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Factors that influence Cyprus merchants to adopt a new contactless e-payment system

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Abstract

The purpose of this study is to identify which factors are more closely linked to the intention of Cyprus merchants to adopt a new contactless card e-payment system. To achieve this, this study has initially examined a number of user acceptance models used in the field of technology and payment systems, at a theoretical and a practical level, and it finally came up with the most significant factors, as suggested by the relevant theory and practice, which influence the intention to adopt a new e-payment product or service.

The framework of this research consists of the research hypotheses and the measurement items. The hypotheses are constructed from the most significant factors (variables), as abovementioned, and are related to the intention of Cyprus merchants to adopt a new e-payment system. The measurement items are used to measure and assess each factor –different items, for each factor- in relation to the influence each factor has on the merchant's intention to adopt the new technology; the measurement items are based on items used in relevant research and practice.

The aforementioned research framework has been applied to the real case of a recently introduced new contactless e-payment system, by JCC in Cyprus. Questionnaires were used to collect data on the factors (variables) of interest from 173 Cyprus merchants who already use e-payment systems, and the data were processed and analysed quantitatively, with the aid of SPSS. The results show that compatibility, social influence and facilitating conditions are the main factors that determine a Cyprus merchant's intention to adopt the new contactless e-payment system. On the other hand, security, relative advantage, and effort expectancy do not significantly influence the merchant's decision for adoption.

Finally, this study recommends that e-payment gateway providers, including JCC, could improve social influence activities, in order to attract merchants and facilitate their decision to adopt. The research outcomes may prove valuable to researchers and practitioners interested in implementing and promoting contactless payment systems.

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Table of Contents

List of Figures

List of Tables

1 Introduction

The rapid growth of information technologies has contributed to the improvement of communication mediums and channels for e-commerce, promoting in this way the introduction of innovative payment instruments and payment protocols to facilitate the completion of business transactions. The market of payment systems is closely related to the developments in information and communication technology (ICT) infrastructure, and so significant improvements have also taken place in the field of payment systems (Choi et al., 2013). Transaction payments may now be made over a wireless interface. Radio frequency technology (RFID) or near field communication technology (NFC) have been used for most contactless payment initiatives. Such technology-enabled credit cards are commonly known as contactless credit cards (Wang, 2008).

Contactless credit cards allow cardholders to tap or wave their cards near a secure reader during checkout instead of swiping them or handing them to a cashier. Cardholders benefit from the increased speed, convenience, and safety. Cardholders do not have to provide a signature for low price transactions, and contactless merchants do not have to provide a receipt for such transactions to cardholders (Wang, 2008). These advantages allow clerks to focus more on other business operations, such as customer service, and preparing orders, instead of dealing with transactions. Therefore, contactless credit cards are very promising to become a popular way of payment (Wang, 2008; Polasik et al., 2013).

However, contactless credit cards still haven't achieved significant rates of adoption in the international market. As Kaminsky (2013) states, cclearly there is more to successfully implementing an NFC-based payment system than simply developing the technology. He mentions that, regardless of the solutions put in the market, NFC will not reach critical mass until 2016-2018. As he states, "even with the significant investments behind NFC, consumers need time to make the change, and merchants need motivation to make the investment". Stafford (2012) also emphasizes the merchants' role in the adoption process by mentioning that "This is not going to be an issue of technology, but rather consumer acceptance and, more importantly, acceptance from vendors and merchants."

According to Ally and Tolleman (2006), a significant challenge for payment system developers is how to obtain critical mass, firstly with the merchants who will install their systems, and secondly with consumers who will make use of them. Many payment systems have failed in the past because of their inability to fulfil the needs of merchants, merchant customers or both, on the one hand, or, on the other, the dominance of existing traditional systems. Thus, in order for a payment system to succeed in the market, payment system engineers need a thorough understanding of their potential users (merchants and consumers) and their needs. They also need to analyse and understand, in a reliable way, both the

process and the factors influencing their decision to adopt, reject or discontinue use of a payment system (Ally and Tolleman, 2006). User acceptance is frequently the central aspect in the research of implementing a new technological innovation, as it determines the success or failure of an information technology product (Thompson et al, 1991; Igbaria, 1993; Davis, 1993). Availability of information technology does not necessarily lead to its acceptance. Most failures of information systems occur from a lack of user acceptance than low quality of the system (Igbaria, 1993; Davis 1993).

Based on (i) the abovementioned research that indicates the necessity to identify and understand the significant factors that influence the decision to adopt a new e-payment system – which in our case is a new contactless smart card introduced to the Cyprus market– , and (ii) on the abovementioned observations that there is globally a low adoption rate of contactless cards, this study is led to endeavor in identifying the factors linked mostly to affecting merchants' adoption of contactless credit cards. The research outcomes may prove valuable to researchers and practitioners interested in implementing and promoting contactless payment systems. Specifically, the study poses the following research question:

(i) Which factors are more closely linked to the intention of Cyprus merchants to adopt the contactless e-payment system? To answer this question, the following hypotheses are made:[1]

H1 Hypothesis 1: **Relative Advantage** affects Cyprus Merchants' intention to adopt the new contactless e-payment system

H2 Hypothesis 2: **Compatibility** affects Cyprus Merchants' intention to adopt the new contactless e-payment system

H3 Hypothesis 3: **Social Influence** affects Cyprus Merchants' intention to adopt the new contactless e-payment system

H4 Hypothesis 4: **Facilitating Conditions** affect Cyprus Merchants' intention to adopt the new contactless e-payment system

H5 Hypothesis 5: **Effort expectancy** affects Cyprus Merchants' intention to adopt the new contactless e-payment system

H6 Hypothesis 6: **Security** affects Cyprus Merchants' intention to adopt the new contactless e-payment system

It is worth mentioning that this study focuses only on merchants, not on consumers. As we will see later in the literature, the majority of the studies on e-payment system adoption, focus only on one of the two entities (merchants or consumers). To our knowledge, only one study takes into account both entities, and its sample included more than 700 respondents (Plouffe et al., 2001a). Also this particular study

[1] The factors and how they were chosen in order to build the hypotheses are explained in detail in chapter two "Literature Review".

showed that the factors that influence merchants' adoption differ in significance from those that influence consumers' adoption. Therefore, based on sample size limitation and the differentiation of each entity, we focused only on merchants, and this choice was made because, as already discussed in the introduction, merchants' role has been considered as more significant in the acceptance of a contactless e-payment system.

The remainder of this study is structured as follows: chapter two reviews the existing literature and practice on adoption models in the field of e-payments; chapter three describes the research methodology for data collection and analysis, and it also presents the results, all processed in SPSS; chapter four discusses the results in relation to the research question and the hypotheses of this study, as well as to the existing literature and practice. Finally, this study closes with conclusions and recommendations.

2 Literature Review

The literature review will explore theoretical models, on the one hand, and empirical studies and their results, on the other, in order to examine and identify the factors that influence the adoption of new technologies, with emphasis on e-payment systems. Based on the literature review, the evaluation framework will be constructed, composed of the factors that influence the adoption of new e-payment systems, and the measures to assess each factor; this framework will be subsequently used for data collection and answering the hypotheses of this research.

A number of theoretical models embedding the factors for the adoption of new technologies have been introduced during the recent years. Before examining the most popular and applied ones in the field of e-payment systems, an explanation is given below of what e-payment and contactless payment systems are, with specific reference to the context of Cyprus.

2.1 Electronic payment systems and contactless payment cards

Shon and Swatman (1998) fdefine e-payment as any exchange of funds initiated via an electronic communication channel; a typical exchange relationship involves the transfer of goods or services between a set of sellers and buyers (Plouffe et al. 2001a); Gans and Scheelings (1999) who define e-payment as payments made through electronic signals linked directly to deposit or credit accounts. According to Hord (2005), e-payment is any kind of non-cash payment that does not involve a paper cheque. Finally, Sumanjeet (2006) defines e-payment as the transfer of an electronic value of payment from a payer to payee through an e-payment mechanism, executed through an electronic network.
This payment mechanism differs between normal credit/debit cards and contactless payment cards as shown in the figures 2.1 and 2.2 below:

Process

1. The merchant inputs the transaction value into the POS terminal. The card is passed by the customer to the merchant.
2. The merchant inserts the card into the terminal.
3. The customer enters the PIN number.
4. Waiting for bank's confirmation.
5. The merchant returns the card and passes the purchased goods with a receipt to the customer.

Payment's characteristics:

- Duration about 25 sec.
- Four-digit PIN authorisation.
- Large and medium stores and businesses.

Figure 2-1. Debit Card in Contact Technology: Stages of the Payment Process (Source: Polasik et al., 2012)

Process

1. The merchant inputs the transaction value into the POS terminal.
2. The customer waves the card in front of a special card-reader - and thereby completes the transaction.
3. The merchant passes the purchased goods with a receipt to the customer.

Payment's characteristics:

- Duration about 12 sec.
- No authorisation needed.
- Selected large and medium stores and businesses, public transportation, parking meters.

Figure 2-2. Contactless Card: Stages of the Payment Process (Source: Polasik et al., 2012)

According to Polasik et al. (2012), there are several benefits for both consumers and merchants from the use of contactless card payment systems: unlike debit cards, there is no need to input a PIN nor to

pass the card to a vendor, making, so, the payment process faster. Keeping the card to the consumer's side has other advantages, such as the lower probability of the card being 'skimmed'.
For merchants, some of the advantages are the same as for consumers. As transactions take place much faster, this leads to reduced queuing, therefore helping improve customer satisfaction. Improved handling of queues also contributes to bigger throughput and better staff productivity. According to Borzekowski and Kiser (2008) the reduced checkout time due to the use of contactless cards could result in cost savings near $0.03 per transaction. Polasik et al. (2012) emphasize that if a large number of stores adopts the contactless technology, and consumers follow too, then merchants who fail to offer this technology will certainly be "punished", because customers will move to other stores. As a downside for merchants, it could be the cost of purchasing a card reader to be added to an existing payment terminal. As we will see in the next sections, cost is not a significant factor for the merchants' intention to adopt a new payment system, especially if the new system will give them a relative advantage and will be compatible with their everyday current tasks.

In their empirical study in countries with the highest use of contactless cards, First Data (2011) reported that while contactless cards have been available for several years in the countries analyzed, less than 12 percent of consumers surveyed have a contactless card. Almost 15 percent of Australians, 14 percent of Polish consumers and 12 percent of Germans have a contactless card. Contactless card owners are less than 10 percent in the Middle East and lowest in the U.K./Ireland, where just 7 percent of consumers own one. Of consumers who have a contactless card, three-fifths have used it, with the primary reasons for doing so being for faster checkout and for the novelty of trying something new. Consumers who have used a contactless card usually like it, with 85 percent saying that it is now their preferred method of payment.

First Data (2011) investigates the question "why although there is a highly stated preference among users in the abovementioned countries, contactless cards aren't more widely used around the globe?" The answer, according to First Data, lies on lack of clear understanding about the benefits of contactless cards: more than 1 in 5 consumers –this information is linked to merchants as will be illustrated in this paragraph– don't see any benefits from using them. Additionally, security seems to be an issue. More than half of consumers have security concerns about the use of such a card: half are afraid of the card being lost or stolen and 41% worry about being charged more than once. The ball, nevertheless, is on the merchant's foot; according to the same study, seventy percent of consumers would consider contactless, once it is accepted by at least 4 in 10 merchants. However, equally limiting is the lack of merchant acceptance of contactless payments.

This study tries to identify the most significant factors that would influence Cyprus merchants' intention to adopt the JCC contactless payment card in Cyprus which belongs to the countries with very limited use of contactless payments cards (it is currently used only on a pilot basis in a few stores). According to the JCCs web site,

> *"JCC contactless is a new method of payment with cards offered now by JCC. The card does not physically need to make contact with the reader. A card featuring contactless technology can simply be held to the reader to pay, rather than inserting a card into the terminal and entering a PIN. Contactless cards are secured by the same advanced technology that underpins chip and PIN."*

Although there is always a frequent resistance in accepting new ways of conducting financial transactions, due to a number of factors, such as security and task complexity (Davis, 1993), Cypriot consumers, such as EU consumers, are very well familiar with the use of debit/credit cards (European Central Bank, 2013). So even if the contactless smart card is a new product for them, it would be easier for them to accept it than how it would be in 2000 where the use of credit and debit cards in Europe was much lowest than today (figure 2.3). This is a good motivation for merchants and banks to start introducing the contactless card in the market. It is also evident that the financial and bank crisis in Cyprus almost did not affect the number of credit/debit cards in Cyprus (source: (Foerster, 2014).

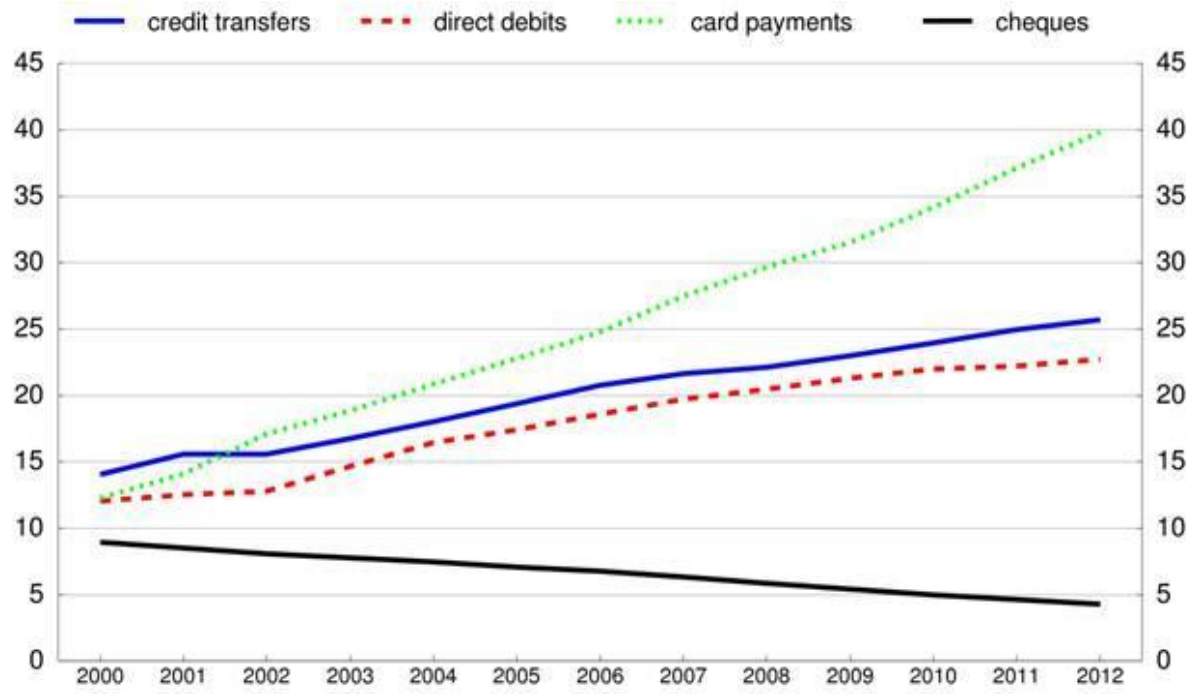

Figure 2-3. Use of the main payment instruments in the EU (2000-2012) - (number of transactions per year in billions, estimated) (Source: European Central Bank, 2013)

2.2 Factors influencing e-payment

A number of models and theories have been proposed and empirically applied using factors that influence adoption of new technologies. The three most widely used models –based on the literature references and empirical studies, as will be discussed in this chapter– are PCI (Perceived Characteristics of Innovation), UTAUT (Unified Theory of Acceptance and Use of Technology) and TAM (Technology Acceptance Model). However, the former two, which are more recent, have been proven more suitable for e-payment systems contrary to TAM (Plouffe et al., 2001a; Ozkan et al., 2010); that is why they have been applied to the most and more recent empirical studies for investigating factors that influence the intention to adopt e-payment systems, as we will see in the following sections. Therefore based on the theoretical aspects and practical results of PCI and UTAUT, as well as on previous research for each factor's significance on influencing adoption, this study has formed its research framework. This framework includes the six hypotheses -already mentioned in Introduction- pertaining to the six factors/variables to be investigated for their significance in the Cyprus merchant's intention to adopt a new e-payment system, as well as the measurements items of each factor, as will be seen in the Methodology chapter.

Below the three adoption models are discussed in relation to the factors, especially the six selected ones.

2.2.1 Perceived characteristics of innovation (PCI)

2.2.1.1 Theoretical background - PCI

The characteristics of an innovation, as perceived by potential adopters, are fundamental to the adoption model. The PCI model derived from the Diffusion of Innovation Theory postulated by Rogers (1995) which suggested that the characteristics of an innovation will help to persuade potential adopters to embrace or reject an innovation. Specifically, he proposed that five constructs could be essential factors in influencing the adoption decision. These are 1) relative advantage, 2) compatibility, 3) complexity, 4) trialability, and 5) observability.

An increasing body of research has demonstrated that it is the perceived attributes of an innovation itself rather than the characteristics of the adopters that are the stronger predictors of the adoption decision (Ally and Mark, 2004). Ostlund (1974) supported this statement a long time before by arguing that the perceptions of an innovation by possible future adopters can be more effective predictors of innovativeness than personal characteristic variables. Also, Labay and Kinnear (1981) concluded that perceptions of innovations provided better predictions of innovativeness than demographic variables.

Based on Rogers' work (Roger, 1995), Moore and Benbasat (1991), expanded the innovation characteristics into seven constructs, and developed an instrument, known as the Perceived

Characteristics of Innovating (PCI), to measure the perceptions (figure 2.4). These constructs are relative advantage, ease of use, compatibility, image, result demonstrability, visibility, and trialability. The first four are taken into account for this study, since they are the ones proved as the most significant in the literature and practice, as will be illustrated below. The last 3, beyond their smaller significance, also do not have any applicability to this study – this will be explained below– and so only a brief reference will be made to them. Additionally, in the sections on the empirical investigation of PCI and the discussion on the UTAUT model, the different factors/constructs will be inter-compared and evaluated, in order to conlcude with the final ones, to be used in this study.

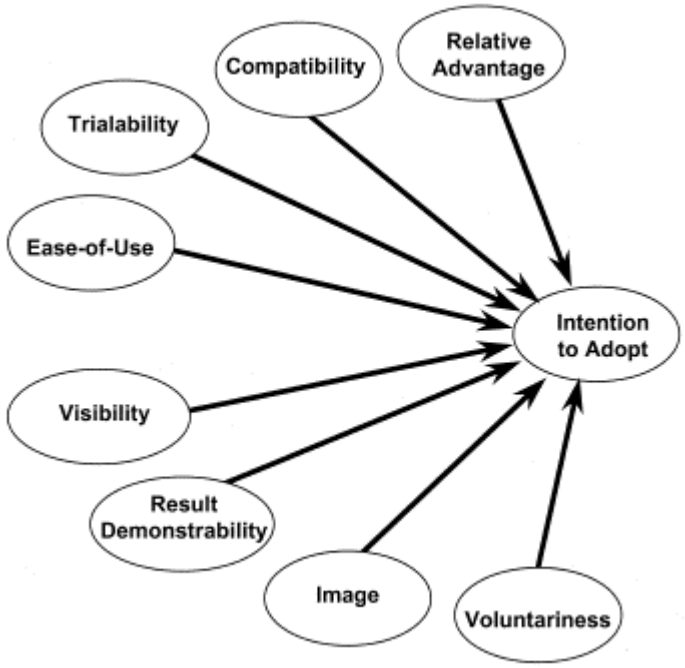

Figure 2-4. Intention to adopt using PCI (Source: Moore and Benbasat, 1991)

Relative advantage represents the degree to which an innovation is perceived to be superior to current offerings. It presents the degree to which a potential adopter considers the innovation as providing an advantage over previous ways of performing the same task. This construct is employed as originally proposed by Rogers (Plouffe et al, 2001a, Moore and Benbasat, 1991). Literature in Information Technology diffusion highlights the significance of relative advantage and places it as an enabler of adoption of an innovation. Specifically, Rogers (1995) states that the higher the perceived relative advantage, the quicker the adoption will take place. Greenhalgh et al. (2004), on the same direction, suggest that relative advantage is an essential condition for adoption, in that potential adopters are impossible to evaluate the innovation further if relative advantage is absent. However, they go beyond this by suggesting that the presence only of relative advantage is not always enough to motivate adoption. Section 2.2.3.1 will add more on relative advantage.

Compatibility represents the degree to which a potential adopter believes that an innovation complies with the adopter's existing preferences and habits. This construct is in consistency with Rogers idea about compatibility, that is, the extent to which an innovation is perceived as being consistent with the current needs, values, and past experiences of potential adopters (Plouffe et al., 2001a, Moore and Benbasat, 1991).

A third construct, that is, **ease of use** is similar to Rogers' concept of complexity, and captures the degree to which a potential adopter considers the use of the target system to be free of effort, that is, how much difficult it is perceived to use the innovation (Moore and Benbasat, 1991). Section 2.2.3.1 will add more on ease of use under the title "effort expectancy".

Tornatzky and Klein (1982) carried out a meta-research of seventy-five publications about perceived attributes and rate of adoption. Relative advantage and compatibility were usually, but not always consistently, related to rate of adoption in a positive direction, and complexity was negatively related to rate of adoption (as expected – this means that "ease of use" or "effort expectancy" are positively related). According to Lemuria and Belanger (2005), perceived relative advantage, perceived image, and perceived compatibility are significant elements of adoption. It is suggested that relative advantage, compatibility, and ease of use are the most relevant constructs to adoption decision. Following this, Kent et al (2004) argued that the use of an innovation increases to the extent that customers perceive it as useful. The perceived usefulness is critical, because it determines if the perceived ease of use will lead to increased use of the service or product and the level of market penetration.

A fourth construct in the PCI measurement instrument is **image** (Moore and Benbasat, 1991). Image represents the degree to which individuals believe that an innovation will improve their social status or prestige in their relevant community. The general idea is that increased prestige increases the acceptance of new technologies (Venkatesh and Brown, 2001). Ram and Sheth (1989) support this idea by stating that a negative image for a new technology (for example, disapproval of it by the relevant community) can be an important reason to reject it. Image is embedded in the relative advantage construct of Rogers. However, Moore and Benbasat (1991, in Plouffe et al., 2001) argue for the inclusion of image in the PCI model as a separate construct, because a number of researchers have demonstrated or argued that the social approval associated with the adoption of an innovation is important and distinct from other constructs, namely the relative advantage. It is one of the interesting results of our study that image or social influence (as called in the UTAUT model) was interpreted in a way that it was linked directly with the relative advantage construct. Section 2.2.3.1 will add more on *image* under the title "social influence".

Trialability represents the degree to which an innovation may be experiment with before adoption (Moore and Benbasat, 1991) or, similarly, the degree to which a potential adopter believes that the innovation can be adequately tried prior to the adoption decision (Plouffe et al, 2001a). In this study, a demonstration, including a small trial of the contactless card system was provided to the merchants, so it would be not meaningful to include this factor-variable. Trialability is also identified as a low-significance factor, as we will see in 2.2.1.2.

Furthermore, Rogers' construct of **observability** is divided into two constructs, these are, result demonstrability and visibility. Visibility is the extent to which an innovation is perceived to be widely diffused/visible in the relevant adoption context, while result demonstrability captures the degree to which the unique features and benefits of an innovation are readily recognised by the potential adopter (Plouffe et al, 2001a). Visibility is not applicable into our case, because the contactless smart card is a very new product, so nobody uses it yet (it is just used on a pilot basis) and so it is not visible to the majority of users. Demonstrability was identified as a low-significance factor for merchants intention to adopt, as we will see in 2.2.1.2.

Finally, **voluntariness** corresponds to the extent to which the use of an innovation is perceived as being voluntary or of free will (Moore and Benbasat, 1991). Moore and Benbasat argue that because innovations are sometimes enforced on individuals in organizations with information systems, the perceived voluntariness associated with adoption might be an important predictor of adoption intentions. In our case, from a preliminary contact with merchants, they noted that they would be willing to use the contactless technology without having to enforce themselves or their personnel to use it. Additionally, voluntariness was identified as a low-significance factor for merchants' intention to adopt, as we will see in 2.2.1.2.

2.2.1.2 Empirical application in the area of e-payment systems - PCI

The study performed by Plouffe et al (2001a), showed that for 379 merchants who participated in a survey for the introduction of a new smart card in the market, relative advantage, compatibility, image and visibility (the latter to a lower degree) were strongly associated with the intent to adopt the new e-payment card. Ease-of-use, result demonstrability, trialability, and voluntariness were not significantly related to adoption intent. It is worth noting that Plouffe et al. also measured consumers' adoption intent, and the results showed that consumers and participating merchants appear to possess somewhat different perspectives when assessing their intention to adopt a new smart card technology. Although consumers emphasize the significance of relative advantage and compatibility, such as merchants, they also give importance to voluntariness. As Plouffe et al. state, consumers seem to value the notion that the adoption decision is under their control, whereas merchants seem to place more value on factors that have the potential to add to their bottom line. The factors of adoption used in their study were

based on the PCI measurement instrument. According to the authors of the study, the results show that marketers should not only pay attention to tactics for improving relative advantage to achieve adoption, as it currently occurs. Contrarily, they should focus on other elements in the marketing mix, such as enhancing their image-building campaign or developing a means of integrating the point-of-sale equipment used for all electronic payment systems (credit, debit and smart card), as part of a compatibility tactic.

Based on our research in the area of contactless e-payments as well as on references by other authors (Young 2008, Polasik 2012), there are no empirical studies that examined merchant intentions to adopt a new contactless e-payment system. There are only very few studies on contactless systems that examine consumer (not merchant) adoptions, as stated by Polasik (2012).

Conclusively, based on the theory and practice related to Perceived Characteristics of Innovation (PCI), as discussed above (sections 2.2.1.1 and 2.2.2.2), the most significant factors are relevant advantage, compatibility and image, followed by ease of use.

2.2.2 Technology Acceptance Model

The technology acceptance model (TAM), developed by Davis (1989), resulted from the theory of reasoned action (TRA). Contrary to TRA that illustrates behavioural theories, TAM is more "information systems" specific . Figure 2.5 illustrates an outline of TAM through its main constructs. TAM identifies and predicts user acceptance parameters of a new technological product before the users actually experience this product (Ozkan et al., 2010). TAM supports that user acceptance of a new technology product depends on perceived usefulness (PU) and perceived ease of use (PEOU) (Ozkan et al., 2010). According to Davis (1989, p.320), PU is "the degree to which a person believes that using a particular system would enhance his or her job performance", and PEOU is "the degree to which a person believes that using a particular system would be free from effort". Although TAM is considered to be a good predictor of the intention to use a new IT package, Ozkan emphasizes that it is not sufficient to predict user attitudes towards e-payment systems. That is mainly because e-payment systems deal with money exchange and not productivity as illustrated in TAM (Ozkan et al., 2010).

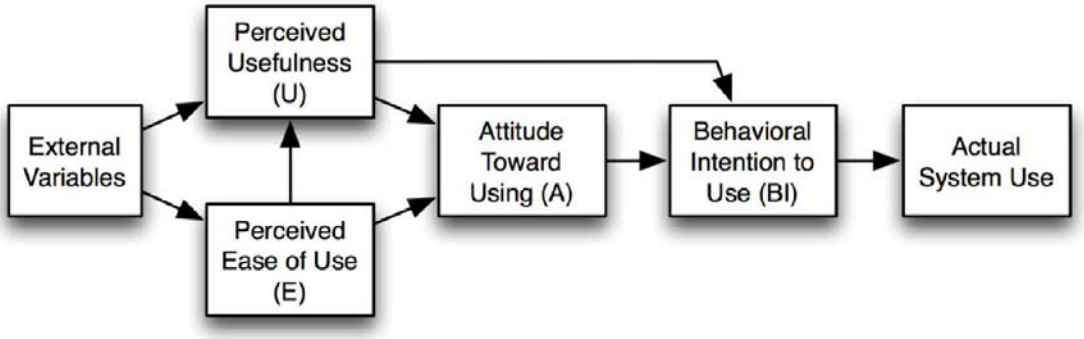

Figure 2-5. Technology Acceptance Model

2.2.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

2.2.3.1 Theoretical background - UTAUT

Venkatesh et al. (2003) chose constructs from PCI, TAM and other models and built a new model that has been largely welcomed by the academic and research community (Widjaja and Tedjawidjaja, 2012; Janson et al., 2013; Muhayiddin et al., 2012). Their new and tested unified model, known as Unified Theory of Acceptance and Use of Technology (UTAUT), integrates eight (8) models used earlier in technology acceptance studies, not just for e-payment systems but for technology in general (Venkatesh et al. 2003). Those eight models are: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM – presented in this study), Motivational Model (MM), Theory of Planned Behavior (TPB), a model which combines TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT – PCI ancestor, presented in this study), and Social Cognitive Theory (SCT).

According to Muhayiddin et al. (2012), the objective of Venkatesh et al. (2003) was to develop a comprehensive model that considers all variables included in the earlier eight well-known models, therefore they conducted a research to empirically compare and test each of the constructs in those models. Their research has found that the eight earlier models were able to explain in the range of 17 to 53 percent the variance in user intentions (that is, to use information technology). Subsequently, a unified model (UTAUT) that integrates elements across the eight models was formulated and empirically validated. With UTAUT, it was concluded that the new model outperformed the previous eight individual models (adjusted R^2 of 69 percent). At a later stage, UTAUT was validated based on data from two other organizations; it still gave similar results (adjusted R^2 of 70 percent) (Muhayiddin et al., 2012; Venkatesh et al. 2003). According to Muhayiddin et al. (2012), based on these better results

comparing to its predecessors, UTAUT would provide a significantly useful tool in order to assess the acceptance factors for introducing a new technology.

The UTAUT model is based on four key constructs, as shown in figure 2.6 below (Widjaja and Tedjawidjaja, 2012; Janson et al., 2013; Muhayiddin et al., 2012): 1) performance expectancy; 2) effort expectancy; 3) social influence; 4) facilitating conditions. According to the latest version of UTAUT (Venkatesh et al., 2012), performance expectancy, effort expectancy, social influence and facilitating conditions are direct determinants of intention to use a technology, while behavioural intention and facilitating conditions directly determine behaviour to use a technology. Gender, experience, age, and voluntariness of use are posited to moderate the impact of the four key constructs on use intention and behaviour. This study is interested in the intention to adopt a new technology, therefore we study the UTAUT model in terms of the analysis of its four constructs with relation to the behavioural intention to use.

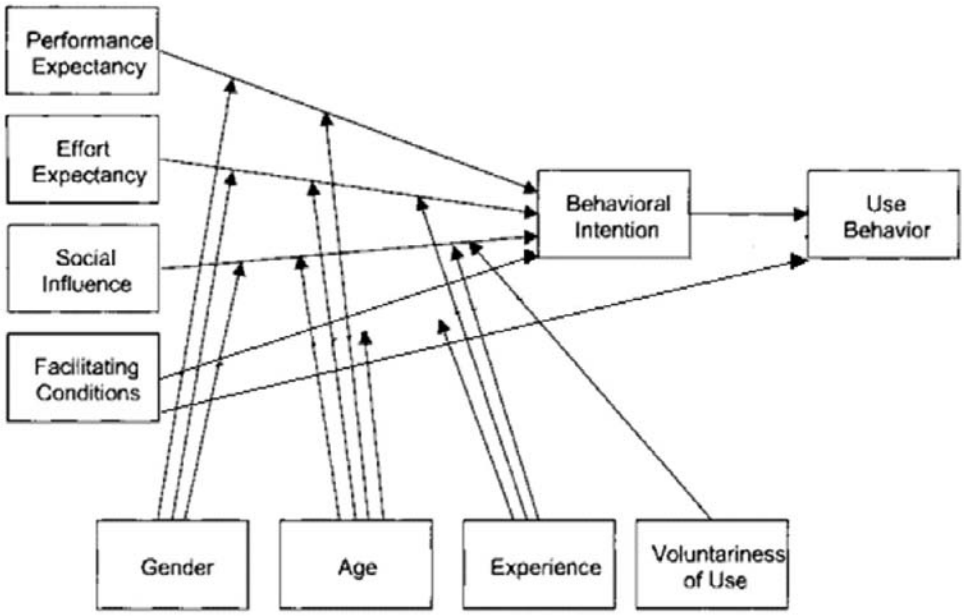

Figure 2-6. The unified UTAUT model (source: Widjaja and Tedjawidjaja, 2012; Janson et al., 2013; Muhayiddin et al., 2012)

Below the four factors of UTAUT are discussed in relation to the PCI constructs mentioned in the previous section, and the final set of factors is developed as part of the research framework of this study.

Performance expectancy (PE) is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh et al., 2003). PE involves constructs from other models, such as motivation, usefulness and relative advantage. They also mention that usefulness is similar to relative advantage. This study will use **Relative Advantage** as a factor of

investigation, since it is indicated in the literature and from empirical studies that it is a significant factor to influence adoption intent (Plouffe et al., 2001a, 2001b; Moore and Benbasat, 1991). Contrary to PE, relative advantage explicitly contains a comparison between the innovation and its precursor. Several studies underscored that individuals are more likely to develop a positive attitude toward a new information technology (IT) product or service if they believe that the new product or service could lead to actual benefits in comparison with existing ones (Basaglia et al., 2008). For example, Rogers (2003) in his case study about the diffusion of mobile technologies in Finland, concluded that relative advantage has a significant role in stimulating the adoption of mobile technologies. This was also pointed out by the results of Plouffe et al. (2001a) as discussed earlier in this dissertation. Although in her study on contactless cards, Wang (2008) investigated consumers' intentions (not merchants'), she reported that she was surprised that the results indicated relative advantage as a non-significant factor. She explained this by stating (p. 688):

> *"Although a payment transaction using a contactless credit card can increase transaction speed and performance, it saves only 12 to 14 seconds relative to a traditional credit card transaction. If cashiers work slowly or checkout queues are long, overall time savings would be negligible."*

Effort expectancy (EE) Effort expectancy is defined as the degree of ease associated with the use of the system (Venkatesh et al., 2003). It is substantially similar to the construct "ease of use" captured in the PCI model (Basaglia et al., 2008). The importance of effort expectancy is critical in the introduction of a new technology. In fact, the adoption process of an innovative technology can go wrong when attributes related to ease of use are not taken into consideration by technology designers (Basaglia et al., 2008).

Social influence (SI) is defined as the degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh et al., 2003). Social influence as a direct determinant of behavioral intention is represented as "image" in PCI. While they have different labels, each of these constructs contains the explicit or implicit notion that the individual's behavior is influenced by the way in which they believe others will view them as a result of having used the technology. However, Venkatesh et al. (2003) go deeper and decompose the complexity of social influence. In particular, they state that social influence affects the behaviour of an individual through compliance, internalization, and identification. While compliance causes an individual to simply change their intention in response to social pressure, that is, the individual intends to comply with the social influence, internalization and identification have a deeper alteration into someone's beliefs, and they may cause an individual to react to potential social status gains.

Therefore, we expect that the degree of innovation is adjusted according to the degree or type of social influence. Lighter innovations will probably cause the need for compliance, while stronger innovations will probably cause the need for internalization of identification.

Facilitating conditions (FC) are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. Venkatesh et al (2003) state that this definition also captures the notion of compatibility provided in the PCI model. Since **compatibility** is found in several studies, as shown in the previous section, as one of the most significant factors, it will be treated independently.

In addition to the four main constructs, there are also four moderators, namely gender, age, experience and voluntariness of experience, respectively.

2.2.3.2 Empirical application in the area of e-payment systems

In their survey with 872 respondents, Muhayiddin et al (2012) applied the UTAUT model and discovered that most of the respondents generally agreed to accept a new proposed electronic dinar payment system. Certain factors were perceived to have stronger influence than others, and these were performance expectancy and facilitating conditions.

In another study performed by Widjaja and Tadjawidjaja (2012), on evaluating the factors affecting merchants' intention to adopt an online payment gateway in Indonesia, the results indicated significant relationship between intention to adopt and performance expectancy, effort expectancy, social influence and facsilitating conditions, as depicted in table 2.1 below. For the security factor, the adjusted R square was 0.107, meaning that 10.7% of the respondent merchants believed that security influences the intention to adopt; therefore security ("S" in the table below) was less significant than the abovementioned factors. Finally, as depicted in the table below, cost is not a significant factor for merchants in their decision to adopt a new e-payment system.

Table 2-1. Regression results for factors and intention to adopt (source: Widjaja and Tadjawidjaja. 2012)

Hypothesis	R-sq	Adj R-sq	F	P
HI: PE to BI	0.262	0.252	26.645	p<0.05
H2: EE to BI	0.164	0.153	14.728	p<0.05
H3: SI to BI	0.229	0.219	22.334	p<0.05

H4: FC to BI	0.194	0.184	18.084	p<0.05
H5: C to BI	0.045	0.033	3.566	p>0.05
H6: S to BI	0.119	0.107	10.129	p<0.05

Based on the results of the two aforementioned studies, as well as relevant research and theory presented in section 2.2.2, which used UTAUT, **performance expectancy** is considered to be a very significant factor; **social influence** is also important, especially for small societies where culture, image and word of mouth can be more easily spread between people (Widjaja and Tadjawidjaja, 2012). As discussed above, this factor is similar to the Image factor of PCI, therefore the two will be unified under one, that is, social influence. **Effort expectancy** is similar to ease of use. Although security becomes the least factor, research shows that it is still very critical (see 2.2.4, and that is why it will be a part of this study's research framework.

2.2.4 Security

According to Tsiakis and Stephanides (2005), security is a set of programs and procedures that intend to verify the source of information and guarantee its integrity and privacy. In the e-payment context, security is related to the payment means and mechanisms for retrieval, storage, transmission and presentation of information. It also refers to the technical aspects that ensure integrity, authentication and confidentiality. To ensure security, a number of mechanisms are used, such as encryption, digital signature, and the checksum/hash algorithm (Flavian and Guinaliu, 2006). For such reasons, security could influence users' intentions to adopt a new e-payment system (Abrazhevich, 2004).

According to a number of researchers (Herzberg, 2003; Misra and Wickamasinghe, 2004), the lack of trust in transaction parties, because of security issues, using e-payment technology, can form a substantial barrier to adoption by merchants. However, in their survey about mobile payments, involving 143 merchants, Mallat and Tuunainen (2008) derived that established companies, such as financial institutions and large telecom operators, are trusted enough to act as mobile payment providers whereas it is more difficult for small players and start-ups to gain trust in the market. Mobiles nowadays use the NFC technology, which is a form of contactless e-payment, as explained earlier before, and JCC is the biggest payment gateway provider, therefore Mallat and Tuunainen's (2008) context is, to some degree, related to our study. Based on Mallat and Tuunainen's findings, security seems not to be a significant factor influencing merchant intentions to adopt, however since there is a general feeling between merchants about security of new e-payment products or services, especially with the current financial and bank crisis in Cyprus, this study is taking security as one of the factors to be examined.

Therefore, to assess how much security influences merchants' intention to adopt the new contactless e-payment system, a relevant hypothesis is proposed below.

2.3 Measurement items

In order to measure each factor, specific measurements items need to be utilized. Moore and Bebasat (1991) suggested a number of measures for the PCI constructs, and Plouffe et al. (2001b) improved those measures. Venkatesh et al. (2003, 2012) used several items for UTAUT, some of which were based on the PCI measurement items.

In order to develop the measurement items for each factor, the initial creators, those are Moore and Bebasat, followed a particular process carried out in three stages (Moore and Bebasat, 1991. The first stage was item creation, whose purpose was to create items for each PCI by detecting items from existing scales, and also by creating additional items which appeared to fit the definitions of the constructs. The next stage in the process was scale development. The basic procedure was to have several judges sort the items from the first stage into different categories, based on the similarities and differences among items. Then the items could be examined and any redundant or ambiguous items would be eliminated. The various scales were then combined into an overall instrument for the testing stage of the instrument, which included three separate steps. First, the instrument was distributed to a small sample of respondents, the responses were analysed, and an initial conclusion of the scales' reliability was derived. Items which did not contribute to the reliability of the scales were rejected from the second round of testing; the latter involved a full scale pilot test with a larger number of subjects. In the third step, the scales were refined more, and a field test of the instrument took place.

Appendix A shows Moore and Bebasat's (1991) items, and Appendix B shows Plouffe et al.'s (2001b) items. The latter's measures were a modified and expanded version of the former's and of the work done by Davies (1989), in order to fit both the merchant and the e-card contexts of their study. A similar procedure was followed in our study.

In summary, the literature review has explored theoretical models, on the one hand, and empirical studies and their results, on the other, in order to examine and identify the factors that influence the adoption of new technologies, with emphasis on e-payment systems. The factors that proved to have impact on a merchant's intention to adopt are part of the research framework of this study, and they are presented as independent variables in the hypotheses illustrated in the section below. Measurement items is the other part of the research framework, and they are depicted in table 3.1 below.

The study of the existing literature has also shown the importance of this study, since no other study has investigated factors influencing the intention to adopt a contactless payment system, by **merchants**. Finally, this study contributes to the existing literature by confirming or challenging the existing findings about the degree of connection between each factor and the intention to adopt.

2.4 Hypotheses and variables

Based on the different factors as explained above, their degree of significance for intention to adopt, as well as (to a lesser degree) the frequency with which they were used in empirical studies, this study employs the following 6 hypotheses:

H1: **Relative Advantage** affects Cyprus Merchant's intention to adopt the new contactless e-payment system

H2: **Compatibility** affects Cyprus Merchant's intention to adopt the new contactless e-payment system

H3: **Social Influence** affects Cyprus Merchant's intention to adopt the new contactless e-payment system

H4: **Facilitating Conditions** affect Cyprus Merchant's intention to adopt the new contactless e-payment system

H5: **Effort expectancy** affects Cyprus Merchant's intention to adopt the new contactless e-payment system

H6: **Security** affects Cyprus Merchant's intention to adopt the new contactless e-payment system

Relative advantage, compatibility, social influence, facilitating conditions, effort expectancy, and security are the six independent variables of this study. Intention to adopt is the dependent variable. This relation is depicted below in figure 2.7, as part of the research framework. The research framework will be completed with measurement items for each factor (independent variable), as will be illustrated in the next chapter.

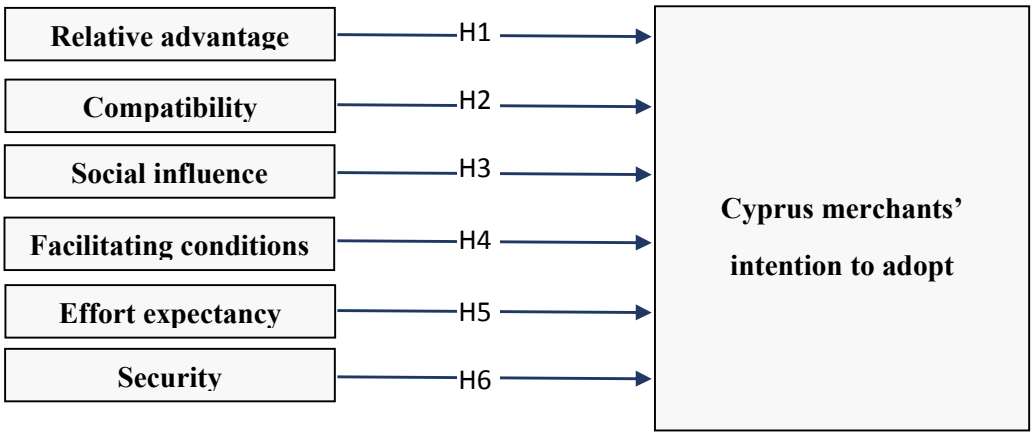

Figure 2-7. The research hypotheses

3 Research Methodology

This chapter presents the measurement items for each factor, discusses the sample and the data collection method, and explains how the data were analysed,

3.1 Measurement items

In order to measure each factor, specific measure items were utilized, mainly based on the items suggested by Moore and Bebasat (1991) (Appendix A) and Plouffe et al. (2001b) (Appendix B) for the PCI constructs. Especially the context of the latter study involves similar characteristics to ours, such as an e-card and merchants. However, we had to modify our items to assess the Cyprus merchant owner's perception of the JCC contactless payment system and its possible role as a point-of-sale technology. Also we had to remove unrelated items, such as ones about consumers. Finally, we also considered items from the studies done by Venkatesh et al. (2003, 2012) for UTAUT, and Muhayiddin (2012). Table 3.1 below presents the measurement items for each factor. Relative advantage, compatibility, social influence, effort expectancy, facilitating conditions, and security are the independent variables, while intention to adopt is the dependent variable. Table 3.1 is actually the simplest form of the questionnaire given to the merchants. Statements under each factor (e.g. 1 to 5 under Relative Advantage, 1 to 4 under Social Influence, etc.) are both the items to measure the influence of each factor on Cyprus merchant's intention to adopt the contactless system, and the statement-questions that had to be answered by the merchants using a five-point Likert scale. The actual questionnaire is presented in Appendix C.

Table 3-1. Measurement items for each factor.

Factor	**Measurement Item**
Relative Advantage	
1	Using the Contactless smart card system will improve the quality of the sale transactions in our business.
2	Using the Contactless smart card system gives us greater control over our business' sales transactions.
3	Using the Contactless smart card system enables us to process payments more quickly.
4	Using the Contactless smart card system enhances the on-the job effectiveness of me and the personnel.
5	Using the Contactless smart card system makes it easier for us to do our jobs.
Social Influence	
1	Merchants who use the Contactless smart card system have more prestige than those who do not.
2	Merchants who use the Contactless smart card system have a higher profile than those who do not.
3	Having a Contactless smart card system is a status symbol among the merchants I know.

4	Important merchants or consumers who will use the Contactless card will influence the market
Effort expectancy	
1	The Contactless smart card system seems easy to learn.
2	The Contactless smart card system seems easy to use.
Compatibility	
1	I think that the Contactless smart card system is compatible with all aspects of my business's sales transactions.
2	I think that using the Contactless smart card system fits well with the way my staff and I like to receive payment for goods and services.
3	Using the Contactless smart card system fits with our business's work style.
Facilitating conditions	
1	I think that banks and governments will support this initiative
2	I trust JCC's ICT infrastructure
Security	
1	I trust that the contactless payment system will not lead to transaction fraud
2	I think that JCC's contactless smart card will protect private information
Intention to adopt	
1	I am interested in using the contactless payment system in my business

3.2 Sample and Data collection

This study is a quantitative research, whereby analysis and classification of numerical data were derived from anonymous survey questionnaires. The questionnaire included the statements in table 3.1 (see Appendix C for the complete questionnaire), and the respondents could answer using a 5-point Likert scale – it will be explained in more detail, below. The questionnaire was distributed to 200 merchants throughout Cyprus. The response rate was 86.5%, meaning that 173 respondents answered it completely and were valid. Each section of the questionnaire was related to the six factors, those are, relative advantage, social influence, effort expectancy, compatibility, facilitating conditions, and security. The last section of the survey consisted of questions related to respondents' information such as annual revenues, the number of employees, experience, and the type of business, mostly categorized as online or business with just the use of credit/debit cards. Table 3.2 below shows the average values for these measures. The questionnaire was in English, and most of the respondents were native Greek speakers, while all of them had very good knowledge of English.

Table 3-2. Demographic data of Cyprus Merchants – Average values

MERCHANTS	173
Annual Revenue	100,000 Euros
Number of Employees	5
Experience	12 years

The study tried to collect a representative sample– including large and small merchants in Cyprus, from multi-national food chains to small restaurants and cafeterias. Other types of business included pharmacies, gas stations, bookstores, and hotels. The responding merchants also use most of the usual types of payments, such as cash, credit and debit cards. No special permission was needed to conduct the survey, since the merchants were either the owners or had a high position in their business. The questionnaires were distributed by e-mail.

Additionally, it is noteworthy that each merchant was given a leaflet with instructions on how the JCC contactless payment system is used in practice, and for most of the merchants, a 30-minute live, face to face demonstration of the new system was given; the merchants also had the chance to try the system themselves. In this way, the merchants would develop a better idea of how the JCC contactless payment systems works, and so be able to evaluate it better too. Merchants did not have previous experience in using a contactless system in their business.

It is also worth reminding that this study has focused only on merchants, and this choice was made because, as already discussed in the introduction of this research, merchants' role has been considered as more significant in the acceptance of a contactless e-payment system.

A five-point Likert scale is used to measure to what extent an individual agree or disagree to the questions being asked. Likert scale is measured as follows: '1' is for Strongly Disagree, '2' is for Disagree, '3' is for Neither agree nor disagree, '4' is for Agree, and '5' is for Strongly Agree. With a neutral scale point, equal distance between all the scale points is achieved. Finally, several studies on e-payment adoption use a 5- or 7-point Likert scale, such as the ones by Plouffe et al (2001a), Ozkan et al. (2009), Wang (2008), and Muhayiddin (2012).

3.3 Data analysis and hypothesis testing

To analyze the collected data, and derive answers for the set hypotheses, this study has chosen to use multiple regression. According to Laerd Statistics (n.d.), multiple regression analysis can be used for two purposes:

(i) "it is used when we want to predict the value of a variable based on the value of two or more other variables. The variable we want to predict is called the dependent variable (or sometimes, the outcome, target or criterion variable). The variables we are using to predict the value of the dependent variable are called the independent variables (or sometimes, the predictor, explanatory or regressor variables)."

For example, we could use multiple regression to understand whether intention to adopt can be predicted based on compatibility, relevant advantage, facilitating conditions, etc.

(ii)

"Multiple regression also allows you to determine the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained."

This latter purpose is the one for which multiple regression is selected to be applied in this study. Therefore we will be able to know how much of the variation in intention to adopt (independent variable) can be explained by the independent variables compatibility, facilitating conditions, relevant advantage, security, effort expectancy and social influence "as a whole" (see tables 4.4 and 4.5 in the next chapter), but also the "relative contribution" of each independent variable in explaining the variance (see table 4.6).

4 Findings

The questionnaire was initially tested on 15 respondents before it was distributed to all of them, to check for its validity. Such a tactic is common in order to test and improve the questionnaire (Teoh et al. 2013). As a result, minor amendments were made on the instrument. Subsequently, a number of tests in SPSS took place in order to check the validity and reliability of the model. As shown in table 4.1, to check the suitability of the data for structure detection, the Bartlett test of sphericity and the KMO test were used (IBM Knowledge Center, 2011). The former was highly significant (p-value=0.00) and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the independent variables was 0.6; this value indicates that the data are therefore suitable for factor analysis (IBM Knowledge Center, 2011).

With eigenvalues > 1.0 and 61.92 percent of total variance explained, six independent factors emerged from the analysis, as depicted in table 4.1. For their intended variables, all the items scored factor loadings >= 0.5, and the items within the same variable were grouped together (all factor loadings are presented in table 4.2). According to Comrey (1973), factor loadings of 0.71 are considered as very high, 0.63 as high, 0.55 as satisfactory, 0.45 as average, 0.32 as low, and below 0.3 as unsatisfactory.

For internal consistency of the items, the Cronbach's α scores for all the independent variables are higher than 0.6, indicating, therefore, that items demonstrate a high internal consistency (Downing, 2004; in Teoh et al., 2013).

Table 4-1. Validity and reliability scores for the independent variables

Measure	Items	Factor loadings	KMO	Eigenvalue	Variance explained (%)	Cronbach's α
Independent variables			0.6			
Social influence	4	0.503-0.727		3.175	17.637	0.627
Relative advantage	5	0.540-0.799		2.081	11.559	0.653
Compatibility	3	0.608-0.8886		1.828	10.154	0.718
Effort expectancy	2	0.571-0.808		1.585	8.804	0.626
Security	2	0.782-0.846		1.305	7.249	0.604
Facilitating conditions	2	0.835-0.839		1.172	6.513	0.618

Table 4-2. Factor Loadings

Items for each Factor	Factor					
	Social Influence	Relative Advantage	Compatibility	Effort Expectancy	Security	Facilitating Conditions
Relative Advantage						
Item 1	..303	**..567**	-..109	..135	..108	..195
Item 2	..083	**.540**	-.092	-.515	-.129	.160
Item 3	.328	**.600**	.100	-.087	.006	-.120
Item 4	-.198	**.799**	.073	-.047	.026	-.068
Item 5	.441	**.550**	.040	.001	.006	.012
Social Influence						
Item 1	**.660**	.068	.127	.042	.013	-.059
Item 2	**.503**	.070	-.055	-.466	-.101	.183
Item 3	**.667**	.206	-.122	-.129	.104	-.095
Item 4	**.727**	.039	-.088	-.076	.023	-.009
Effort Expectancy						
Item 1	.024	-.061	.006	**.808**	-.252	.028
Item 2	-.248	.056	-.057	**.571**	-.300	.169
Compatibility						
Item 1	.141	.204	**.608**	.380	.228	-.100
Item 2	-.125	.039	**.849**	-.122	-.008	-.043
Item 3	-.008	-.072	**.886**	.016	-.059	.071
Facilitating Conditions						
Item 1	-.085	.133	-.082	-.002	-.013	**.835**
Item 2	-.005	-.119	.068	.014	.001	**.839**
Security						
Item 1	.097	.029	.058	-.033	**.846**	-.004
Item 2	-.039	.020	-.038	-.242	**.782**	.005

Finally, table 4.3 shows the mean and standard deviation scores for all the items grouped under each variable. The standard deviation scores for all the items are well below 1.00, indicating consistency in the respondents' answers.

Table 4-3. Mean and Standard deviation scores for all items.

	Item	Mean	Std. Deviation
Relative Advantage			
1	Using the Contactless smart card system will improve the quality of the sale transactions in our business.	3.7341	.80611
2	Using the Contactless smart card system gives us greater control over our business' sales transactions.	3.6185	.65955
3	Using the Contactless smart card system enables us to process payments more quickly.	4.7803	.46788
4	Using the Contactless smart card system enhances the on-the job effectiveness of me and the personnel.	4.3815	.75027
5	Using the Contactless smart card system makes it easier for us to do our jobs.	4.6590	.56486
	Average	4.235	
Social Influence			
1	Merchants who use the Contactless smart card system have more prestige than those who do not.	2.0809	.85204
2	Merchants who use the Contactless smart card system have a higher profile than those who do not.	2.0694	.85985
3	Having a Contactless smart card system is a status symbol among the merchants I know.	2.0462	.79836
4	Important merchants or consumers who will use the Contactless card will influence the market	2.0636	.85692
	Average	2.065	
Effort Expectancy			
1	The Contactless smart card system seems easy to learn.	4.5145	.57675
2	The Contactless smart card system seems easy to use.	4.3988	.49108
	Average	4.457	
Compatibility			
1	I think that the Contactless smart card system is compatible with all aspects of my business' sales transactions.	3.4566	.66876
2	I think that using the Contactless smart card system fits well with the way my staff and I like to receive payment for goods and services.	3.5607	.71777
3	Using the Contactless smart card system fits with our business' work style.	3.7572	.70630
	Average	3.592	

Facilitating conditions			
1	I think that banks and governments will support this initiative	3.6301	.67481
2	I trust JCC's ICT infrastructure	4.0636	.47189
	Average	3.847	
Security			
1	I trust that the contactless payment system will not lead to transaction fraud	2.6647	.47345
2	I think that JCC's contactless smart card will protect private information	4.2717	.74017
	Average	3.468	
Intention to adopt			
	I am interested in using the contactless payment system in my business	3.45	.595

4.1 Multiple regression

Table 4.4 provides the R, R2, adjusted R2, and the standard error of the estimate, which can be used to determine how well a regression model fits the data. According to Laerd Statistics (n.d.), the R^2 value (also called the coefficient of determination) which is the proportion of variance in the dependent variable that can be explained by the independent variables. We can see from the value of 0.337 that the independent variables explain 33.7% of the variability of the dependent variable.

Table 4-4. Model Summary

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	*.581[a]*	*.337*	*.313*	*.49289*

The *F*-ratio in the **ANOVA** table (Table 4.5) tests whether the overall regression model is a good fit for the data. The overall model was significant R^2*=.337, Adjusted* R^2*=.313, F(6,166)=14.07, p<.0005* (see Table 4.5).

Table 4-5. ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.505	6	3.417	14.067	.000[a]
	Residual	40.328	166	.243		
	Total	60.832	172			

Table 4.6 shows the multiple regression results between all the independent variables and the dependent variable. Social influence, compatibility, and facilitating conditions are related/associated to the merchants' intentions to adopt the contactless e-payment system, i.e. they make a statistically significant contribution to the overall model ($p<0.05$). In particular, compatibility and facilitating conditions have a positive significant association (their p-values are below 0.05 and their β coefficients are at 0.281 and 0.128, respectively), meaning that the higher the compatibility or facilitating conditions of the contactless payment system the higher the intention to adopt. The largest beta coefficient is 0281, which is indicated for the independent variable compatibility. This indicates that this variable makes the largest contribution in explaining the dependent variable. The variable facilitating conditions plays a statistical significant role in the model and also makes a strong contribution to explaining the dependent variable but not that strong as the variable compatibility. On the contrary, social influence has a negative significant association (its p-value is below 0.05 and its β coefficient is at -0.468). For a one-unit increase in the social influence variable the intention to adopt will decrease by 0.468 units. In summary, H2, H3, and H4 are supported . Finally, relative advantage, security and effort expectancy are not related to the merchants' intention to adopt the contactless e-payment system. They do not play a statistically significant role in the model ($p<0.05$) Therefore, H1, H5 H6 are not supported. The following chapter will try to interpret the results.

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Table 4-6. Multiple regression results between independent variables and Cyprus merchants' intention to adopt –Model Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.451	.037		92.088	.000
Social influence	**-.278**	**.038**	**-.468**	**-7.403**	**.000**
Relative Advantage	-.025	.038	-.042	-.662	.509
Compatibility	**.167**	**.038**	**.281**	**4.447**	**.000**
Effort expectancy	.084	.038	.141	2.232	.027
Security	-.022	.038	-.037	-.578	.564
Facilitating conditions	**.076**	**.038**	**.128**	**2.018**	**.045**

5 Discussion

Relative advantage was surprisingly not found to be a significant factor, being in this way in contrast with other studies (Plouffe et al., and theory (Rogers, 1995, 2003; Moore and Benbasat, 1991) that identified relative advantage as a significant factor in influencing the intention to adopt a new e-payment system. Nevertheless, the result of this study, regarding relative advantage, complies with the result of Wang's (2008) study that investigated the influence of contactless cards (Wang, 2008)[2]. Although Wang's study was related to consumers' adoption intention, the fact that both consumers and merchants similarly evaluate the significance of relative advantage (Plouffe et al., 2002a), makes our finding more valuable and realistic. Wang (2008) supports this finding by mentioning that although a payment transaction using a contactless credit card can increase transaction speed and performance, it saves only 12 to 14 seconds relative to a traditional credit card transaction. If cashiers at the merchants' side work slowly or checkout queues are long, overall time savings would be unimportant. Therefore, the relative advantage resulting from the use of a contactless credit card is not powerful enough to push merchants' or even consumers' adoption. Furthermore, the fact that Cyprus suffers from financial crisis and an atmosphere of uncertainty, make merchants even more hesitant to believe that the new e-payment contactless card will give them a powerful relative advantage.

Contrary to relative advantage, **compatibility** was found significant and received the highest score with a β coefficient at 0.281. Similarly to relative advantage, compatibility was the other factor that was significant for both merchants and consumers in Plouffe et al. (2001a) study, and so the fact that it was also found significant in Wang's (2008) study for contactless cards, makes compatibility indeed a very significant factor. So, compatibility was found to have the most significant effect on Cyprus merchants' intentions to adopt the contactless credit card. If using contactless credit cards fits the way they like to receive payments for goods and services, their business's work style and it is compatible with all aspects of their business's sales transactions, then merchants will have a favourable impression. A positive impression is likely to facilitate their adoption of this innovation. Another study that complies with our finding for the highest significance of compatibility is the one by Chin and Gopal (1995), from the field of education. They studied MBA students' intentions to adopt a new system using a reduced set of PCI characteristics, and found that compatibility was a more important predictor than either relative advantage or effort expectancy. We also made another observation with regard to the type of the business (the only moderator which pointed a difference between the results). Merchants who work online, without the use of credit/debit cards for payments, gave answers with lower scores for

[2] To our knowledge, there are no empirical studies that examined merchant intentions to adopt a new contactless e-payment system. There are only very few studies on contactless systems that examine consumer (not merchant) adoptions, as stated by Polasik (2012).

compatibility. That is probably because they considered that a credit card, even contactless, would change their current way of payment transactions and tasks.

Effort expectancy was also observed to be an insignificant factor. Since most merchants already have a significant experience with the use of debit and credit card payment systems, and so they are familiar with their operation, it is relatively effortless for them to use a new technology with similar, but more advanced, characteristics. Therefore, all merchants consider it as easy to use contactless credit cards, and so effort expectancy does not have a significant influence on them. This attitude was also enhanced by the fact that a 30-minute demonstration was given to the merchants for them to understand how the contactless card works. In the relevant literature and research, effort expectancy seems to be either a non-significant factor (Plouffe et al, 2001a) or a low significance factor (Widjaja and Tetjavidjaja, 2011).

Security was observed to be an insignificant factor. The reason that Cyprus merchants do not perceive security to be a significant issue may be that the issuers of the contactless credit card is the same as the one who offers the majority of traditional credit cards, that is JCC. Therefore, merchants do not need to reevaluate their trust of issuers when making decisions to adopt contactless credit cards. This is also supported by Mallat and Tuunainen (2008) who derived that established companies -such as JCC in the case of this study- are trusted enough to act as e-payment providers, contrary to small players and start-ups who face difficulties in gaining trust in the market. Additionally, merchants in Cyprus appreciate the steps taken by many banking institutions and payment gateway providers to address the challenges associated with security. As in the case of Malaysia (Teoh et al., 2013) banks and JCC would issue regular warning to users as well as update users of any occurrence of fraud. These moves increase merchant's confidence to use the payment channel.

Facilitating conditions were found significant. Cyprus merchants may worry about the government's support to facilitate and regulate the infrastructure for the new payment system. On the other hand, their answers indicate that they trust JCC's existing infrastructure, and so their greatest worries are onto the government's side. In the relevant literature and practice, facilitating conditions were found as low significance factors. According to (Widjaja and Tedjawidjaja, 2013) the e-payment gateway providers should ensure the infrastructure to be ease to use by their client merchants. Also, they should make several clear procedures for facilitating merchants in case of possible errors.

Social influence was found as a negatively significant factor. Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh et al., 2003). The negative significance might lie on the reason that many merchants probably thought the "important others" included important competitors. When important competitors

believe that a merchant should not use the new system, for this merchant this is an opportunity to adopt the innovation and make the difference in the market; to act when other do not expect it. Other studies found social influence significant too, but also positive, comparing to our study. For example, Widjaja and Tadjawidjaja, (2012) found social influence important, especially for small societies where culture, image and word of mouth can be more easily spread between people. Therefore, a further clarification of social influence could be provided to the respondents for them to obtain a better understanding of it. An interesting point regarding social influence, is that the likely way that Cyprus merchants interpreted social influence links it indirectly with the relative advantage. That is why, Cyprus merchants see through the lack of movement from their competitors (the "important others") an opportunity to adopt a new technology and make a difference in the market; the adoption of such a technology is perceived to give them a relative advantage over their competitors. Our observation about the relationship between social influence and relative advantage brings on the surface Roger's (1995) diffusion of innovation theory which supports that image is embedded in the relative advantage construct. Also another questions is posed: Why while social influence which has a negative significance, and it is also linked to relative advantage, relative advantage was insignificant (it should be positively significant). A possible answer is because Cyprus merchants pay more attention to the social image per se, rather to the actual competition.

This study has some limitations. The small sample size raises the issue of generalizability. In order to enhance accuracy and generalizability of the findings, a larger sample size including also probably merchants that do not use credit/debit card systems and across different geographical locations could be considered in a possible future study. Also the respondents of this study were merchants; it would be interesting to examine the perceptions of consumers too.

6 Conclusions and Recommendations

.

This study examined the factors influencing Cyprus merchants' intention to adopt an e-payment innovation, that is, the JCC contactless smart card. Questionnaires were used to collect data from Cyprus merchants who already use e-payment systems. The regression results showed that compatibility, social influence and facilitating conditions are the main factors that determine a Cyprus merchant's intention to adopt of the new contactless e-payment system. On the other hand, security, relative advantage, and effort expectancy do not significantly influence the merchant's decision for adoption.

Compatibility was found to have the most significant effect on Cyprus merchants' intentions to adopt the contactless credit card. That is related with the fact that the majority of the merchants already use credit or debit card payment systems, so using contactless cards will still fit the way they like to receive payments for goods and services, as well as their business's work style. Merchants seemed to realize that the new contactless system is compatible with all aspects of their business's sales transactions, and so they likely developed a positive impression which would probably facilitate their adoption of this innovation. Therefore JCC and bank institutions could emphasize this advantage of the contactless card and promote it to merchants and consumers, through communication channels, so as all will know about it.

Also social influence and facilitating conditions are factors that seem to be very important for merchants; therefore JCC and bank institutions should pay extra attention to them. On the one hand they could improve social influence activities, in order to attract merchants and facilitate their decision to adopt. Merchants seemed to pay more attention to the social image per se, rather to the actual competition. Therefore, they need to be informed well and know how to distinguish between business opportunities that could give them a relative advantage and social norms. With regard to facilitating conditions, since, based on the results, merchants may worry about the government's support to facilitate and regulate the infrastructure for the new payment system, government and payment gateways could make several clear procedures for facilitating merchants in case of possible errors. On the other hand, since merchants seem to trust JCC's existing infrastructure, JCC, and payment gateway providers in general, should continue ensure that their infrastructure is easy to use and reliable.

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8 Appendices

8.1 Appendix A. Moore and Benbasaat – List of Items by construct

Voluntariness

1. My superiors expect me to use a PWS.
2. My use of a PWS is voluntary (as opposed to required by my superiors or job description).
3.* My boss does not require me to use a PWS.
4.* Although it might be helpful, using a PWS is certainly not compulsory in my job.

Relative Advantage

1.* Using a PWS enables me to accomplish tasks more quickly.
2.* Using a PWS improves the quality of work I do.
3.* Using a PWS makes it easier to do my job.
4. The *disadvantages* of my using a PWS far outweigh the advantages. (See Note a.)
5. Using a PWS improves my job performance.
6. Overall, I find using a PWS to be advantageous in my job.
7.* Using a PWS enhances my effectiveness on the job.
8.* Using a PWS gives me greater control over my work.
9. Using a PWS increases my productivity.

Compatibility

1.* Using a PWS is compatible with all aspects of my work.
2. Using a PWS is completely compatible with my current situation.
3.* I think that using a PWS fits well with the way I like to work.
4.* Using a PWS fits into my work style.

Image

1. Using a PWS improves my image within the organization.
2. Because of my use of a PWS, others in my organization see me as a more valuable employee. (See Note a.)
3.* People in my organization who use a PWS have more prestige than those who do not.
4.* People in my organization who use a PWS have a high profile.
5.* Having a PWS is a status symbol in my organization.

Ease of Use

1. I believe that a PWS is cumbersome to use.
2. It is easy for me to remember how to perform tasks using a PWS. (See Note a.)
3. My using a PWS requires a lot of mental effort.
4. Using a PWS is often frustrating.
5.* My interaction with a PWS is clear and understandable. (See Note a.)
6.* I believe that it is easy to get a PWS to do what I want it to do.
7.* Overall, I believe that a PWS is easy to use.
8.* Learning to operate a PWS is easy for me.

Result Demonstrability

1.* I would have no difficulty telling others about the results of using a PWS.
2.* I believe I could communicate to others the consequences of using a PWS.
3.* The results of using a PWS are apparent to me.
4.* I would have difficulty explaining why using a PWS may or may not be beneficial.

Visibility

1. I have seen what others do using their PWS.
2.* In my organization, one sees PWS on many desks.
3. I have seen a PWS in use outside my firm. (See Note a.)
4.* PWS are *not* very visible in my organization.
5. It is easy for me to observe others using PWS in my firm.

I have had plenty of opportunity to see the PWS being used. (See Note b.)
I have not seen many others using a PWS in my department. (See Note b.)

Trialability

1. I've had a great deal of opportunity to try various PWS applications.
2. I know where I can go to satisfactorily try out various uses of a PWS.
3. A PWS was available to me to adequately test run various applications.
4.* Before deciding whether to use any PWS applications, I was able to properly try them out.
5.* I was permitted to use a PWS on a trial basis long enough to see what it could do.

I am able to experiment with the PWS as necessary. (See Note b.)
I can have PWS applications for long enough periods to try them out. (See Note b.)
I did not have to expend very much effort to try out the PWS. (See Note c.)
I don't really have adequate opportunities to try out different things on the PWS. (See Note c.)
A proper on-the-job tryout of the various uses of the PWS is not possible. (See Note c.)
There are enough people in my organization to help me try the various uses of the PWS. (See Note c.)

Notes

a. The indicated items were all deleted as the result of the first factor analysis and hence were not in the final scales.

b. The indicated items, which were deleted after the initial test, are suggested as candidates for inclusion in any expanded scale

c. The indicated items, which were not in the final instrument, had item-scale correlations less than 0.40 in the initial test and are suggested as secondary candidates for lengthening the scale.

d. *—indicates items suggested for inclusion in any "short" scales.

8.2 Appendix B. Plouffe et al. – List of items by construct

Relative advantage

1) a - Using an Exact card improves the quality of my transactions with merchants.

1) b - Using the Exact card system improves the quality of the sales transactions my staff and I conduct in our business.

2) a - Using an Exact card gives me greater control over my purchasing transactions.

2) b - Using the Exact card system gives me and my staff greater control over our business' sales transactions.

3) a - Using an Exact card enables me to make purchases more quickly.

3) b - Using the Exact card system enables me and my staff to process payments more quickly.

4) a - Using an Exact card enhances my effectiveness in making purchases.

4) b - Using the Exact card system enhances the on-the job effectiveness of me and my staff.

5) a - Using an Exact card makes shopping easier for me.

5) b - Using the Exact card system makes it easier for me and my staff to do our jobs.

Ease-of-use

1) a - Learning to operate the Exact card was easy for me.

1) b - Learning to operate the Exact card system was easy for me and my staff.

2) a - I find it easy to get the Exact card to do what I want it to do.

2) b-My staff and I find it easy to get the Exact card system to do what we want it to do.

3) a - Using an Exact card is clear and understandable.

3) b - Using the Exact card system is clear and understandable for me and my staff.

4) a-I find the Exact card easy to use.

4) b-My staff and I find the Exact card system easy to use.

Compatibility

1) a - Using an Exact card is compatible with all the ways I like to pay for purchases.

1) b - Using the Exact card system is compatible with all aspects of my business' sales transactions.

2) a- I think that using an Exact card fits well with the way I like to pay for goods and services.

2) b-Ithink that using the Exact card system fits well with the way my staff and I like to receive payment for goods and services.

3) a - Using an Exact card fits with my style as a consumer.

3) b - Using the Exact card system fits with our business' work style.

Image

1) a - People who use an Exact card have more prestige than those who do not.

1) b-Merchants who use the Exact card system have more prestige than those who do not.

2) a - People who use an Exact card have a higher profile than those who do not.

2) b-Merchants who use the Exact card system have a higher profile than those who do not.

3) a - Having an Exact card is a status symbol.

3) b - Having an Exact card system is a status symbol among the merchants I know.

Result demonstrability

1) a-I would have no difficulty telling others about my experience using an Exact card.

1) b - My staff and I would have no difficulty telling others about our experience using the Exact card system.

2) a- I believe I could communicate to others the consequences of using an Exact card.

2) b- My staff and I could communicate to others the consequences of using the Exact card system.

3) a - The impact of using an Exact card is apparent to me.

3) b - The impact of using the Exact card system is apparent to my staff and me.

Visibility

1) a-In my community, I see many people using Exact cards.

1)b-In my community, I see many merchants using the Exact card system.

2) a - The Exact card is not very visible in my community.

2) b - The Exact card system is not very visible in my community.

Trialability

1) a - I've had a great deal of opportunity to try the Exact card in various situations.

1) b- My staff and I have had a great deal of opportunity to try the Exact card system in various situations (e.g., a customer asks to pay for a purchase with a combination of Exact and cash).

2) a - Before deciding whether to use an Exact card, I was able to properly try it out.

2) b - Before deciding whether to use the Exact card system, my staff and I were able to properly try it out.

Voluntariness

1)a-My use of an Exact card is voluntary.

1) b - My business' use of the Exact card system was voluntary.

2)a-While it was suggested to me, using an Exact card certainly is not compulsory.

2) b - Although suggested to my business, using the Exact card system was not compulsory.

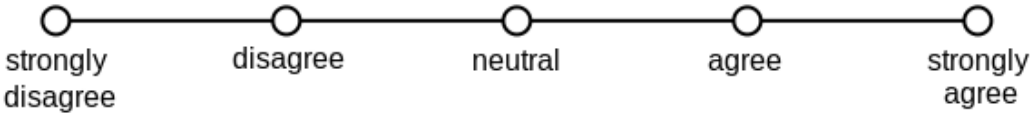
Intention to adopt

1) a - Once the trial period is over, I will be interested in continuing to use smartcard payment systems.

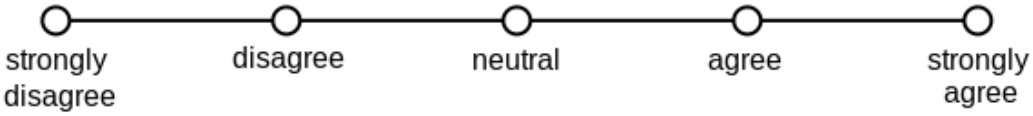
1) b - Once the trial period is over, I will be interested in continuing to use a smartcard payment system in my business.

8.3 Questionnaire of this study

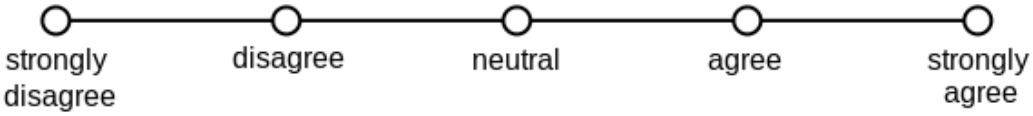
1. Using the Contactless smart card system will improve the quality of the sale transactions in our business



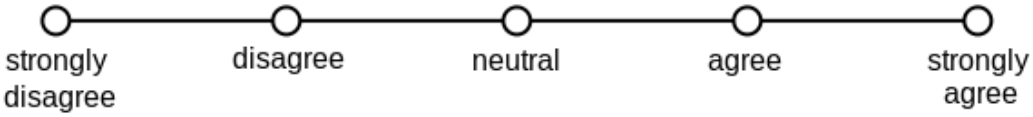
2. Using the Contactless smart card system gives us greater control over our business' sales transactions.



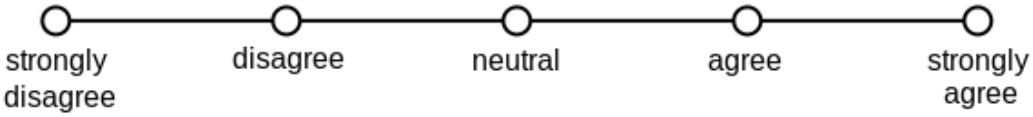
3. Using the Contactless smart card system enables us to process payments more quickly.



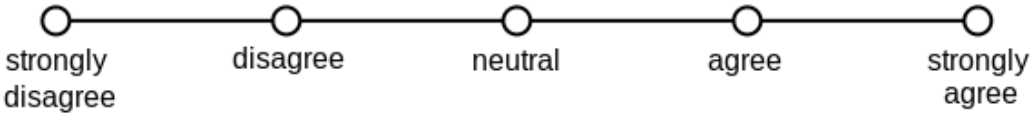
4. Using the Contactless smart card system enhances the on-the job effectiveness of me and the personnel.



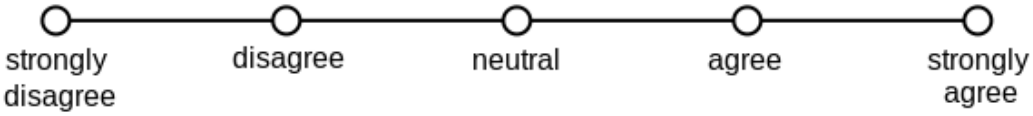
5. Using the Contactless smart card system makes it easier for us to do our jobs.



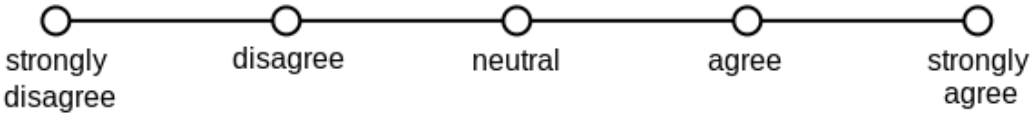
6. Merchants who use the Contactless smart card system have more prestige than those who do not.



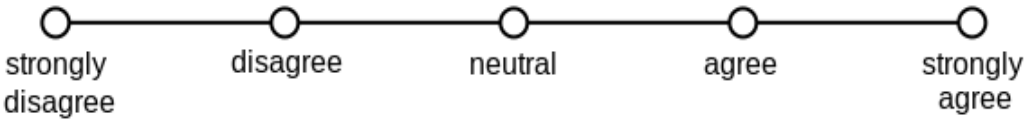
7. Merchants who use the Contactless smart card system have a higher profile than those who do not.



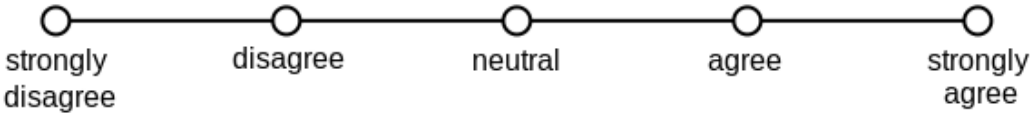
8. Having a Contactless smart card system is a status symbol among the merchants I know.



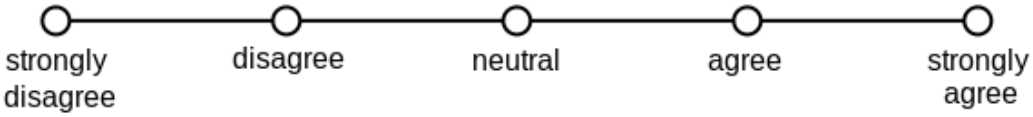
9. Important merchants or consumers who will use the Contactless card will influence the market.



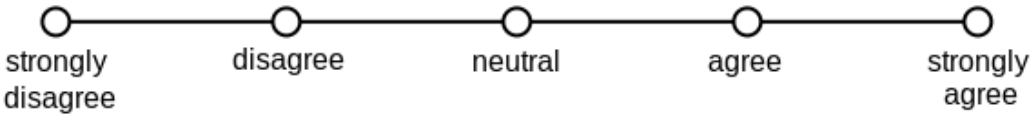
10. The Contactless smart card system seems easy to learn.



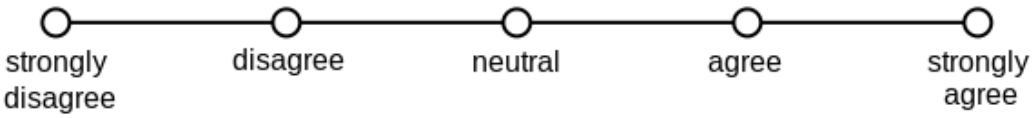
11. The Contactless smart card system seems easy to use.



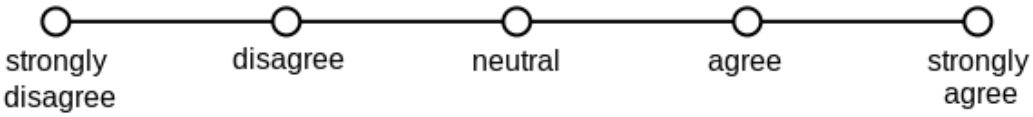
12. I think that the Contactless smart card system is compatible with all aspects of my business's sales transactions.



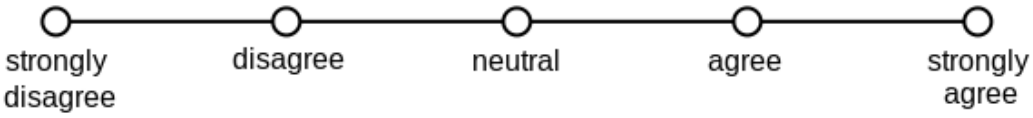
13. I think that using the Contactless smart card system fits well with the way my staff and I like to receive payment for goods and services.



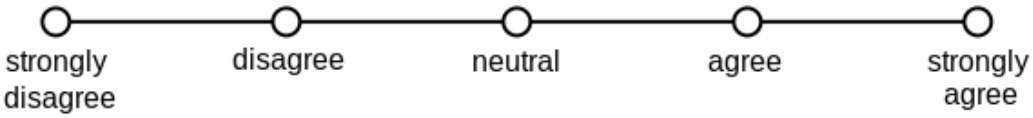
14. Using the Contactless smart card system fits with our business's work style.



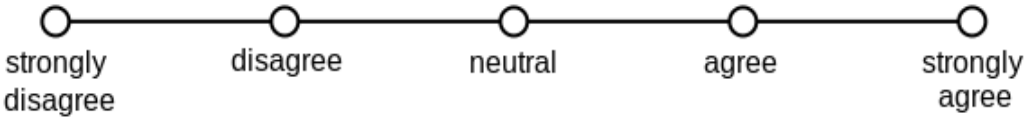
15. I think that banks and governments will support this initiative



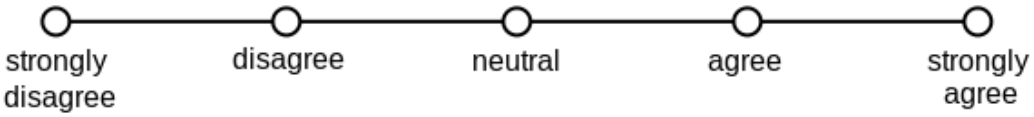
16. I trust JCC's ICT infrastructure



17. I trust that the contactless payment system will not lead to transaction fraud



18. I think that JCC's contactless smart card will protect private information.



19. I am interested in using the contactless payment system in my business