factor(s) that influence the process of adoption of Moneo.

2. Electronic purse context

Card-based payment transactions was originally worked with magnetic stripe technology used for online authorization. With smart cards, more particularly microprocessor cards which take advantage of being equipped with a processor chip as the operation heart of the card, the concept remains the same but cards are quiet flexible in their applications and more secure. The security of smart cards is enhanced by PIN verification. The seize and power of the chip determine their storage and processing capacity. These types of cards are useful where storing a secure digital key or identity is the goal.

There are currently three fundamental categories for electronic payment using smart cards. First, credit cards, in which payment is made after a service is rendered (pay later). Second, debit cards, in which payment is made when the service is rendered (pay now). Third, electronic purse, in which payment is made before the service is rendered (pay before). For more details and evaluation about the advantages and limitations of such payment systems we can see [15, p 528-29; 27].

In contrast to a debit card, electronic purse is a payment innovation designed to substitute for low value cash purchases. It is based on smart card technology. It contains a reloaded sum which debits the amount for each transaction during its coupling with a reader (terminal of payment ATM). The transfer is done without direct involvement of a financial intermediary (in an off-line mode), which is different for the case from the purchases carried out by credit cards, debit cards or checks. In this case the exchange of instructions between the consumer and merchant financial institutions are inevitable. This direct involvement of a depository institutions in the transactions by debit cards, credit cards or checks increases the fixed costs associated with using these instruments, making them impractical for small payments.

[1] The smart card, is an electronic product born since two decades and constitutes a technology information revolution. It is a credit sized plastic card with a chip embedded in it providing power to serve many different uses (for example: SIM cards for mobile phone, credit/debit cards as Visa, MasterCard, etc.).

Because its balance is transferred directly from the consumer to the merchant, the electronic purse could replace a range of cash transactions and actually it becomes the only protagonist for small payments.

Electronic purse offers advantages simultaneously to consumers, merchants and even to the financial institutions. For consumers, electronic purse offers a convenience in its use by avoiding move to the bank or to the distributor. It fills and satisfies the multi-uses need related to the small purchases such as a bread, coffee, drinks, postmark, newspaper, etc. It makes it possible to have the supplement which misses often cruelly. Also, customer can fix and control his budget because a user can spend and reload only the amount he wishes. Another advantage offered by the electronic purse is that often several merchants do not accept checks or cards for paying small purchases[2]. For merchants, electronic purse makes it possible to save time and money in the handling of cash. Also, it makes it possible to reduce the risk of loss and accelerates the payment. It permits the increase of the variety in the number of the products paid by card. It also permits to collect consumers market data and to work out marketing programs according to the consumers affinity. For issuers, electronic purse allows them to decrease the relative proportion of money in the form of coin and currency compared to the total of the money supply, therefore more money returns to the banking structure which profits from an action leverage (the banks lend more than they have, since when they lend money, a great part returns in the banking structure). In addition, it constitutes a mean of reducing the costs of the currency, of improving safety by the reduction of the transfers of funds and of decreasing the use of the check for the small payments[3]. Therefore, the settlement of an electronic money makes it possible to improve the profitability of the banks and to create a support privileged to offer new services: fidelity, ticketing, etc.

The Olympic Games of Atlanta in 1996, constitutes the first most important trial pilot of electronic purse ever realized. This experiment was undertaken by three American banks (First Union, National Bank and Wachiovia) and Visa. After that, other electronic purse projects were developed among them Moneo. Table 1 shows the principal electronic purse projects in Europe.

The Moneo purse allows individual payments to be made up to a value of 30 euros. Cards can be recharged at participating bank terminals to a maximum value of 100 euros. If the user wants an express top-up at a retailer terminal, the maximum amount is 30 euros. So there is two ways in which the Moneo card can be reloaded. First, at the retail outlet, at the time of purchase, through the point-of-sale (POS) terminal. This 'express loading' facility rescues a card user from the embarrassment of reaching the POS terminal only to find that they do not have sufficient value on their card to make their payment. This function is available when the Moneo purse is associated with a bank card or a bank account. Second, at an automatic e-purse dispenser (DAME). DAME terminals are to be installed in bank branches, bank self-service areas and in public places such as railway stations and shopping malls.
Retailers obtain terminals at the best price they can get from their bank, and pay a negotiated commission on transactions (between 0.3 % to 0.9 % for each transaction). They will be able to use two types of payment terminals: either a terminal dedicated only to Moneo or a combined Moneo/Cartes Bancaire terminal. For consumers, Moneo is available in two forms. It can either be carried as an additional function on the Carte Bancaire (which is issued by the French banks as an account-based payment card); or it can be a stand-alone purse card.

[2] For example in France this limitation is generally with the lower part of 8 or 15 euros.
[3] It refers to management cost of the currency and the small checks which is important for banks.

Moneo uses technology derived from the Geldkarte purse developed by the German banks and amended to include the express top-up facility. The flow of data between the chip in the 'proximity' Moneo card (running on the ISO 14443 B standard) and the chip in the terminal is secured by triple DES encryption. There is no need for the cardholder to use a PIN code, except during a recharging transaction. Cardholders' purchasing transactions are not routinely tracked and information only flows back to the issuing bank when the card is being recharged. However, the Billetique Monetique Service BMS (the jointly owned company that operates the Moneo card) does admit that a certain number of transactions are captured, randomly, for statistical purposes.

In addition, France is the country with the highest number of payment card transactions per inhabitant in the world and also the first country in Europe where all cards have been equipped with microchips. Situation in france is specific because the most widely used card is not a competing credit card but a payment card (or bank card) that is accepted through the nationwide payment system. Moreover, the payment card technology in France is run by a central organization called GIE Cartes Bancaires 'CB'. This smart card already handles many offline transactions and is also widely used in public telephones. With 'Carte Bancaire' system, compatibility and standardization problems do not exist. The existence of such network facilitated the launching of Moneo purse since merchants are already electronically linked large numbers of banks. In other words, there is a natural market linkage that exists between the electronic purse and other payment cards. However, if Moneo purse can be combined with bank card because of compatibility, merchants must pay additional cost to adapt their traditional smart card terminal with the new payment application. Then they can list Moneo logos on their storefront windows to indicate that customers can use their Moneo cards to make purchases. So in order to facilitate the use of the electronic purse, the adaptation of the existing POS and ATM terminal with a logical option is required. Thus the consumer will have the free choice between an electronic purse payment and the use of a credit or debit payment card. Indeed, the both payment modes will be in competition.

Countries	Projects
Belgium	Proton
Denmark	Danmont
French	Moneo
Germany	Geldkarte
Italy	Minipay
Netherlands	Chipknip
Luxembourg	Mini Cash
Portugal	Multibanco

Source : ECB (European Central bank)

Table 1: Principal electronic purse projects in Europe

3. Theoretical foundations

In this section, we refer to theories that deal with the adoption problems of new products and their empirical evidence. These theories are widely based on work developed around innovation theory [12, 17], network externalities [6, 9] and social influence [2]. The introduction and definition of factors and/or variables of adoption related to our model were inspired from previous approaches. In that, we will show that smart card product adoption, more specifically electronic purse, depends on three kinds of process supporting the model.

The first process underlines individual adoption factors described by three great types of factors. They are the technological, economic and social factors. The second highlights individual intra-categorical adoption factors related to the network externalities effects and to the social influence both for consumers and merchants and to the competition effects for merchants. The third process presents the inter-categorical adoption factors associated with network externalities effects. It reflects interactions between consumers and merchants. We consider the first process as exogenous and the two others as endogenous.
We note that, the economic theory about adoption and diffusion of products derived from smart card are limited and are recent [1, 8, 14, 24], although smart card products contribute usefully to our everyday life. In this part we try to design a theoretical framework looking into some factors which can influence the product adoption.

3.1. Innovation theory

Innovation is defined as a new idea perceived by the individual [17] or by the organization. It is a product, a service, an input, a process or a technology. *The diffusion is the process by which this innovation is communicated according to certain channels through time among the members of a social system*. Roger's works largely contributed to the determination of the characteristics of an innovation that influence its adoption. According to the author, "*the characteristics of innovations, have perceived by individuals, help to explain to their different spleen of adoption*" [17, p 15].

Rogers [16] defines five characteristics that affect the adoption rate of an innovation: the relative advantage, compatibility, complexity, triability and observability. Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes. Compatibility is the degree to which an innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters. Complexity, is the degree to which an innovation is perceived as difficult to understand and use. Triability, is the degree to which an innovation may be experimented with on a limited basis. Observability, is the degree to which the results of an innovation are visible to others. Thus, the innovations which will be perceived by the individual must have enough relative advantage, compatibility, triability, observability and less complexity so that they are adopted more quickly than other innovations.

Based on Rogers' conceptual framework, Moore and Benbasat [12] added new variables that can influence the adoption and the diffusion of an innovation. The two authors developed a measurement instrument known as the PCI (Perceived Characteristics of Innovating). This instrument brought additional constructions which can also influence the individual decisions of adoption. Other characteristics as the relative advantage, compatibility, complexity and triability, Moore & Benbasat [12] introduce the notions of visibility, result demonstrability, image and voluntariness. Visibility is the extent to which an innovation is perceived to be widely diffused in the relevant adoption setting. Result demonstrability captures the degree to which the unique features and benefits of an innovation are readily discerned by the potential adopter. Indeed, these first two variables replace or represent the concept of observability defined by Rogers. In addition, image represents the degree to which an individual believes that an innovation will bestow them with added prestige or status in their relevant community or location. Finally, voluntariness reflects the extent to which the adoption of an innovation is perceived to be under an individual's volitional control.

From the same point of view and based on the previous adoption studies, Tornazky and Klein [23], affirmed that the following characteristics of the innovation as the relative advantage, compatibility, and to a lower extent, complexity constitute the most important preachers with the adoption. However, we think that the use of these three factors as only variables of analysis can affect the interpretation and explanation exactitude of behaviours or the intention of adoption. Likewise, the empirical example [24] carried out within the framework of launching smart card trial in New York city is founded on this analysis method.

3.2. Network externalities theory

Economists use the term “externalities” to describe situations in which one individual’s behavior has spillover effects on others. Consumers and merchants are the principal users of payment means. Indeed, the increase of the number of merchants who propose a new payment system is benefit to the consumers. Reciprocally, merchants acquire a benefit with the increase of the number of consumers who use the new payment mean. This illustrates the interaction of the demand [3] that exists between consumers and merchants for the use of a payment mean. Thus, the payment instruments describe a network good because the benefit drawn from the good is related to the increase in the number of the users [6, 9]. So we ask the following question: why do the payment instrument demand depend at the same time on the balance of the total number of consumers and merchants? The explanation is that the benefit to the consumer of having electronic purse is a function of how many merchants/businesses will accept it in payment for goods and services. In addition, the merchant seems to agree to invest in the electronic purse system only when there is a sufficiently large demand for using these payments mean. Consequently, the consumer’s benefit depends directly on the number of merchants accepting the payments mean and only indirectly on the number of the consumers who adopts it or uses it. Conversely, the merchant’s benefit depends directly on the number of the consumers using the electronic purse and only indirectly on the number of merchants accepting them. Thus, the problem to achieve the critical mass [13, 16, 25] of users (consumers and merchants) is a very important issue to market penetration for the new payments systems. Oliver et al. [13] define the critical mass as "*small segment of the population that chooses to make big contributions to the collective action while the majority do little or nothing*". The concept is important because market dynamics can change considerably once critical mass has been achieved. Market for network goods may growth slowly until reaching a critical mass, then suddenly begin expanding quite rapidly (generally, the process releases a S-shaped diffusion curve). This makes it difficult to forecast the size of a market on the basis of growth rates before critical mass has been attained.

3.3. Social influence and competition effects

The introduction of influence as a non homogeneous variable in this framework can present a serious factor in the innovation adoption process for such good with strong network externalities. This prospect deals with 'social networks' contributions. In this sense, Bass’s [2] study showed a distinction between two kinds of social interactions in the diffusion process. The first kind of interaction assumes that adoption is driven by information from a source external to the social system. It underlines the influence of the merchants actions to consumers mental process. The second kind of interaction assumes that adoption is driven by communication within a specific social system. It illustrates the social interactions between the adopters of the innovation and the non adopters. i.e. that the adopters can influence the non adopters for the innovation use. Here we consider a simple spatial proximity where a

successful innovative product' adoption in one area can influence the adoption decision for other areas.

In addition, the merchant's decision to accept the new payment instrument will depend on whether the discounted expected future returns from the card exceed the fixed costs of the hardware and software equipment required to accept it and on the effects that can get it of setting up the payment system compared to the competitor. It is related to the ability and will to respond to competitors' actions. This emphasizes beating the competition and having the ability to make product offerings that are comparable with rivals. Thus, competition gives another reason for merchants to accept a new payment system.

However, some barriers can arise if the new payment system is proprietary; that is, cards could only be used in machines owned by the bank issuing the card, and is not technically compatible. For example in United States, initially, most ATM systems were proprietary and merchants were compelled to install a debit terminal that is linked to an ATM network permitting customers to make a retail purchase using a debit card. In this situation, a retailer interested in installing a debit card system would have to choose from different, competing ATM systems, knowing that a choice would exclude a potentially large group of customers with competing cards. The alternative, installing different equipment for each ATM system, would be prohibitively expensive. Thus, retailers would have a strong incentive to install debit card readers only in areas where one bank's ATM cards enjoyed a significant market share.
Such problem doesn't exist with the 'Carte Bancaire' system, because the network's technical specifications are typically chosen as a network standard by all financial institutions or banks issuers. As a result, merchants may be more likely to adopt electronic purse as a payment alternative. Electronic purse can be a substitute to small cash payment and complementary to bank cards, checks, etc.

4. Research model

Our purpose in this paper is to analyze the factors that have limited the Moneo purse success in spite of the high level of utilization of existing payment cards in France, and to examine prospects for future growth. Thus, we focus on the adoption problems faced by the Moneo purse for its diffusion which has a payment infrastructure compatible with the cards payment already in place and issued by the same organisation GIE 'CB'.

This research is expected to contribute that the model of electronic purse diffusion based on the endogenous factors (process P 2 and process P 3) and exogenous factors (process P 1) as factors used to predict intention to adoption electronic purse. The following figure 1 provides the research model.

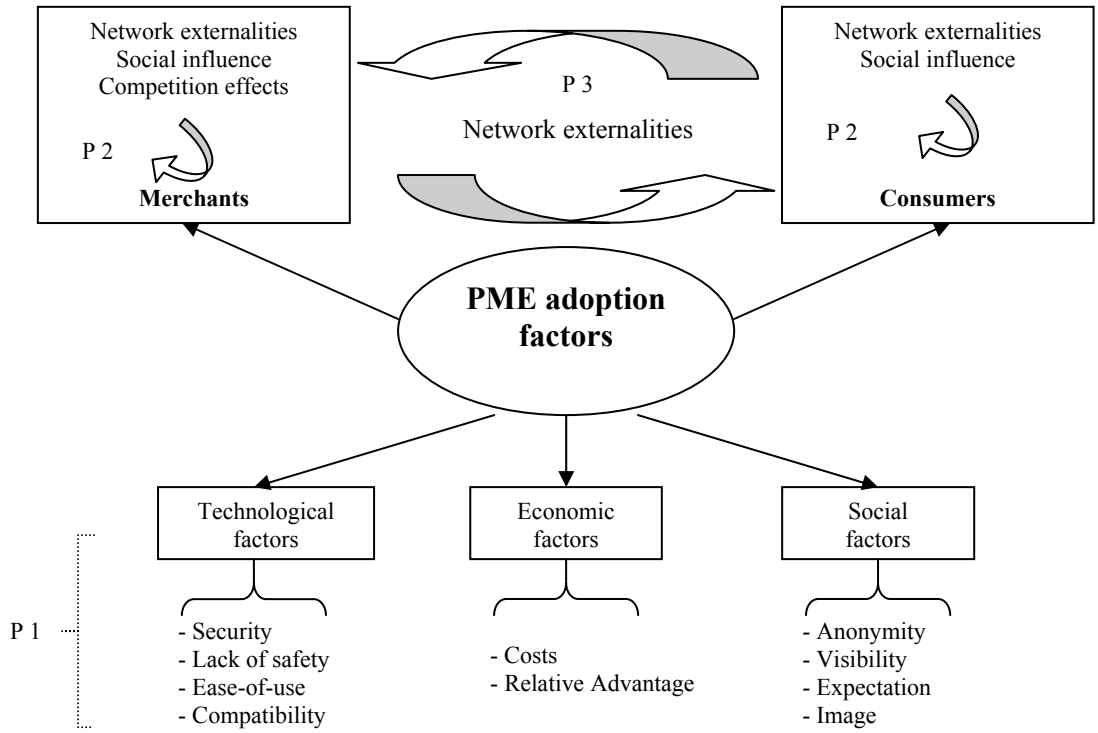

Figure 1: Electronic purse adoption and diffusion model

Based on the figure 1 this research has a model with three process:
Process 1: the assumptions of individual adoption factors can be used to predict intention to adopt electronic purse.
Process 2: the assumptions of the individual intra-categorical adoption factors can be used to predict intention to adopt electronic purse.
Process 3: the assumptions of the inter-categorical adoption factors can be used to predict intention to adopt electronic purse.

4.1. Factors of individual adoption

Here, we propose a new descriptive construction of the variables that may influence adoption electronic purse process. This modelling is based on the referred work describes above about innovation theory and can be an archetype to study the adoption process of other smart card products and more particularly of those which are related to the payment systems. The variables are related to ease-of-use, compatibility, relative advantage, anonymity, visibility and image. Other variables were added as security, lack of safety, cost and expectation. *Security* is a major stake in the payment systems. The success of the smart cards comes primarily from their higher security that guarantees not only security for banking community but also for consumers and merchants. Any failure in the security level will induce the reduction of the number of individuals who will adopt the product. *Lack of safety* expresses the fact that the electronic purse payment system must work continuously without any risk of interruption. This availability must be ensured 24h a day. *Costs* is related to two types of costs. First, initial costs, which include the set up cost of the payment system as reader or the expenditures of subscription. Second, operational or transaction costs, which represent the fees supported by the merchant for each transaction. Indeed, the cost of technology or innovation refers to the initial cost and also to operational cost and usually is assumed to be

negatively related to the adoption and implementation of innovation. Users usually evaluate the costs against the benefits before adopting the technology. *Expectation* is the assessment of the degree of individual expectation after having to test the innovation. This can reflect the opinion of consumers and merchants. Indeed, Gagliardi & Compeau [7] observed that individuals with lower expectations tended to adopt the innovation more easily. Whereas strong expectations often lead to the rejection of technology after a trial period.

We divide all variables into three groups. Each group must describe a particular explanatory factor. It is about the technological, economic and social factors [4].

4.1.1. Technological factors

The technological factors considered herein are: security, lack of safety, ease of use and compatibility.

Assumption 1: *A high level of security offered by electronic purse (system) contributes largely to its adoption by consumers (merchants).*

Assumption 2: *Electronic purse (system) failure during of a transaction decreases the motivation of the consumers (merchants) to adopt the electronic purse (system).*

Assumption 3: *Consumer (merchant) electronic purse (system) acceptance will be easier when it is easily used.*

Assumption 4: *The use of a new mean of payment (system) which is compatible with other means already in use increases its adoption by the consumers (merchants).*

4.1.2. Economic factors

The economic factors herein involve costs and relative advantage.

Assumption 5: *Weaker the fixed costs of subscription (of installation) are, more important the adoption or the acceptance of the product by the consumers (merchants) will be.*

Assumption 6: *Advantages brought by the electronic purse (system) influence its adoption by consumers (merchants).*

4.1.3. Social factors

The social factors considered herein are: anonymity, expectation, visibility and image.

Assumption 7: *Identity and transaction anonymity influence the use of the product both for consumers and merchants.*

Assumption 8: *Lower the consumer (merchant) expectation is, more easier the adoption of electronic purse (system) will be.*

Assumption 9: *More the visibility of the electronic purse (system) is extended in an area more its acceptance by the consumers (merchants) is easy.*

Assumption 10: *The 'better' the image of the electronic purse is, the more consumers (merchants) try to get and to have it (to set up it).*

4.2. Individual intra-categorical adoption factors

Based on the network externalities and social influence frameworks, individual intra-categorical variables involve herein: network externalities and social influence both for consumers and merchants and competition effects dealing only with merchants.

Network externalities: Electronic purse describes a good with network externalities because the average consumer's benefit from using them in transactions depends on how many other consumers and merchants are using the same mean. Moreover, the total benefits associated with the use of electronic purse exceed the benefits accruing directly to an individual consumer. By extending the network, one person's participation also increases the benefits to others. This shows the strong interdependence that exists between the consumer and merchant demand for electronic purse. Moreover, we can distinguish two types of benefits. Those accruing to the consumer and those accruing to the merchant. However, in the market structure foreseen for most electronic purse the consumer and the merchant are almost never the same person (which is not the case for example for the faxes where the person can be at the same time the sender and the receiver). In other words, a participant always places himself in only one side of the market. Hence, the nature of the demand interdependence is determined by the total number of market participants and by the relative number of consumers and merchants. Noted here that we consider a positive network externalities as an Individual intra-categorical adoption factors if the benefit a consumer (merchant) derives from using electronic purse increases as the number of other consumers (merchants) adopting electronic purse increases.

Assumption 11
Consumers agree more easier to adopt electronic purse (system) with the increase in the number of the consumers (merchants) who use it.

Social influence: Social influence copes with the effect that an electronic purse success adoption in a particular area can entail an influence on other areas. We suggest that individual decisions making to adopt electronic purse is influenced by geography proximity. It is question of taking into account the intensity of the inter-individual relations on an inter-regional level. The idea is that electronic purse, in some areas (example at Paris in France), gets a ticketing function. However this application seems to constitute a strategic or catalyst application aiming to improve the adoption of the product. Therefore, a successful electronic purse' adoption in one area can influence the adoption decision in other areas.

Assumption 12
More the electronic purse (system) is well widespread in other area(s) already setting up electronic purse more its adoption by consumers (merchants) in the new area is easy.

Competition effects: Merchants must get some advantages not only from replacing current and routine cash payment transactions for small amount but also from competition. The later can give another reason for merchants to accept electronic purse payment. Therefore, merchants should calculate the benefit get from accepting electronic purse system or not.

Assumption 13
If the Moneo system provides a benefit compared to the competitor its adoption will be easy.

4.3. Inter-categorical adoption factors

Inter-categorical adoption factors involve network externalities effects between consumers and merchants. Consequently, the consumer's benefit depends directly on the number of merchants accepting the payments mean. Conversely, the merchant's benefit depends directly on the number of the consumers using electronic purse.

Assumption14
Consumers (merchants) draw more benefit through the increase of the number of the merchants who accept electronic purse (system) than increase in the number of the consumers (merchants) who use it.

5. Empirical results

5.1. Data and methods

Data collection was gathered through a questionnaire conducted near four groups: Moneo adopters merchants, non Moneo adopters merchants, Moneo cardholders and non Moneo cardholders. The study lasted one month during which we questioned fifty people of each category. The setting up of Moneo in the area of Aix-Marseille-Ciotat constitutes a trial project before a general deployment on the whole of the area of Bouches-du-Rhône. The respondents inside of the pilot area were carefully selected to ensure that they were representative of the overall population. In that, the distribution of the questionnaires was the following one: concerning the category of the Moneo adopters merchants (8 questionnaires in Aix-en-Provence, 8 in Ciotat, the remainder was distributes between 10 districts in Marseille with a light advantage for the southern districts). Regarding, the questionnaires collected since the Moneo cardholders, we estimate that the distribution in terms of percentage is not far from that of the adopters merchants. Due to the difficulties associated with identifying consumers during the pilot, the merchants allowed access to interview their customers. In addition, on the fifty adopters merchants 19 of them (5 in Ciotat, 3 in Aix-en-Provence and 12 in Marseille) have accepted to participate in the investigation by proposing questionnaires to their customers carrying Moneo. The response rate was of 63%. Concerning the questionnaires of non-adopters merchants and non-cardholders, we carried out the following distribution: 20 % in Aix-en-Provence, 20 % in Ciotat and of 60 % in Marseille.

The description of the variables in the questionnaire was illustrated mainly by two types of questions. First, a category of affirmative sentences whose scale employed corresponds to five ordinal level (Type 1: completely agree, rather agree, no rather agreement, not at all agree and without answer; Type 2: very often, rather often, seldom, never and without answer; Type 3 very expensive, rather expensive, cheaper, not expensive, without answer). Then, a category of interrogative sentences (questions) whose scale employed corresponds to three ordinal level (yes, no, don't know). The proposed measures were initially tested in a small-scale pilot study. The tests helped clarify some questions and eliminate others for which information would not be available. The measurement items as they appeared on the survey are shown in the appendix A.
The data drawn from the questionnaires were analyzed by using descriptive statistics for endogenous variables (P2 and P3) and ordinary least squares (OLS) regression estimation for exogenous variables (P1). We have ten independent variables for P1. Each variable is described sometimes by several questions. We calculated the sum of the scores relating to all questions for each variable. Thus, we used a method based on the assignment of the scores for

each variables, then to regress all variables on these scores using OLS. The assignment of the scores corresponds on the scale according to: for the questions related to the first category we used the following scale. Type 1: completely agree (score 2), rather agree (score 1), not rather (score -1), not at all agree (score -2) and without answer (score 0). Type 2: very often (score 2), rather often (score 1), seldom (score -1), never (score -2) and without answer (score 0). Type 3 very expensive (score -2), rather expensive (score -1), cheaper (score 1), not at all expensive (score 2), without answer (score 0). For the questions relating to the second categories, the scale was: yes (score 2), no (score -2) and don't know (score 0). Noted that Finally, the dependent variable was the adoption of electronic purse. This variable was measured on a five-point scale which assessed the frequency of adoption: never (score -2), at least once (score -1), once a month (score 0), several times/month (score 1) and daily (score 2).

Multiple regression analysis was used to test assumptions 1-10. This analysis allowed for a detailed understanding of how each of the independent variables predicted adoption. While assumptions 11-13 was interpreted from descriptive statistics.

5.2. Results

Results concerning the four groups are reported. First, we describe statistics results of the adoption factors respectively related to merchants and consumers not using Moneo. Then, we present a survey results of the independent variables estimations and its description statistics for the adoption of Moneo. Third, we examine the links between the variables which will be translated in the tables 2 and 3 respectively associated to merchants and consumers both using Moneo. Finally, we provide the statistics results of intra/inter categorical adoption factors.

5.2.1. Non adopters merchants versus non cardholders

The data analyzed for the both groups, non adopters merchants and non cardholders, highlighted two key objectives. The first objective was to investigate the responses of the two groups in order to bring an answer for the reasons that prevent the adoption of Moneo. The second objective was to shed light on the future of the intentions to adopt Moneo. We stress that the specific questions are joined by an answers listing nearly reflecting the factors of adoption that we have already defined for the two previous groups. The questions followed by a series of ordered choices (the possible answers).

The primary result indicates that the two groups would not be willing to accept the adoption of Moneo. This results are shown in figure 2. For the merchants, answers distribution shows that the product is uninteresting, nor practical and that the service offered is quite costly. The response rate were respectively of 45 %, 23 % and 35 %. Whereas for the consumers the response rate were 65 % (non interesting) and 45 % (high-priced service). We noted that the variable 'security' does not happen in the decision of the consumers (the response rate was zero).

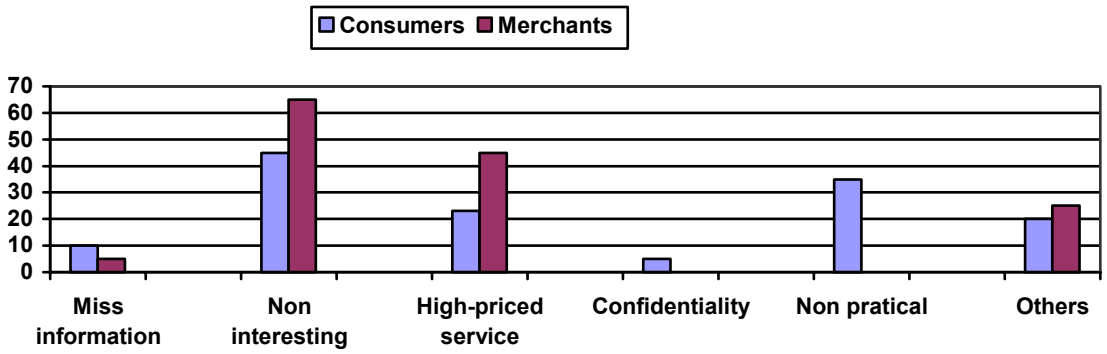

Fig. 2. Why did you not choose Moneo?

Furthermore, the merchants and the consumers adopt an attitude which currently strongly seems to reject the new instrument of payment (figure 3). Indeed, respectively 60 % and 85 % of the consumers and the merchants said that they don't want to adopt Moneo (at least in the short run) whereas respectively 40 % and 15 % are undecided. Moreover, we notice that there is any favourable answer to adopt Moneo by the two groups.

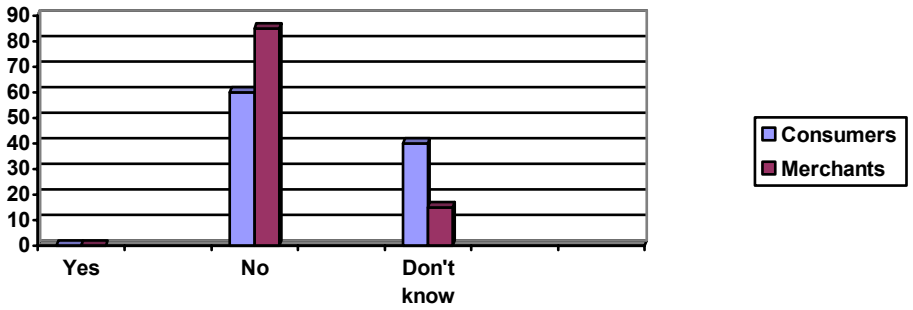

Fig. 3. Do you Think going to choose Moneo?

5.2.2. Adopters Merchants

The highest average scores were obtained by the variables of ease-of-use (2,46 on a range of 7), lack of safety (-1,04 on a range of 4), cost (-2,34 on a range of 8) and visibility (-1,56 on a range of 7). These variables represent all the factors which describe the adoption intent for electronic purse with a predominance of the variables relating to the technological factor.

First, at the technological factor level, the variable of ease-of-use shows that the degree of product simplicity plays a positive role in the adoption of Moneo. This suggests that the use of the product was clear and comprehensible. Consequently, it does not constitute an impediment for the diffusion of the product among merchants. The variable relating to 'lack of safety' is favourably evaluated to adopt Moneo insofar as the answers affirm that the system does not let appear major failures when transactions are made. In addition, the variable relating to 'compatibility' indicate a score almost zero (0,02) showing that merchants are well endowed for the level of compatibility, offered by Moneo, compared to their activity or work habits. Such attitude shows that this variable can influence negatively the adoption of Moneo. For that reason, a substantial effort must be made, at the technological factor level, to ensure the adoption of the new product particularly for the variable related to compatibility.

Second, at the economic factor level, the average score of the variable relating to 'costs' shows that the majority of merchants assess that the costs are too expensive both for the setting up

Moneo system and for the commissions charged for each transaction. This constitutes a major obstacle in the adoption of Moneo. Moreover, the variable relating to 'relative advantage' reflects a negative trend to adopt Moneo insofar as the average of the scores indicate a negative value showing that the new product does not bring a relative advantage in its use compared to the other instrument of payment, in particular the currency.

Third, at the social factor level, the variable of 'visibility' receives a negative quite important value showing that Moneo is not widespread in the studied cities. Moreover, merchants did not seem to be rather satisfied carrying out their small sales with the Moneo system. 'Expectation' received a relatively favourable evaluation with an average score of 0,52 indicating that merchants are well endowed for the degree of Expectation. Concerning, the rest of variables (anonymity and image) relating to the social factor, it seems that they do not considerably influence the adoption of Moneo although the merchants are enough divided for the variable of 'anonymity'[4]. The score obtained by 'anonymity' was 0,04 whereas the variable 'image' has received a score of -0,62 showing that the use of Moneo does not seem to improve the image of merchants and to really influence the adoption process.

This tendency seems to be roughly confirmed through the regressions carried out on the whole variables. Figure 4 summarizes estimated independent variables related to Moneo adoption intent. It shows three significant values, all of them are associated with the technological factor and are strongly influenced the decision to adopt Moneo. These values are related to ease-of-use, compatibility and lack of safety. The highest correlation coefficient was obtained for the relationship between 'adoption' and 'lack of safety' (r = 0.29). ease of use (r = 0.27) and compatibility (r = 0.25) also exhibited a significant and positive relationship with 'adoption'. Merchants look for a system ease-of-use, compatible with others existing payment system and safe. The other variables did not have meaningful links with the decision to adopt the innovation.

Table 2: Estimations and some descriptive statistics

	Bêta		**P level**		**Mean**		**Range**	
	M	**C**	**M**	**C**	**M**	**C**	**M**	**C**
Ease-of-use	**0,27**	**0,62**	0,08	0,006	2,46	3,62	7	2
Compatibility	**0,25**	**0,35**	0,08	0,09	0,02	2,84	4	5
Security	0,02	**0,39**	0,90	0,02	0,92	1,40	4	2
Lack of safety	**-0,29**	-0,10	0,05	0,57	-1,04	-0,96	4	4
Cost	-0,17	**-0,88**	0,22	0,00	-2,34	-0,52	8	4
Relative Advantage	0,06	0,15	0,71	0,57	-3,5	3,1	14	15
Anonymity	-0,17	-0,01	0,27	0,94	0,04	1,48	4	4
Visibility	-0,13	**0,43**	0,35	0,04	-1,56	-0,64	7	4
Expectation	0,07	-0,00	0,62	0,99	0,52	1,68	4	4
Image	0,002	**-0,45**	0,99	0,04	-0,62	0,16	4	4

Variables significantly different from zero are in boldface.

We stress that the R^2 value is relatively high indicating that the model may have considerable utility in assessing adoption intention for the new innovations. Table 2 summarizes the regression of the variable 'adoption' and highlights the level of the plus value '*P*' showing, at the significance level $\alpha < 0,05$, only three variables which are statistically acceptable (the variables are those mentioned above: ease-of-use, compatibility and lack of safety).

[4] This variable is more related to the cardholder adoption process rather than to the adopters merchants one.

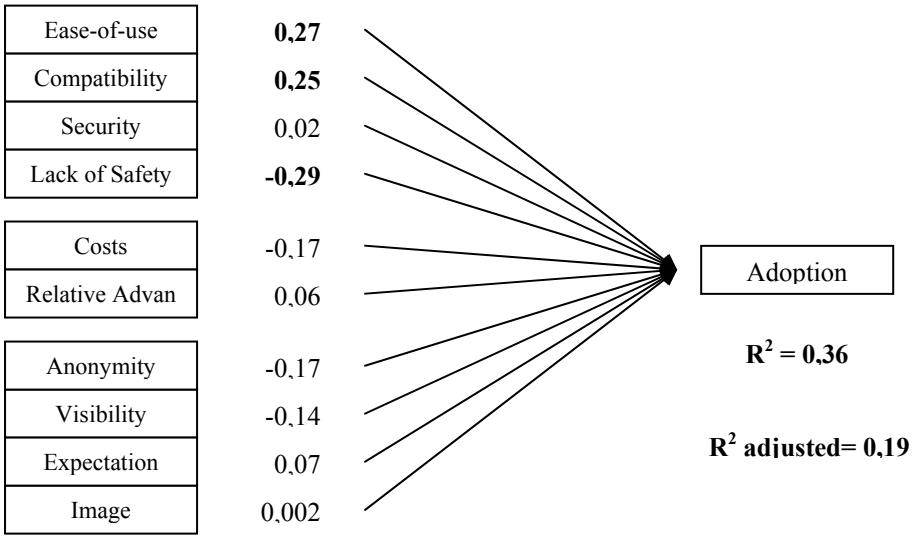

Fig. 4: Diffusion and adoption model of Moneo (for merchants)

Table 3 indicates that all variables have a significant correlation, except for variables as lack of safety, visibility and expectation which do not have a significant correlation with other variables. This suggests that these variables are an essential construct to study and assess the intention to adopt Moneo.

Table 3: Correlation among constructs

	Ease of	Compatibi	Security	L of sa	Cost	RA	Anonym	Visibility	Expectat	Image
Ease of u	1									
Compati	-0,03	1,00								
Security	**-0,23**	**0,21**	1,00							
Lack of s	-0,03	-0,02	**0,29**	1,00						
Cost	-0,05	0,02	-0,12	0,07	1,00					
RA	-0,08	-0,10	-0,10	0,11	**0,22**	1,00				
Anonym	**0,34**	**-0,20**	-0,14	0,05	-0,03	**-0,21**	1,00			
Visibility	**-0,28**	0,18	-0,01	-0,14	0,07	**-0,21**	**-0,25**	1,00		
Expecta	-0,15	-0,13	0,09	0,05	-0,08	**-0,23**	**-0,23**	0,16	1,00	
Image	-0,18	-0,07	-0,06	0,12	-0,002	**-0,34**	0,03	0,15	-0,09	1,00

For significance level α = 0,05

5.2.3. Cardholders

Table 2 indicates that the highest average scores were obtained by ease of use (3,62 on a range of 2), compatibility (2,84 on a range of 5), security (1,40 on a range of 2), anonymity (1,48 on a range of 4) and expectation (1,68 on a range of 4). These variables belong to the basket representing both the technological and the social factor. Hence, these variables constitute elements which play a significant positive role to adopt Moneo. However, variables as cost and relative advantage which related to the economic factor indicate average scores, respectively of - 0,52 on an range of 4 and 3,1 on an range of 15, showing that consumers are enough endowed. This proves that the economic factor plays a central role and greatly influences the decisions to adopt Moneo.

Furthermore, the results of estimated coefficients yielded several insights that confirm previous finding and shed light on the future of the adoption Moneo process (figure 5). Indeed, all factors (economic, technological and social) shows a significant correlation. Some have negative correlations and others have positive ones.

First, at the technological factor level, two variables indicate acceptable estimated value with significance level of 5 %. The former is compatibility. It shows a positive correlation for the Moneo adoption process. This is confirmed, where the majority of the answers express that the use of Moneo is compatible with their small purchases. The later is security. It illustrates a positive correlation for the Moneo adoption indicating that more the product is secure more important and easier its adoption will become.
Second, at the economic factor level, the cost illustrates a negative correlation showing that it plays critical role in the process of adoption of Moneo. Cardholders estimate that the Moneo services is quite costly and therefore negatively influence its adoption.
Finally, at the social factor level, the variable of 'visibility' and 'Image' have respectively a positive and negative significant correlations. The visibility indicates that the product is seldom seen among people and trades, which suggests that the degree of social influence is weak. Therefore, the adoption of Moneo is positively correlated to the extent to which it is perceived to be widely diffused in the pilot area. However, the variable of 'Image' show that the image of Moneo seems to slow down its adoption. Moneo has not a "good image".

We stress that the R^2 value is quite high indicating that the model may have considerable utility in assessing adoption intention for the new innovations. Table 3 summarizes the regression of the variable 'adoption' and highlights the level of the plus value p showing, at the path significance level $\alpha < 0,05$, only five variables which are statistically acceptable (ease of use, compatibility, security, costs, visibility and image).

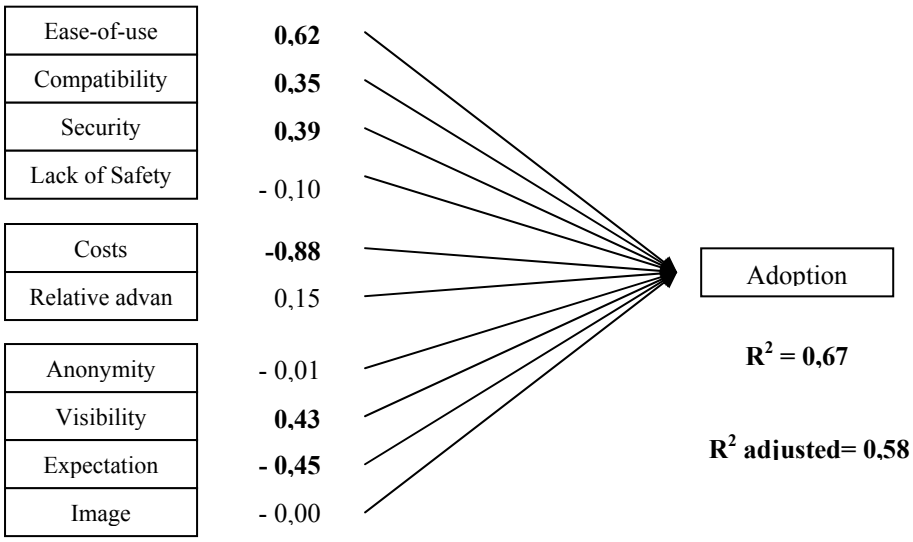

Fig.5: Diffusion and adoption model of Moneo (for cardholders)

Table 4 indicates that all the variables have a significant correlation among constructs describing the process of adoption of Moneo. These correlations show, on the one hand, a negative significance particularly for variables like complexity, security and safety and on the other hand a positive significance particularly for variables like relative advantage, anonymity, visibility and satisfaction. This suggests that overall variables seem to not play a considerable role in the intention of Moneo adoption.

Table 4 : Correlation among constructs

	Ease of	Compatibi	Security	L of sa	Cost	RA	Anonym	Visibility	Expectat	Image
Ease of u	1									
Compati	**0,62**	1,00								
Security	**-0,22**	**0,34**	1,00							
Lack of s	0,16	-0,01	**0,31**	1,00						
Cost	0,03	-0,05	**-0,21**	**-0,33**	1,00					
RA	**-0,29**	**-0,18**	**-0,55**	**-0,46**	0,23	1,00				
Anonym	-0,03	-0,18	**-0,22**	**0,42**	**-0,40**	**0,27**	1,00			
Visibility	***-0,47***	0,24	**-0,33**	**-0,37**	-0,003	**0,63**	**0,37**	1,00		
Expectat	**-0,45**	0,09	**-0,21**	**-0,21**	0,09	**0,18**	0,17	**0,52**	1,00	
Image	**-0,50**	**0,43**	-0,08	**-0,25**	**0,54**	**0,48**	-0,05	**0,53**	**0,29**	1,00

For significance level α = 0,05

5.2.4. Network externalities, social influence and competition effects

Networks externalities effects must play an important role in the adoption and the diffusion of Moneo. They constitute an endogenous factors in the phenomenon of diffusion of innovation. This is related to the installed base of merchants and consumers who have adopted the product. So we must reach an adoption rate which allows a takeoff or a massive adoption of Moneo: it is the critical mass. Admittedly the measurement of this rate is not the object of this study but the majority of people questioned affirm that the adoption of Moneo depends on its adoption both by merchants and consumers. Furthermore, we estimate that this prospect is important insofar as the product is an interactive good. Its adoption depends simultaneously of the two sides (consumers and merchants). The results indicate that 98% of people think that the product did not yet reach the critical mass.

In addition, the individual decisions making to adopt electronic purse seem to be influenced by the use of Moneo in other areas. But, it is difficult to provide an exact answer for such geographic proximity role because at this stage we don't know the degree of Moneo adoption success in the other areas of France. The results indicates respectively that 58% and 67% for cardholder and merchants estimate that the use of Moneo in other area has influenced their decision to adopt it. While, 15 % and 9% affirmed don't be influenced by the use of Moneo in other area. The rest answers was don't know (Figure 6).

Furthermore, regarding 'competition effect', the results show that 50 % of the merchants estimate that the adoption or the introduction of Moneo does not constitute a way to draw an advantage to face competition. Moreover, results underline that 90 % of merchants think that the non use of Moneo does not make them lose customers for the profit of their competitors. Whereas 36 % among them estimate that they can faithful customers carrying Moneo. Therefore, the reaction is enough shared what implies that this variable can have relatively an endogenous effect in the adoption of Moneo.

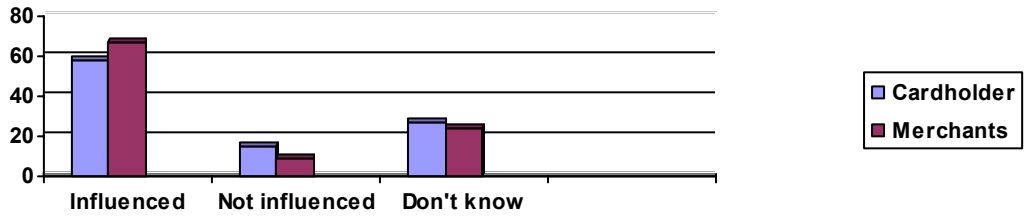

Fig. 6. Have you been influenced by other area(s) already introduced Moneo?

6. Discussion and limitations

The study described in this paper look at the process of adoption and diffusion of Moneo in the area of Aix-Marseille. Both merchants and customers have shown a marked reluctance to embrace the concept and many banks express serious doubts about the solidity of the business case for the purse product. Is this a temporary situation, which reflect the normal and understandable resistance to technological innovation? Or, are there are some more fundamental problems with current concepts and approaches. The outcomes deal with three main processes that we estimate playing a central role for a successful diffusion of this payment innovation. These process illustrates endogenous and exogenous variables and have a close link between the world of development, production and marketing of the new product. Hence, the analysis of these process highlighted the following interpretations:

For the two endogenous process, it seems difficult to us to propose an exact conclusion about the network externalities effects to adopt Moneo. However, the adopters of the products estimate that the adoption and the diffusion of Moneo depend simultaneously on its adoption by the merchants and the consumers, especially that the product is an interactive innovation. This characteristic makes its process of adoption slower than that of a noninteractive innovation [11]. We underline that if network externalities are present, the larger the network producing the network good, the larger willingness to adopt it will elicit from consumers and thus the higher prices the network will be able to extract. Moreover, social influence seems to play a positive role in the adoption of Moneo at least for merchants and consumers already adopted Moneo. Finally, competition effects seems do not play a major role in the adoption of Moneo. Answers are enough shared.

For exogenous process, the factors related to provide the following interpretations. First, at the technological factor level, this study reveals that compatibility influences negatively the adoption of the product for merchants insofar as the mainstream of the participating merchants thinks that the idea of the electronic purse was well appropriate for their activities whereas actually they are faced with a technical problem which is not completely adequate with their work habits (for example the bakers and the tobaccos say that the use of Moneo make them waste more time than during a cash payment. Indeed, when the reader is not directly connected to the cash-box, this cause a problem; i.e. that the merchant need to type the price both on the reader and on the cash-box). However, the use of the system remains easy and comprehensible, as a consequence the variable of ease-of-use has a positive relationship with the merchant' intention to adopt Moneo. The safety seems to have a positive effect for the adoption of the product, indeed the majority of the participating merchants estimate that the system did not know major failures. Admittedly, some failures were recorded but they don't directly affect the Moneo adoption process.
For the consumers, ease-of-use, compatibility and security constitute the main variables which seem to influence the decision to adopt the product among technological factors. Thus, the consumers don't only look for a product easy to understand and use, compatible with purchase but also especially secure.

Second, at the economic factor level, the two selected variables do not illustrate significant values for the merchant case. While with descriptive statistics this factor mainly influences the decisions to adopt Moneo. Indeed, merchants are reserved with the adoption of Moneo because it is too costly. They point out that the commissions fixed on each transaction are unacceptable especially that they carry out small sales and that the adoption of the product by the consumers did not yet reach a critical mass threshold.

Moreover, the consumers clear the same reasons concerning the costs problem which strongly influence and might or not facilitating the adoption process of such innovation. The highest regression coefficient come out with cost (r = - 0,88). Likewise, relative advantage indicates that, currently, merchants perceive any relative advantage to adopt Moneo. The majority of the answers relating to this variable draw a negative attitude. Therefore, we think that these two variables can lead to greatly improve the likelihood of adoption of Moneo among the potential adopters merchants.

Third, at the social factor level, the descriptive data show that visibility can constitute an important factor to adopt Moneo by the merchants and the consumers if the product is widely perceived in the tested area. Moreover, the results indicate a significant estimation for visibility in the consumers case (r = 0,43). At this time, the product is seldom perceived. Moreover, the degree of expectation shows that the merchants are not satisfied with the Moneo system. For that, the banking association which undertakes with the setting up of the system must revise its marketing policy in order to improve and cure this dissatisfaction. In addition, if we take account the previous interpretations, this policy is closely dependent to economic and technological factors. However, Moneo seems to satisfy the expectation for cardholders, particularly old people, while it is still limited to some trades.

Fourth, both non-cardholders consumers and non-adopters merchants rather show a very pessimistic outlook about their intention to adopt Moneo. The role of the economic factor, cost and relative advantage, seems to constitute the main obstacles for the Moneo adoption process in the area of Aix-Marseille.

The above results seem to converge with the real situation. Although more than 300 million euros was invested by the banks in a direct and indirect way in the system, Moneo does not taking off truly. According to BMS (Billetique Monetique Service) data, 1,2 million of Moneo cards are currently in circulation in France, against 45 million of traditional bank cards (debit and credit cards). The annual number of transactions generated by Moneo is similar to those carried out in one day by the bank cards. Indeed, merchants in the Aix-Marseille area found that the number of transaction made by Moneo is few (an average 4 per week). Conscious about these disastrous difficulties, the banks (BNP Paribas, Société Générale, Credit Agricole, etc.) and the other shareholders of BMS (such as RATP, SNCF, France Telecom) are unanimously agreed to work together in order to revive the card. The idea is to reduce or limit the development objectives, by giving the priority to the partnerships which function.

The trial highlighted also the major role played by the economic factors particularly those related to costs. In fact, the high level of the transaction costs, spreading out from 0.2 to 0.9 euro, had caused the anger of the small retailers brought together within the Commercial Council of France (CCF), as an example, 0,9 euro of commission corresponds to 20 or 25 % of margin on a newspaper, a stamp or a package of cigarettes. A quarter of the margins would be cut down per year whereas the currency does not support cost. In addition to this expenditure we add installation and operational expenses: 100 to 120 euros per terminal, plus 15 euros of location per month. Merchant must adapt their traditional smart card terminal or reader with the new payment device that entails other expenditures. The presence of competing and incompatible systems may hindered the attractiveness of the electronic purse to both consumers and retailers [22]. This substantial costs related to the new card reading terminals or to the retrofit of existing terminals has been among major factor holding back the implementation of the electronic purse innovation. Noted that merchants have faced some

technical problems related to this new devices (mentioned already above) which caused a sling attitude from some merchants.

Furthermore, the banks do not plan to transfer a commission to merchants when a consumer reloads his Moneo card in their shop (directly since the merchants' terminals). Yet, the CCF points out that the "time" to pay a transaction will even increase. Many operations will be made and cause a certain number of times: the transaction time, the time of calling the payment terminal towards the bank, the time to choice between Electronic purse payment or credit/debit card payment and the time for an express reloading.

All these reasons have created a pessimist environment to adopt the innovation. Several retailers grouping (such as La Confédération Nationale de la Boulangerie-Patesserie Française et La Confédération des Débitants de Tabac de France et La Fédération du Commerce et de la Distribution), who gather 25 million daily customers, have decided to boycott Moneo as long as the three following requirements will not be satisfied:
- Suppress the current two thresholds of payment (10 and 30 euros): merchants must determine the level of the threshold freely, as it is the case today for the bank card.
- Suppress the express reloading at retailers' terminal.
- Set up a strict security procedures: the risks of fraud and the absence of evidence are likely to start the customers trust.

Finally, we stress that this study yielded several insights that confirm that the introduction of Moneo in the area of Aix-Marseille meets some difficulties and seems to converge towards a failure if an promotional and marketing efforts is not made particularly by the banks in order to reach at first stage the critical mass. Like other payment system, the market for electronic purse involve the creation of networks between the issuers of services and their customers. The involvement of banks may be necessary for the further diffusion of electronic purse. They are 'lead users' [26] of the technology and in this respect provide an effective 'need forecasting' mechanism. With a greater marketing push, customers and merchants will come to see more clearly the advantages of the electronic purse and will begin to use it more intensively. They must also focus on the economic factor and revise their pricing policies. However, this is not say that their participation in the industry will guarantee the commercial success of the product. The main obstacle to the proliferation of electronic purse and its commercial viability is mass acceptance. The factors that may contribute to ensuring or speeding up the widespread acceptability of this payment technology are: a catalyst application may be required as an impetus to usage. This be could anything from a transport application to the adoption of the technology by a mass market retailer. Electronic purse must be multifunctional, combining systems that can be used in both the real and electronic worlds [18]. There also is need for government to set the ground rules. This of course, would require organisations of co-operation in order to set standards and specifications. The lack of commonly accepted international technical standards for smart cards and particularly for electronic purse constitute one major barrier to its development and diffusion. An increase in collaboration may be one of the main factors leading to the widespread acceptance of the electronic purse (for example creating a multi-application product, however, the problems with multi-application smart cards are that they are too costly for mass issuance and require an heterogenic terminal which implies multiple implementations of a same application). Because of the high cost of the back-end infrastructure necessary for smart cards, organizations must form partnerships in order to help launch projects. In addition, the suppliers of the product must enhance their system at technological level. They can be interested in the other successful electronic purse projects that have already taking place in

other countries (for example the Proton[5] project in Belgium). Indeed, evaluation of the technical factors generally indicates that the technology works. However to ensure adoption, the merchants indicated that the technology must bring them benefits. The benefits of electronic purse for the retailer were regarded as a less contentious matter. Most players agreed that electronic purse will allow retailers to increase the security of their operations by lowering the amount of cash they have to handle. It may also be a cost-saving measure, as it could greatly reduce leakage and errors in counting [19]. But, interviewed merchants point out that the perceived advantage of a decrease in cash-handling varies depending on the size and market presence of the retailer. For smaller retailers, the cash flow at the end of the day makes up a large part of their business incentive, yet, they prefer cash for reasons of accounting and fiscal flexibility, whereas for the larger retailers, cash-handling is simply costly and cumbersome. In addition, the speed of check-out is also a benefit as it can lead to greater convenience and turn-over as well as increased customer satisfaction. Thus, larger distribution networks and chains are less vulnerable than the independent and small merchants to easily support the commissions costs and consequently to adopt the Moneo system.

However, The study carried out shows some limitations. One limitation of this study includes the choice of the variables assigned to each factor. This can emerge criticism. Indeed, other variables can be added and others which are already existing can probably not reflect exactly the specific factor. Another limitation is that the study deal with a project whose main objective is to test the introduction of Moneo into the area of Bouches-du-Rhône. Consequently, an important number already adopters of the system is not commitment for definitive adoption especially when it benefits from some advantage particularly related to costs (for example free setting up Moneo system). Finally, the examination of the critical mass associated to network externalities effects seems to be neglected. Admittedly, here our objective is not to compute the threshold of the critical mass but rather to show the importance of this variable as an endogenous factor required to the adoption and the diffusion of Moneo.

7. Conclusion and future research

In this present work, we have examined the process of adoption of the Moneo electronic purse in the Aix-Marseille area following the launch of a new payment 'smart card' program by banks. The new card was designed to maintain compatibility among the existing smart card reader devices and could be integrated with the bank card. This denotes the specific situation for the electronic payment system using smart card in France. Such system rests on a remarkable networks integration, integration made possible by a high degree of interbank coordination. In order to understand this adoption phenomenon, we were based on three fundamental underpinnings theories: innovation theory [12, 17], network externalities [6, 9] and social influence [2]. We explore and model the processes and driving forces of the diffusion of Moneo. Our analysis suggests that Moneo adoption was influenced by a combination of both endogenous and exogenous factors. The present study attempts to add significantly to the body of diffusion of innovation theory by drawing a model which can be an archetype for other new smart card payment products.

[5] The Proton scheme is the most successful international electronic purse standard, more than 30 million such card have been issued in 15 countries world-wide. The Proton specification are now administered by a profit-making company called Proton World International whose members include Visa, American Express, ERG, Banksys and Interpay.

The results of this analysis revealed tow essential points related to the exogenous process. First, according to the estimated results, the technological factor (particularly through variables as ease-of-use, compatibility and safety) influences more significantly the process of adoption than the two other factors for merchants. Whereas compared to the descriptive statistics, the economic factor (in particular the cost) influences largely decisions of adoption among merchants. This suggests that the fundamental dimension that needs to be assessed before a massive diffusion of Moneo is the both technological and economic factor of the innovation. Second, according to the estimated results, the three factors together (particularly through variables as ease-of-use, compatibility, security, cost, visibility and image) play an important role in the Moneo adoption process for consumers. Therefore, the links between the various factors is strong. This view joined Lindley [10]'s works which considers the smart card industry as a sociotechnical system that requires the support of technological infrastructure, organisational (including economic) infrastructure and social acceptance. In other words, if we incorporate the technical, organisational and social considerations as influencing smart card innovation, then the process of innovation can be viewed from within the sociotechnical framework.

In addition, we have found that the adoption of Moneo can be influenced by its introduction in other area both for merchants and consumers however this endogenous variable remain at descriptive level consequently an empirical investigation of the influences on the adoption decision for electronic purse dealing with spatial proximity must be undertaken more deeply[6].

However, the trial project shows that Moneo did not satisfy the majority of these conditions or results which explain the actually failure of the card. Indeed, Moneo was cumbersome, expensive and unifunctional. Yet, some psychological factors including the intra-individual factors (such as the handling of a transaction, costs, attitude to risk) and the inter-individual factors (social trends and social interactivity) [21] influence negatively the adoption card process. While, from the monetary perspective the real problem is that money is a network good and needs a big investment by the promoter to overcome inertia, just as the credit card did. This investment was simply not forthcoming. Therefore the strategy development concerning technical, cost and marketing aspects must be revised. Moreover, co-operation between financial institutions and others players, particularly merchants and networks operators, is strongly required for a successful outcome.

Finally, an interesting element would be to propose an empirical evidence about the effect of the network externalities particularly to achieve critical mass while the product is an interactive innovation. Such network externalities may provide one explanation for the slow growth in the use and the diffusion of electronic purse. Indeed, we must reach an adoption rate which allows a takeoff or a massive adoption of Moneo: it is the critical mass. Admittedly the measurement of this rate will be an interesting prospect for future framework.

Acknowledgements

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[6] Here we take into account the intensity of the inter-individual relations in an inter-regional level joining Steyer and Zimmermann [20]'s work.

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Appendix A

Individual adoption factors

Security
C- What do you think about the security level offered by the Moneo?
M- What do you think about the security level offered by the Moneo system?
Lack of safety
C- Did you meet failures with Moneo during a transaction?
M- Did you meet failures with Moneo system during a transaction with your customers?
Ease-of-use
C- Learning to operate Moneo was easy for you.
M- Learning to operate Moneo system was easy for you.
C- Using Moneo is clear and comprehensible.
M- Using Moneo system is clear and comprehensible.
Compatibility
C- The use of Moneo is compatible with your small amount purchases.
M- The use of Moneo system is compatible with your business activity.
Costs
C- What do you think about the Moneo service price?
M- What do you think about the Moneo system setting cost?
M- What do you think about fees you pay for each transaction using Moneo?
Relative advantage
C- The use of Moneo improves the quality of your transactions with merchants.
M- The use of Moneo system improves the quality of your transactions with consumers.
C- The use of Moneo gives you greater control over your purchasing transactions.
M- The use of Moneo system provides you a control of your accountancy.
C- Does the use of Moneo enable you to make purchases more quickly.
M- Does the use of Moneo system enable you to process payments more quickly.
C- Does the use of Moneo facilitate your low value purchases?
M- Does the use of the Moneo system modify your turnover?
Anonymity
C- With Moneo, you keep your identity preserved.
M- With the Moneo system, you believe that you can keep anonymous the traceability of your customers' transactions.
Visibility
C- In your area, you see many people using Moneo.
M- In your area, you see many merchants using Moneo system.
Expectation
C- Does Moneo satisfy you to carry out your small purchases?
M- Does Moneo system satisfy you to make your small payments?
Image
C- Having Moneo forms part of your standing.
M- Having Moneo system reinforces your company image.
Adoption
C- On average, how much time do you use your Moneo?
M- On average, how much time do you use your Moneo system?

Individual intra-categorical factors

Network externalities
C- The diffusion of Moneo depends on its use by other consumers.
M- The diffusion of Moneo system depends on its use by other merchants.
Social influence
C- Have you been influenced by other area(s) already introduced Moneo?
M- Have you been influenced by other area(s) already introduced Moneo system?
Competition effects
C- Do you think that the use of Moneo system improves your customers loyalty?
M- Does the adoption of Moneo system offer you a competitive advantage in payment compared to your competitors?

Inter-categorical factors

Network externalities
C- The adoption of Moneo depends on its diffusion among the merchants.
M- The adoption of Moneo system depends on its diffusion among the consumers.