

THE ADOPTION OF NEAR-FIELD COMMUNICATION TECHNOLOGY
FOR MOBILE PAYMENTS:
AN EMPIRICAL INVESTIGATION OF MAJOR DETERMINANTS

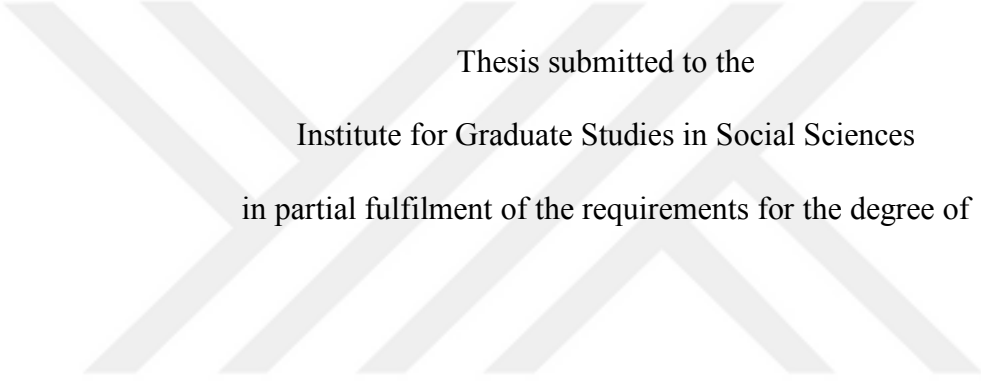


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BOĞAZIÇI UNIVERSITY

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The Adoption of Near-Field Communication Technology for Mobile Payments:
An Empirical Investigation of Major Determinants

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DECLARATION OF ORIGINALITY

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- this thesis contains no material that has been submitted or accepted for a degree or diploma in any other educational institution;
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ABSTRACT

The Adoption of Near-Field Communication Technology for Mobile Payments:

An Empirical Investigation of Major Determinants

Continuous developments in technology expedites the improvements in payment industry, which directly affects the way people pay. Near-field communication (NFC) protocol-based payment method is the latest trending payment method amongst users. It enables users to make fast and secure payments by simply bringing their mobile phone closer to the POS devices. However, the adoption rate of proximity based mobile payment has been low. Accordingly, the present study attempts to find the adoption factors of NFC mobile payment by considering social influences, personal traits, cultural traits, behavioral beliefs and moderating effects such as demographic and previous experience. Our findings show that perceived innovativeness in IT, perceived risk, relative advantage and social influence are statistically significant determinants for NFC adoption. However, time pressure is found as an insignificant determinant as opposed to the expectations. Another proved relationship is that there is a statistically significant relation between the use of mobile payment services and NFC. NFC adoption is higher among consumers with higher mobile payment experience.

ÖZET

Mobil Ödemelerde Yakın Alan İletişim Teknolojisinin Kabulü:

Başlıca Belirleyicilerin Ampirik Olarak İncelenmesi

Teknolojideki sürekli gelişmeler, ödeme endüstrisindeki gelişmeleri hızlandırmakta ve bu da insanların ödeme şeklini doğrudan etkilemektedir. Yakın alan iletişimi (NFC) protokolü tabanlı ödeme yöntemi, kullanıcılar arasında en son trend ödeme yöntemidir. Kullanıcıların cep telefonlarını kullanarak hızlı ve güvenli ödeme yapmalarını sağlar. Bu çalışma, NFC mobil ödeme yöntemini benimseme faktörlerini, sosyal etkileri, kişisel özellikleri, kültürel özellikleri, davranışsal inançları ve demografik ve önceki deneyimler gibi etkileri göz önüne alarak bulmaya çalışmaktadır. Bulgularımız, Bilişim Teknolojilerinde algılanan yenilikçiliğin, algılanan riskin, göreceli avantajın ve sosyal etkinin, NFC'nin kabulü için istatistiksel olarak önemli belirleyiciler olduğunu göstermektedir. Bununla birlikte, zaman baskısı beklentilerin aksine önemsiz bir etken olarak bulunmuştur. Kanıtlanmış bir başka ilişki de, mobil ödeme servislerinin kullanımı ve NFC kullanımı arasında istatistiksel olarak anlamlı bir ilişki olduğudur. NFC'nin kabulü, mobil ödeme servisinin kullanım deneyimi ile arttığı anketlerin analizi ile kanıtlanmıştır.

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TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION.....	1
CHAPTER 2: LITERATURE REVIEW.....	4
2.1 Technology adoption theoretical models.....	4
2.2 Mobile payment evolution and its adoption.....	10
2.3 NFC mobile payment adoption.....	12
CHAPTER 3: CONCEPTUAL MODEL AND HYPOTHESIS DEVELOPMENT....	15
3.1 Social influences.....	16
3.2 Personal traits.....	17
3.3 Behavioral beliefs.....	19
3.4 Experience.....	21
CHAPTER 4: RESEARCH METHODOLOGY.....	23
4.1 Instrument.....	23
4.2 Sample.....	23
CHAPTER 5: ANALYSIS AND RESULTS.....	25
5.1 Confirmatory factor analysis.....	25
5.2 Structural model.....	29
CHAPTER 6: DISCUSSION AND CONCLUSION.....	41
CHAPTER 7: LIMITATIONS AND FUTURE RESEARCH.....	45

APPENDIX: SURVEY QUESTIONS..... 46

REFERENCES..... 51



LIST OF TABLES

Table 1. Sample Demographics.....	24
Table 2. Construct Reliability and Validity.....	26
Table 3. Discriminant Validity (Fornell-Larcker Criterion)	26
Table 4. Discriminant Validity (Heterotrait-Monotrait Ratio (HTMT)).....	27
Table 5. Outer Loadings.....	27
Table 6. Descriptive Analysis.....	28
Table 7. Correlation Analysis.....	29
Table 8. Model Fit Results	30
Table 9. Model P-Value, T Stats and Hypothesis Results	32
Table 10. Indirect Effects, Path Coefficients and Total Effect.....	32
Table 11. Mobile Payment Experience * NFC User Crosstabulation	33
Table 12. Chi-Square Tests	33
Table 13. Model Chi-Square Analysis.....	33
Table 14. R Square Analysis	34
Table 15. F Square Analysis.....	35
Table 16. Predictive Relevance (Q ²) Analysis	36
Table 17. Effect size (q ²) Analysis	36
Table 18. Hedonistic Scales – One-Way Anova	37
Table 19. Hedonistic Scales - Tukey Multiple Comparisons	38
Table 20. Hedonistic Scales Descriptives	38
Table 21. VALS Scales – One-Way Anova.....	39
Table 22. VALS Scales - Tukey Multiple Comparisons.....	39
Table 23. VALS Scales - Descriptives.....	40

LIST OF FIGURES

Figure 1. Theory of reasoned action	5
Figure 2. Theory of planned behaviour.....	6
Figure 3. Technology acceptance model.....	7
Figure 4. Diffusion of innovations theory.....	8
Figure 5. Categorization of adopters.....	8
Figure 6. TAM2	9
Figure 7. UTAUT.....	10
Figure 8. Research model.....	15
Figure 9. Test results of the research model.....	30

CHAPTER 1

INTRODUCTION

Payment is the heart of all businesses. It is very crucial for businesses to provide appropriate payment services to their customers. With the continuous developments in technology, payment methods have also evolved and diversified, which enables businesses to accept various types of payment methods on their channels. Cash, cheque, debit card, credit card and digital payment solutions are the main payment services which are currently provided by businesses. In addition to these methods, mobile payment methods are also becoming very important due to the widespread use of mobile devices and it facilitates transactions immobile, or pervasive commerce (Tan, Ooi, Chong, & Hew, 2013). The methods which are used by consumers in order to purchase goods and services drastically changed with the widespread penetration of proximity mobile payment systems (Slade, Williams, Dwivedi, & Piercy, 2015).

Companies have been investing heavily to provide mobile payment solutions to increase their revenues. The new innovations in short-range wireless technologies such as Near Field Communication (NFC), Bluetooth, Infrared Data Association (IrDA) and Radio Frequency Identification (RFID), consumers have been able to conduct payment “anytime” and “any-where” (Leong, Hew, Tan, & Ooi, 2013). With the help of these advancement, a new type payment method has emerged, which is called mobile payment (m-payment) using NFC enabled mobile devices. There are several definitions of m-payment in the literature. Most of the authors states that NFC payment technology is as a convenient solution to daily payment needs. Mobile payment allows its users to manage their daily payment needs such as bill, services and goods, by using their mobile devices

(Dahlberg, Mallat, Ondrus, & Zmijewska, 2007). M-payment is also seen as a new solution for reducing the use of cash at point of sale by enabling micropayments in mobile commerce (Menke & De Lussanet, 2006).

Tech companies already released their m-payment services through their NFC enabled mobile devices. For example, Apple developed its own NFC payment technology Apple Pay in October 2014, Google has its own payment solution Android pay in June 2016, and Alibaba also has Alipay March 2018. Given the rise of Internet of Things (IoT), which is another hot topic in the tech industry, this type of method has become more popular amongst users in the recent years. This technology can be integrated into any mobile device such as mobile phone or watch, and users take the advantage of convenient and fast payment.

Although NFC mobile payment is more convenient and has benefits and advantages over other payment types such as cash and credit card, its adoption rate is surprisingly low amongst users. In the literature, this was researched by authors recently. Oh et. al. (2014) analysed the acceptance of NFC-based mobile payment services and used Innovation Diffusion Theory (Rogers, 2010) to explain the current state of the acceptance. Li et al. (2014) also addressed the reasons of slow adoption of NFC by building a research model from Technology Acceptance Model (Davis F. D., 1986). Pham et al. (2015) diagnosed the mobile payment usage, and tried to find the main factors affecting the intention to adopt mobile payments as well as the main hurdles that need to be overcome in order to accelerate the adoption of NFC mobile payment.

This study aims to understand the factors affecting the intention to use NFC mobile payments by using an adapted version of Yang et al. (2011)'s model.

Considering the major advantages of NFC payment over other payment methods, time

pressure factor was also integrated to the Yang's model in order to analyse its effect on the adoption. Finally, behavioral beliefs and social norms are also analysed to understand the reasons behind the slow adoption of NFC mobile payment.



CHAPTER 2

LITERATURE REVIEW

2.1 Technology adoption theoretical models

NFC mobile payment is the latest innovation of mobile phone manufacturers. It can only be used with mobile phones supporting this technology, however NFC feature will default be included in all mobile phones in the near future. As more phones support this feature, the adoption rate of NFC mobile payment is expected to increase. However, this is not the only parameter affecting the adoption rate. In the scientific literature, there are many proven models which were designed and developed to analyse the behaviour intention of using new technology, and many social psychology studies using these models (Pavlou, 2002). Some of the critical theories and models are briefly reviewed in the following sub-sections.

2.1.1 Theory of reasoned action (TRA)

Theory of Reasoned Action assumes that behavioral intention, which is the previous step to behavior, is a belief or information about the probability that performing a particular behavior will lead to a specific outcome (Ajzen & Fishbein, 1977; Akour, 2009). As stated in TRA model, attitude and subjective norms are playing key role on the behavioral intention of an individual. Attitudes, which is also called behavioral beliefs, reflect an individual's self-evaluation on performing the behavior, whereas subjective norm, which is also called normative belief, refers to the effect of social pressures on an individual's innovation adoption.

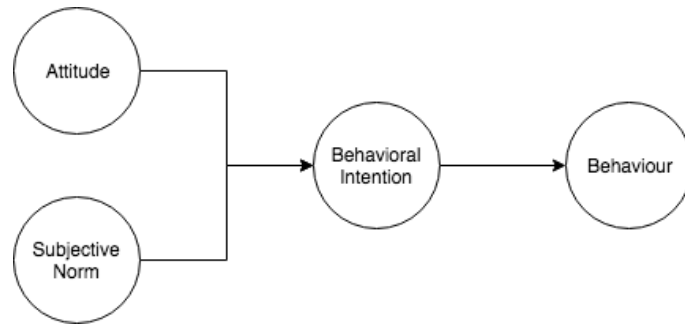


Figure 1. Theory of reasoned action

2.1.2 Theory of planned behaviour (TPB)

Theory of Planned Behaviour is an extended version of Theory of Reasoned Action.

Perceived Behavioral Control is included to the TRA model and it has a direct effect on behavioral intention and indirect effect on Behaviour. Perceived Behavioral Control is included to examine the person's beliefs on how simple or difficult it is to show a certain behavior or act in a certain manner. TPB posits that (Ajzen, 1991) there is a direct impact of certain beliefs on behavioral perceptions and indirect the actual behavior. This model is actively used in modern marketing tools. In tech world, all shopping websites have abundant customer reviews, ratings and discussions to form user's opinions. In addition to that, most web services have free trial plan for their potential users, which lets them to test the platform and decide whether they should subscribe to the platform.

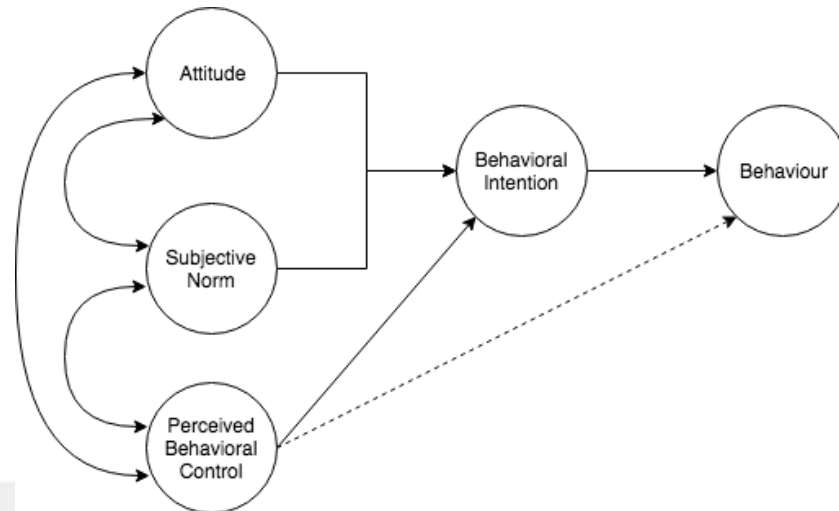


Figure 2. Theory of planned behaviour

2.1.3 Technology acceptance model (TAM)

Technology Acceptance Model is an adaptation of TRA designed for understanding the user acceptance of information systems (Davis F. D., 1986). TAM aims to provide a theoretically justified general explanation of the determinants of information systems acceptance by describing users' behaviour across a wide spectrum of computer technologies and user populations (Davis, Bagozzi, & Warshaw, 1989). TAM was also adopted as a proven theoretical model used to analyse and clarify acceptance in technology products (Legris, Ingham, & Collette, 2003).

In TAM, there are two main constructs, which are Perceived usefulness and Perceived Ease of Use. Davis (1989) defined these two constructs as follows:

- Perceived Usefulness: “the degree to which a person believes that using a particular system would enhance his or her job performance” Davis (1989)
- Perceived Ease of Use: “the degree to which a person believes that using a particular system would be free from effort.” Davis (1989)

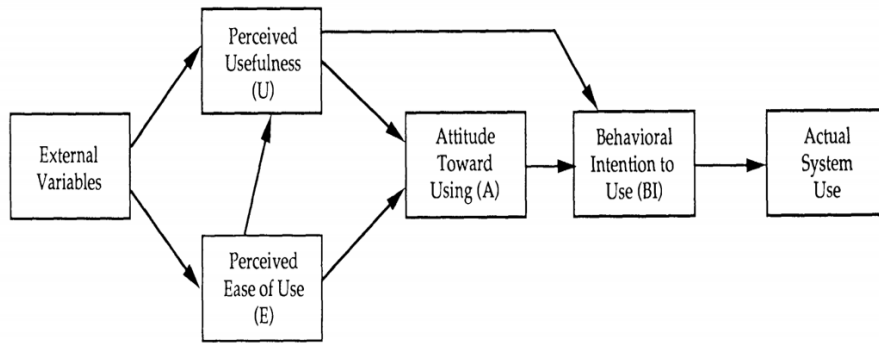


Figure 3. Technology acceptance model

2.1.4 Diffusion of innovations theory

Diffusion of innovations is a theory that is trying to explain how, why, and at what rate new ideas and technology spread. Relative advantage, compatibility, observability, trialability, and complexity are the main constructs of the diffusion innovation Theory (Rogers, 2010). Relative advantage is same with the Perceived Usefulness and complexity is same with the Perceived Ease of Use in TAM. Trialability is the ease with which customers can try a new product or service. Observability is the noticeable results of trying or consuming the idea. Lastly, compatibility is the level of ease of using the past experience to understand how the new product functions.

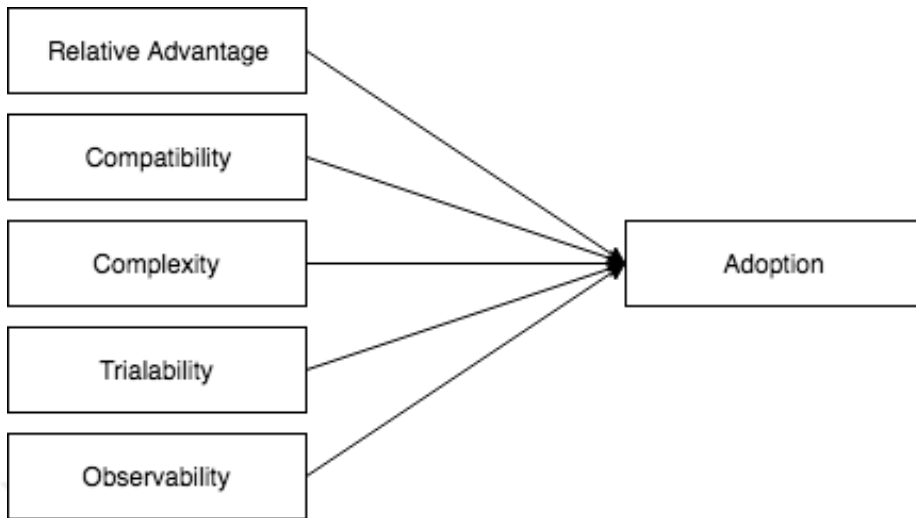


Figure 4. Diffusion of innovations theory

As shown in figure 5, adopters are categorized as innovator (venturesome), early adopter (respectable), early majority (deliberate), late majority (sceptical) or laggards (traditional) (Rogers, 2010).

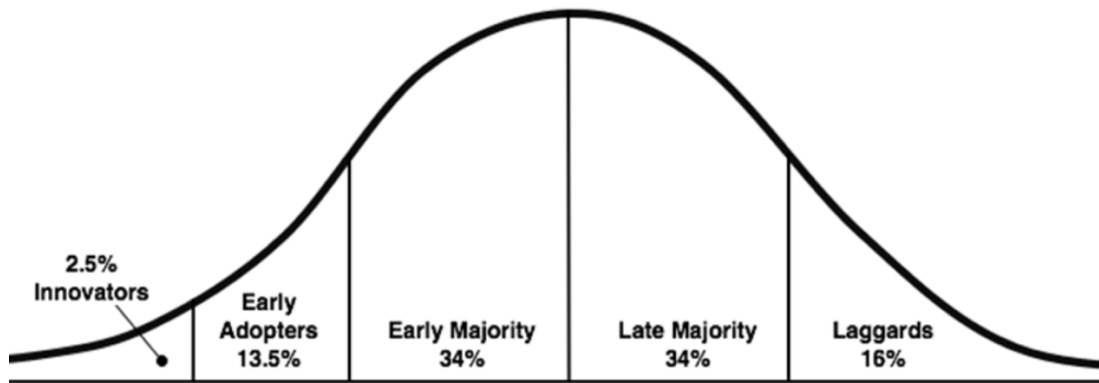


Figure 5. Categorization of adopters

2.1.5 Technology acceptance model 2 (TAM 2)

Venkatesh and Davis (2000) extended original TAM model by including subjective norm, job relevance, image, output quality, and result demonstrability as additional

constructs. All of these factors have direct impact on Perceived Usefulness.

Additionally, the study proved that Subjective Norm not only affects perceived usefulness but also directly affects Intention to Use and Image.

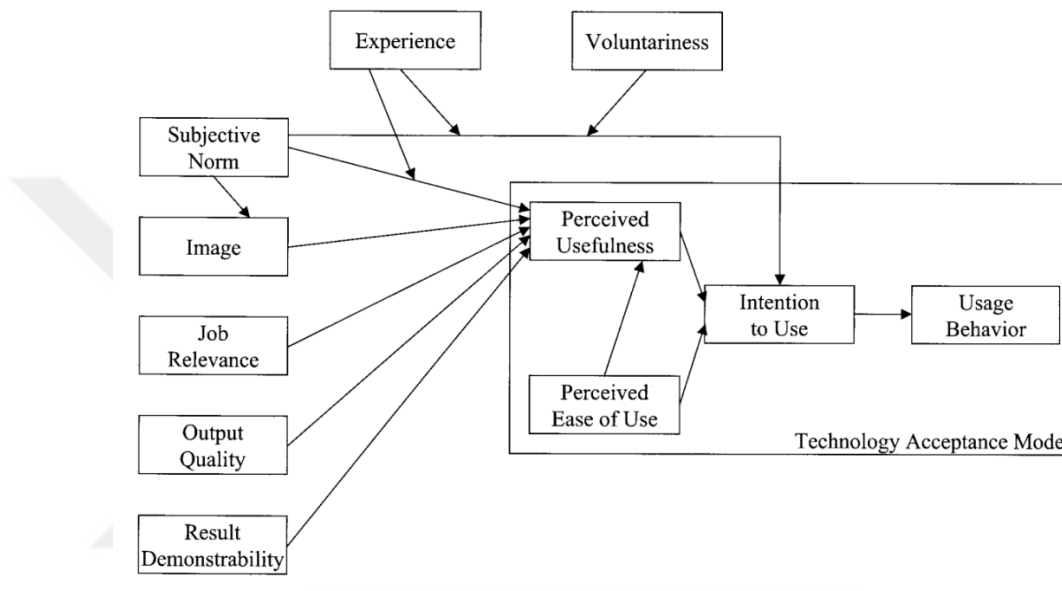


Figure 6. TAM2

2.1.6 Unified theory of acceptance and use of technology model (UTAUT)

Unified Theory of Acceptance and Use of Technology (UTAUT) is the expanded version of TAM (Venkatesh, Morris, Davis, & Davis, 2003). This new model consolidates the most established technology acceptance theories including TRA, TAM, TPB, DOI, motivational model (Davis et al., 1992), the model of PC utilization (Thompson, Higgins, & Howell, 1991; Venkatesh, Morris, Davis, & Davis, 2003) and social cognitive theory (Compeau, Higgins, & Huff, 1999). Although it is a very comprehensive model, UTAUT has not easily been adapted to researches related to mobile payments (Akour, 2009).

As shown in figure 7, UTAUT proposes 4 key constructs, two of which are derived from TAM. Performance expectancy is the same as TAM's perceived usefulness and likewise effort expectancy is same with perceived ease of use. UTAUT also includes 4 moderator constructs which are gender, age, experience and voluntariness of use. 'Voluntariness of use' measures whether technology is a must in the job and to what extent it is required by the executives.

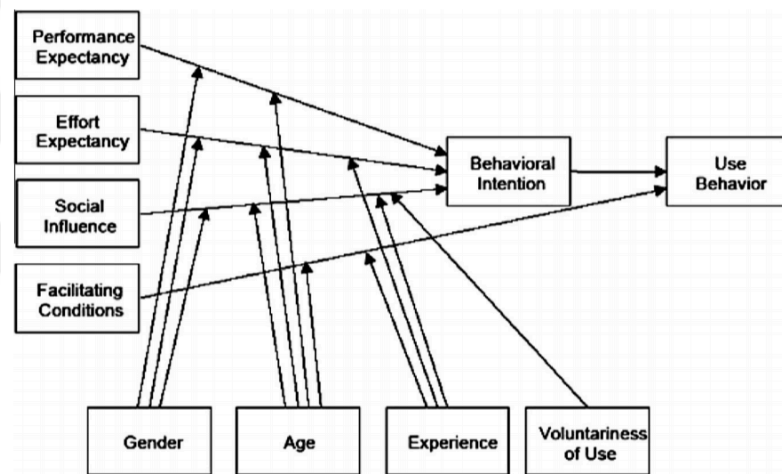


Figure 7. UTAUT

2.2 Mobile payment evolution and its adoption

The researches has been done on mobile payment for nearly 10 years. The researchers started to do their researches on internet banking and mobile banking but then mobile payment took the attention of researchers due to its high penetration rate in a very short time. The new advances on mobile devices and the high usage of mobile devices helped the adoption of mobile payments by its users.

Mobile payment is a strong alternative to other payment methods for bills, services and goods (Kim, Mirusmonov, & Lee, 2010). It basically uses the benefits of mobile

technologies such as wireless communication technologies, telecommunication technologies and recently NFC technologies. The main benefit of mobile payment services over other payment methods is that it is location independent. Users can make payment anytime and anywhere when they have internet connection.

Mobile payment (M-Payment) is a very general term because it includes many different type of technologies. The first mobile payment is considered as payment via a short message (Zhou, 2013). Mobile devices users were downloading ring tones, wallpapers, music and game via sending short messages to their service providers (Dahlberg, Mallat, Ondrus, & Zmijewska, 2007). Users can also use mobile payment technologies to buy products from vending machines and tickets from ticket machines (Dahlberg, Mallat, Ondrus, & Zmijewska, 2007). With the upcoming advances, users could connect to internet via their mobile devices and a new term arose mobile commerce (M-Commerce). Mobile device owners started to shop via their mobile devices. With the rise M-Commerce, mobile wallet solutions such as PayPal started to invade the market. On the other hand, financial institutions also took the advantage of mobile technologies. Banks developed their responsive internet banking and mobile application which enables their customers to use their services on mobile devices. Banks even started to change their strategies and define them “Mobile-First” because of the importance of mobile banking.

In the literature, there are many studies focused on mobile payment adoption. Yang et al (2011) analyse the differences on adoption factors between potential and current users. They found that behavioral beliefs including perceived fee, social influence and PIIT have direct significant impact of behavioral intention for potential adopters. Additionally social influence and PIIT have also indirect significant impact on

adoption. Regarding current users, direct impact of perceived fee on behavioral intention and indirect impact of social influence were not significant. Based on Cabanillas et al (2014), the impact of risk, social influence, usefulness was found significant both for users who are under 35 and above and equal 35. According to Oliveira, the impact of compatibility, social influence, innovativeness, perceived technology security and performance expectancy on behavioral intention were found significant. Yan and Yang (2005) found that trust is significantly impacting the adoption of intention to use of mobile payments and trust has significant relationship with perceived ease of use, perceived usefulness, structural assurance and ubiquity.

2.3 NFC mobile payment adoption

Oh et al. (2014) defined Near Field Communication (NFC) as a “key enabling technology of the mobile industry”. It has also been considered as the future of MP services (Ondrus & Pigneur, 2007, July). The increase in mobile phone usage amongst people with the new advances in mobile technologies created huge opportunities for companies which are interested in providing new payments solutions and complementary services to their customer. The increase in mobile phone usage amongst people with the new advances in mobile technologies created huge opportunities for companies which are interested in providing new payments solutions and complementary services to their customer (Pham & Ho, 2014, July). In the contemporary information systems literature, researchers mostly focus on the acceptance of mobile payment methods in general rather than specifically on NFC payment method. However, in recent years, there is an increasing interest on NFC mobile payment

adoption studies due to the new released payment methods such as Apple Pay, Android Pay and NFC enabled cards.

In the new studies, all of the technology adoption models explained in the previous section were applied by researchers to understand the factors affecting the intention of NFC mobile payment services.

Leong et al. (2013) has published a research aiming to analyze the determinants of the adoption of NFC-enabled mobile credit card, which was considered as the future of payment. Leong extended TAM by adding Social influence, Perceived Innovativeness in Information technology (PIIT), Trust and Perceived Cost and analyzed the direct and indirect effect of each construct on intention to adopt NFC enabled mobile credit card. Age and experience was also included as moderator constructs to the model. Leong et al. (2013) found that PIIT and Trust have a significant effect on Perceived Usefulness and Perceived Ease of Use, which directly affect Intention to adopt NFC-Enabled mobile card.

In another study, Pham & HO (2004) proposed a new model, which is a combination of Technology Acceptance Model and Diffusion of Innovation Theory, to analyze the effect of product-related factors, trust-based factors, personal-related factors and attractiveness of alternatives on the intention to adopt NFC mobile payments.

UTAUT model was also used to analyze the intention to use NFC mobile payment in Slade's paper (Slade, Williams, Dwivedi, & Piercy, 2015). Slade et al. extended the UTAUT by integrating perceived Risk and Trust as additional constructs, and proved that Trust in provider and Perceived risk significantly affect the intention to use the NFC mobile payment.

The importance of mobile payment solutions and the impact of them on payment market are mentioned by some of the authors in the literature; they say that the success of mobile commerce is dependent on mobile payment services (Lu, Yang, Chau, & Cao, 2011; Lu, Yang, Chau, & Cao, 2011), that it has become more and more prevalent in everyday life today (Schierz, Schilke, & Wirtz, Understanding consumer acceptance of mobile payment services: An empirical analysis, 2010), that in China it created a huge potential market attracting numerous service providers which are interested in offering m-payment services (Yang, Liu, Li, & Yu, 2015), that is revolutionizing the payment market (Hedman & Henningsson, 2015), or that it has a huge market potential (Zhou, 2013).

CHAPTER 3

CONCEPTUAL MODEL AND HYPOTHESIS DEVELOPMENT

Figure 8 presents the research model including the proposed hypotheses in this study. This research model was adapted by the research model of Yang et al. (2011). Original model was built to analyse the main determinants of mobile payment adoption in mobile commerce. In order to analyse the NFC mobile payment adoption, this study used the same model by adding time pressure as a new construct.

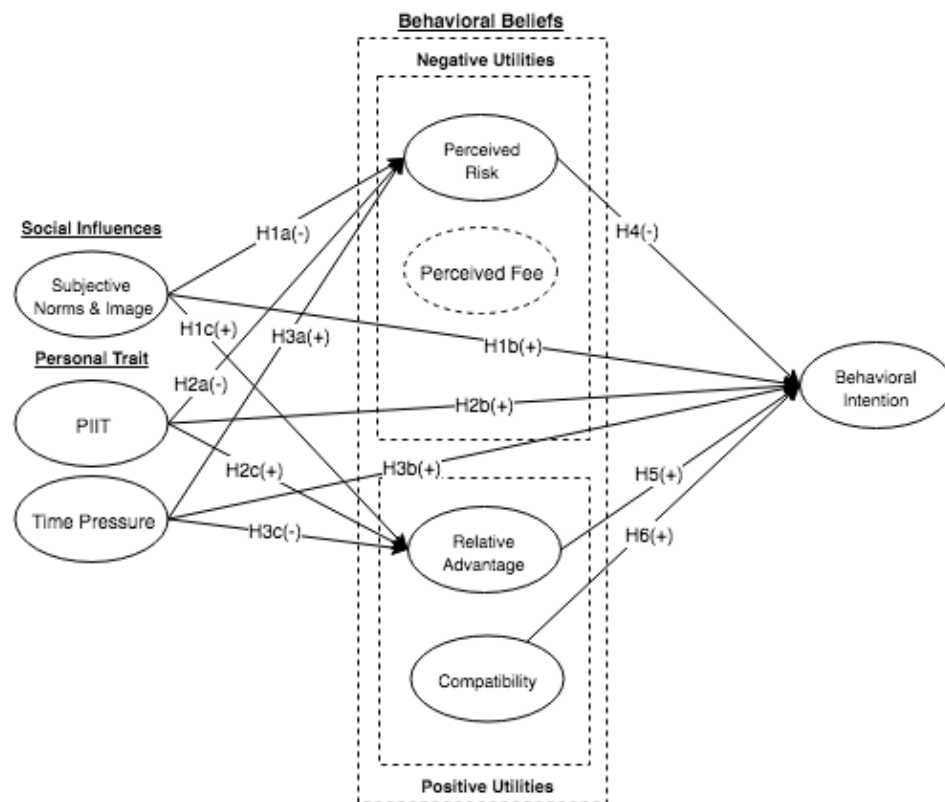


Figure 8. Research model

3.1 Social influences

Social influence can be defined as the shift in attitude which is caused by one person to another, purposely or not, as a consequence of the way the person who changed recognises themselves in relationship to the other person who influenced, other people and community in general. Social influence is included in models of technology Acceptance models such as TAM2 and UTAUT, and also in models of consumer behaviour such as TPB and TRA. Interestingly, although original TAM is one of the most applied models, TSM tends to neglect social influence in the model (Shin, 2009). However, in early studies related to mobile payment and specifically NFC payment, it has been found that social influence is an important motivation for new technology adoption. Yang et al. (2011) and Oliveira et al. (2015) found that social influence has significant effect on behavioral intention to adopt mobile payment. It was also found that social influence has a strongest influence on Behavioral intention with regards to NFC payment adoption (Slade, Williams, Dwivedi, & Piercy, 2015).

Taking into account the findings of previous researches on mobile payment adoption, social influence is considered as an important construct that should be integrated into the model. Therefore, the following three hypothesis are posed:

Hypothesis 1a: Social influence is negatively related to perceived risk of adopting NFC mobile payment.

Hypothesis 1b: Social influence is positively related to the intention to adopt NFC mobile payment.

Hypothesis 1c: Social influence is positively related to relative advantage of adopting NFC mobile payment.

3.2 Personal traits

Under the personal traits, this study included Personal innovativeness in technology and time pressure in order to analyse the effects of them on perceived risk, relative advantage and Behavioral Intention.

3.2.1 Personal innovativeness in information technology (PIIT)

Personal innovativeness in technology (PIIT) is regarded as one of the key factors on technology adoption. Agarwal and Prasad (1998) defined it as “the willingness of an individual to try out any new information technology”. In the previous studies, it was found that PIIT has a significant direct or indirect effect of PIIT on behavioral intention. Lu et al. (2005) observed a powerful causal relationships between social influences, personal innovativeness and the perceptual beliefs. On another study, Yang et al. (2011) found that PIIT has a significant positive effect on relative advantage and Behavioral intention in mobile payments. In a separate research regarding intention to use mobile payment, it was also found that PIIT has significant positive effect on perceived ease of use (Kim, Mirusmonov, & Lee, 2010).

Considering the findings explained above, PIIT is integrated into the model and the following three hypothesis are posed:

Hypothesis 2a: PIIT is negatively related to perceived risk of adopting NFC mobile payment.

Hypothesis 2b: PIIT is positively related to the intention to adopt NFC mobile payment.

Hypothesis 2c: PIIT is positively related to perceived relative advantage of adopting NFC mobile payment.

3.2.2 Time pressure

Time pressure is defined as “the degree to which consumers consider themselves busy” (Srinivasan & Ratchford, 1991). When NFC payment technology is compared to cash payment and credit card payment with swipe and chip, transaction time of NFC payment is lower than the cash payment and credit card. In cash payment, there is generally change needed to be calculated and handed to the consumer. Also, in credit card payment, consumer is expected to enter PIN to authorize the transaction. Both of these processes take time. However, modern mobile devices use finger print or face recognition technology for authorizing their users and this makes NFC payment via mobile payment faster than its alternatives.

Considering the fact that NFC payment is significantly faster than any type of cash and credit card payment, it is expected that consumers who are time sensitive chose to use NFC payment over other payment methods in their daily lives. Therefore the following three hypothesis are posed:

Hypothesis 3a: Time Pressure is negatively related to perceived risk of adopting NFC mobile payment.

Hypothesis 3b: Time Pressure is positively related to the intention to adopt NFC mobile payment.

Hypothesis 3c: Time pressure is positively related to perceived relative advantage of adopting NFC mobile payment.

3.3 Behavioral beliefs

Peter & Tarpey (1975) designed the valence framework, Valence theory, originating from economics and psychology fields (Lin, Wang, Wang, & Lu, 2014), to explain consumer behavior intention by considering both positive and negative aspects of behavioral beliefs.

Valence framework was applied by some of the researchers in their studies to analyse the consumer behaviour. Lu et al. (2011) incorporated valence framework into their model to analyze whether trust of a customer in Internet payment services is likely to affect his or her initial trust in mobile payment services. They also examined how these trust beliefs might interact with both positive and negative valence factors and affect a customer's adoption of mobile payment services. Ozturk et al. (2016) aimed to explore restaurant customers' NFC-MP technology acceptance by using a model based on valence Theory, and proved that privacy concern, utilitarian value and convenience significantly affected individuals' NFC-MP technology acceptance.

3.3.1 Perceived risk

Innovations involve risk in it (Cho, 2004). NFC mobile payment has also its own risks. In the literature, it is found that Perceived Risk is one of the major barriers for consumers to adopt mobile payment services (Mallat, 2007; Shin, 2009; Liu, Yang, & Li, 2012). Also Yang et al. (2012) argued that perceived risk is a clearly a negative construct in the models analysing Information System related product adoption. Based on the findings of authors about perceived risk, this study also takes perceived risk as a negative effect on consumers' intention to use NFC mobile payment.

When customers recognize that using NFC mobile payment will pose a greater risk, they

are likely to have less intention to use NFC mobile payment. The following hypothesis is therefore posed:

Hypothesis 4: Perceived risk of NFC mobile payment services is negatively related to the intention to adopt it.

3.3.2 Relative advantage

When convenience, efficiency and ubiquity are considered as performance measures, traditional payment services lack of many benefits of mobile payment services (Yang, Lu, Gupta, Cao, & Zhang, 2011; Mallat & Tuunainen, 2005). Apart from these three performance measures, another key attribute of mobile payment is that it brings users independence to use the service at any time and any location if they have internet access (Jarvenpaa & Lang, 2005).

As mobile payment is considered as a better alternative to traditional payment services, it is expected that relative advantage has a positive effect on intention to use mobile payment. In a previous study, Kim et al. (2010) found that Behavioral intention in mobile technologies is positively affected by relative advantage.

In the light of previous studies and findings, relative advantage was integrated into the model designed to analyse NFC mobile payment adoption. Therefore, The following hypothesis is posed:

Hypothesis 5: Perceived relative advantage of NFC mobile payment is positively related to the intention to adopt it.

3.3.3 Compatibility

In a nutshell, if a product is compatible with someone, that it fits with the his/her existing values, current needs, and present lifestyle. In the literature, perceived compatibility has been considered as a very important construct in technology adoption model. Tornatzky & Klein (1982) found that perceived compatibility is a very important innovation characteristic which drives consumer acceptance. In another research, Hardgrave et al. (2003) posits that perceived compatibility positively affects both the attitude toward using a technology and perceived usefulness.

Some authors researching the mobile payment adoption also used Compatibility. According to Teo & Pok (2003) and Wu & Wang (2005), Compatibility is an important factor determining individuals' use of mobile service. Also, Yang et al. (2012) found that compatibility is one of the most important factors determining consumers' intention to use mobile payment service. Schierz et al. (2010) also examined that perceived compatibility exerts the greatest impact on the intention to use mobile payment services.

In the light of previous researches and findings of authors, compatibility was integrated into the model designed to analyse NFC mobile payment adoption. Therefore, The following hypothesis is posed:

Hypothesis 6: Perceived compatibility of NFC mobile payment is positively related to the intention to adopt it.

3.4 Experience

Experience is one of the constructs of UTAUT model (Venkatesh, Morris, Davis, & Davis, 2003). It was considered as an important factor on Behavioral intention.

The effect of previous experience of similar technologies on new technology adoption was also considered as a part of this study, therefore a separate construct was integrated to the research model. Participants were asked to reply to a question regarding how many years they are experienced in mobile payment services. It is expected to see a positive relationship between the previous experience and the NFC payment services usage, therefore following hypothesis is posed:

Hypothesis 7: There is a relationship between mobile payment experience and NFC payment services usage.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 Instrument

In order to analyse the research model and validate the hypotheses, a survey was conducted. Survey questions which were prepared to measure the constructs were adapted from the literature related to mobile payment and mobile banking. Seven-point Likert scale was used in the questionnaire. Appendix section includes each construct and its adapted items, items' original version and original author information.

4.2 Sample

The data collection was conducted using an online survey tool (www.typeform.com). Sample was collected with convenience sampling as survey was distributed via social media to the friends and via email to the colleagues in Ireland and Turkey and they were also asked to redistribute in their own networks. Survey was available online for 2 months. A total of 140 valid responses were collected.

In the survey, the goal of the survey was presented to the respondents. In addition to that, in order to avoid the confusion about the subtle difference between mobile payment and NFC payment, a detailed explanation of the NFC payment services (Near field communication, abbreviated NFC, is a form of contactless communication between devices like smartphones or tablets) was also presented to the respondents.

Table 1 presents the demographic details of respondents. 93 respondents have never used NFC mobile payment services, on the other hand 47 respondents has experience on NFC mobile payment services. Majority of the respondents are male and between 25-35 years old. Nearly 70% of respondents are working for corporate

companies. Monthly income of the respondents are evenly spread except “over 5000 USD”. Similarly, Education level of the respondents are evenly spread except “Phd”. Also most of the respondents have either no experience or more than 2 years’ of mobile payment experience.

Table 1. Sample Demographics

Measure	Item	Potential Adopters (N1 = 93)		Current Users (N2 = 47)	
		Count	Percentage	Count	Percentage
Gender	Female	29	31.2	15	31.9
	Male	64	68.8	32	68.1
Age	24 or below	11	11.8	6	12.8
	25 to 30	45	48.4	25	53.2
	31 to 35	20	21.5	12	25.5
	36 or above	17	18.3	4	8.5
Education	High School and less	23	24.7	3	6.4
	Bachelors	28	30.1	21	44.7
	Masters	31	33.3	21	44.7
	Phd	11	11.8	2	4.3
Occupation	Corporate	64	68.8	31	66
	Education	16	17.2	4	8.5
	Government	2	2.2	4	8.5
	Student	11	11.8	8	17
Monthly Income	1500 USD or below	23	24.7	11	23.4
	1500 USD to 3000 USD	28	30.1	20	42.6
	3000 USD to 5000 USD	31	33.3	11	23.4
	Over 5000 USD	11	11.8	5	10.6
Mobile Payment Experience	I never used before	45	48.4	0	0
	0 to 1 years	6	6.5	9	19.1
	1 to 2 years	5	5.4	12	25.5
	2 or above	37	39.8	26	55.3

CHAPTER 5

ANALYSIS AND RESULTS

5.1 Confirmatory factor analysis

In this study structural equation modelling (SEM) PLS was used to analyse the proposed research model and hypotheses with the SmartPLS software. However, in order to validate the items of a scale and reliability of the items, initially a Confirmatory factor analysis is made. There are three criteria that has to be analysed: i) factor (outer) loadings of the measurements on each construct should be over the value of 0.7; ii) the composite reliability (CR) of each construct should exceed the value of 0.8; and iii) the average variance extracted (AVE) by each construct should meet the cut-off value of 0.5 (Li, Liu, & Heikkilä, 2014; Li, Liu, & Heikkilä, 2014; Li, Liu, & Heikkilä, 2014; Lin, Wang, Wang, & Lu, 2014). In addition to these criteria, Dillone Goldstein's rho, also referred to as the composite reliability coefficient (Werts, 1974) can also be used for reliability check. Rho value should be above 0.7 to satisfy the criteria.

As shown in Table 2, perceived fee available in the original version of the research model was removed because it was found unreliable (Cronbach's Alpha < 0.7) based on the survey results. Discriminant validity table with Fornell-Larcker Criterion and Heterotrait-Monotrait Ratio were also analyzed to test whether constructs that are expected to be unrelated are unrelated. As can be seen in Table 3 and Table 4, values between constructs are below 0.85, which shows that none of the constructs are related to each other.

As presented in the Table 4, the composite reliability (CR) values of each item is above 0.8, as recommended. Also the average variance extracted (AVE) of all the

constructs satisfy the recommended minimum level of 0.5. These two parameter indicated that there is a strong internal consistency between items. In addition to these two parameters, Cronbach Alpha of each scale was also analysed in the study. Cronbach Alpha values of each scale is the recommended level which is 0.7. As an additional composite reliability check, Rho_A value of each value is also above the recommended value, 0.7. As shown in Table 5, outer loadings of each item except TimePressure1 is above recommended minimum level. 0.7. The outer loading of TimePressure1 is 0.678, which was very close to 0.7, so it was ignored.

Table 2. Construct Reliability and Validity

Construct	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Compatibility	0.786	0.801	0.903	0.823
Behavioral Intention	0.892	0.894	0.920	0.698
Perceived Risk	0.819	0.820	0.917	0.846
Perceived Innovativeness	0.814	0.827	0.890	0.730
Relative Advantage	0.830	0.843	0.886	0.661
Social Influence	0.850	0.860	0.899	0.692
Time Pressure	0.786	0.847	0.874	0.702
Perceived Fee	0.534	0.889	0.781	0.650

Table 3. Discriminant Validity (Fornell-Larcker Criterion)

	Behavioral Intention	Compatibility	Perceived Risk	PIIT	Relative Advantage	Social Influence	Time Pressure
Behavioral Intention	0.836						
Compatibility	0.659	0.907					
Perceived Risk	-0.452	-0.546	0.920				
PIIT	0.480	0.352	-0.184	0.855			
Relative Advantage	0.621	0.520	-0.273	0.329	0.813		
Social Influence	0.333	0.209	-0.148	0.210	0.385	0.832	
Time Pressure	0.238	0.104	0.015	0.290	0.270	0.132	0.838

Table 4. Discriminant Validity (Heterotrait-Monotrait Ratio (HTMT))

	Behavioral Intention	Compatibility	Perceived Risk	PIIT	Relative Advantage	Social Influence	Time Pressure
Behavioral Intention							
Compatibility	0.779						
Perceived Risk	0.527	0.688					
PIIT	0.561	0.441	0.223				
Relative Advantage	0.711	0.635	0.322	0.390			
Social Influence	0.376	0.255	0.175	0.251	0.447		
Time Pressure	0.281	0.129	0.061	0.345	0.315	0.168	

Table 5. Outer Loadings

	Behavioral Intention	Compatibility	Perceived Risk	PIIT	Relative Adv	Social Inf	Time Press
BehavioralIntention1	0.815	0.626	-0.368	0.404	0.471	0.163	0.170
BehavioralIntention2	0.838	0.603	-0.417	0.484	0.506	0.193	0.185
BehavioralIntention3	0.870	0.537	-0.420	0.363	0.564	0.371	0.211
BehavioralIntention4	0.859	0.539	-0.355	0.362	0.547	0.354	0.245
BehavioralIntention5	0.794	0.433	-0.321	0.389	0.504	0.316	0.184
Compatibility1	0.545	0.891	-0.556	0.329	0.456	0.224	0.092
Compatibility2	0.643	0.923	-0.444	0.312	0.486	0.162	0.097
PIIT1	0.360	0.283	-0.126	0.783	0.256	0.110	0.147
PIIT2	0.419	0.319	-0.193	0.878	0.346	0.224	0.309
PIIT3	0.448	0.298	-0.149	0.899	0.233	0.192	0.270
RelativeAdvantage1	0.407	0.341	-0.124	0.216	0.763	0.271	0.150
RelativeAdvantage2	0.581	0.483	-0.286	0.329	0.839	0.345	0.261
RelativeAdvantage3	0.540	0.437	-0.190	0.264	0.833	0.313	0.241
RelativeAdvantage4	0.463	0.410	-0.266	0.244	0.816	0.313	0.208
Risk1	-0.427	-0.479	0.924	0.179	-0.281	-0.123	0.022
Risk3	-0.405	-0.526	0.916	0.160	-0.220	-0.149	0.006
SocialInfluences1	0.349	0.249	-0.143	0.203	0.274	0.723	0.117
SocialInfluences3	0.294	0.166	-0.129	0.126	0.402	0.889	0.124
SocialInfluences4	0.249	0.117	-0.097	0.175	0.288	0.866	0.175
SocialInfluences5	0.189	0.150	-0.114	0.203	0.293	0.839	0.008
TimePressure1	0.153	0.058	-0.011	0.158	0.135	-0.009	0.678
TimePressure2	0.218	0.100	0.019	0.265	0.258	0.117	0.922
TimePressure3	0.219	0.096	0.022	0.284	0.261	0.180	0.893

As it can be deduced from the mean values in the descriptive analysis table 6, except social Influence, respondents tended to respond on mid value but slightly at the positive side (greater than 4) of the 7 Likert scale. Standard deviation is between 1.105 and 1.573, which shows that data spread densely around the mean value.

Table 6. Descriptive Analysis

	Mean	Std. Deviation
Relative Advantage	4.68	1.105
Social Influence	3.58	1.337
Behavioral Intention	5.02	1.172
PIIT	5.07	1.219
Compatibility	4.67	1.243
Time Pressure	4.93	1.312
Risk	4.14	1.573

As it is shown in the table 7, bivariate correlation analysis was applied to find the significance of relationship between constructs. According to the results, there are significant relationships between most of the constructs. However, there are 4 exceptions. There was no significant relationship found between time pressure and compatibility, time pressure and social influence, risk and social influence, and risk and time pressure.

Table 7. Correlation Analysis

		Relative Adv.	Social Inf.	Behavioral Intention	PIIT	Comp.	Time Pressure	Risk
Relative Adv.	Pearson Correlation	1						
Social Inf.	Pearson Correlation	.396**	1					
Behavioral Intention	Pearson Correlation	.611**	.381**	1				
PIIT	Pearson Correlation	.326**	.233**	.479**	1			
Comp.	Pearson Correlation	.512**	.251**	.650**	.354**	1		
Time Pressure	Pearson Correlation	.252**	0.118	.234**	.278**	0.101	1	
Risk	Pearson Correlation	-.268**	-0.165	-.450**	-.185*	-.550**	0.011	1

5.2 Structural model

First of all, in order to assess structural model for Collinearity Issue, partial Least Squares (PLS) path modelling method was applied. The PLS path modelling method was developed by Wold (1982). In essence, the PLS algorithm is a sequence of regressions in terms of weight vectors. Secondly, Bootstrapping was performed to analyse the significance and relevance of structural model relationship. Lastly, blindfolding was applied to do further analysis of the model such as explained variance (R^2), effect size (F^2), predictive relevance (Q^2) and the effect size (q^2).

5.2.1 Model fit

Model Fit result is used by researchers to decide whether a hypothesis model structure fits the empirical data or not. Root mean square residual covariance (RMS_{θ}) is one of the model fit measures which was introduced by Lohmoller (1989). It is suggested that a well-fitting model has a RMS_{θ} value lower than threshold value which is 0.12. Any

value above the threshold value indicated a lack of fitness in the model (Henseler, et al., 2014). As shown in table 8, RMS_{θ} is 0.195, which is higher than 0.12. Although it is close 0.12, this result shows that model does not fit well with the empirical data

Table 8. Model Fit Results

	Saturated Model	Estimated Model
SRMR	0.068	0.107
d_ULS	1.285	3.154
d_G	0.791	0.989
Chi-Square	628.947	687.968
NFI	0.692	0.663
Rms Theta		0.195

5.2.2 Significance and relevance of relationships

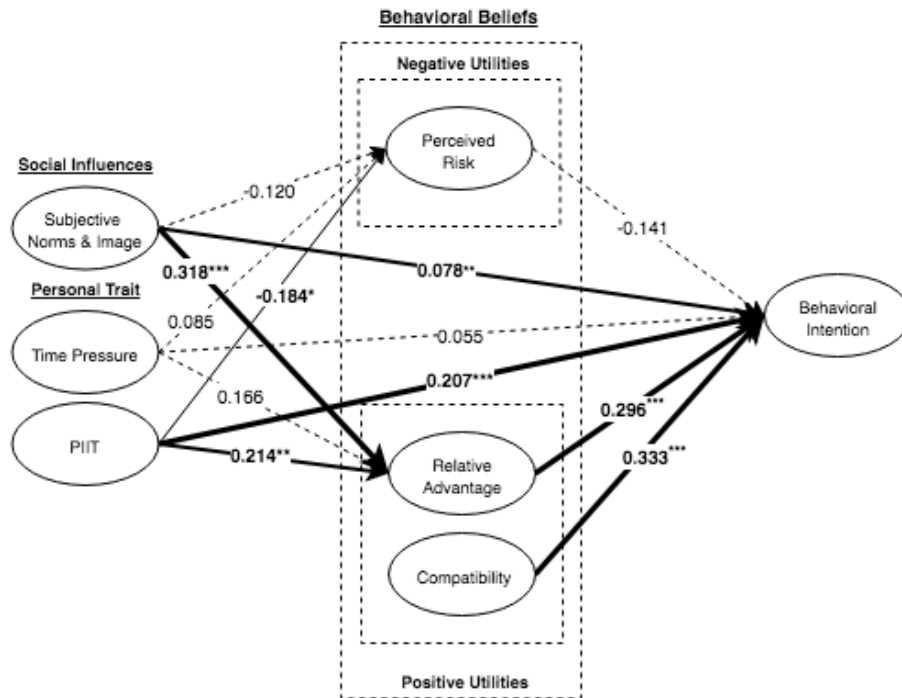


Figure 9. Test results of the research model.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

As shown in Figure 9 and Table 9, each path has its own significance and path coefficient value calculated by Smart PLS with bootstrapping method, which are helpful to analyse research model hypothesis.

In terms of social influences, the negative effect of social influences on relative advantage (Hypothesis 1c) and the positive effect of social influences on behavioral intention (Hypothesis 1a) were supported, while negative effect on perceived risk (Hypothesis 1b) was not supported. Regarding personal traits, the negative effect of PIIT on perceived risk (Hypothesis 2b), and the positive effect of PIIT on behavioral intention (Hypothesis 2a), and relative advantage (Hypothesis 2c), were supported. However, the impact of time pressure on perceived risk (Hypothesis 3b), on behavioral intention (Hypothesis 3a), and relative advantage (Hypothesis 3c) were not supported. In terms of behavioral beliefs, the negative effect of perceived risk (Hypothesis 4) was not supported, while the positive effect of relative advantage (Hypothesis 5) and compatibility (Hypothesis 6) on Behavioral intention were supported.

Although path coefficient is an important value for determining the strength of the relation between constructs, it is also suggested to analyze the indirect effect of constructs. As shown in Table 10, social influence, perceived innovativeness and time pressure have indirect effect on the behavioral intention. This means that total effects of these constructs on behavioral intention are higher than the direct effects of them on behavioral intention.

Table 9. Model P-Value, T Stats and Hypothesis Results

Path	Hypothesis	T Stat (O/STDEV)	P Value	Supported
Social Influence -> Behavioral Intention	H1a	2.955	0.003	YES
Social Influence -> Perceived Risk	H1b	1.335	0.182	NO
Social Influence -> Relative Advantage	H1c	4.473	0.000	YES
Perceived Innovativeness -> Behavioral Intention	H2a	3.875	0.000	YES
Perceived Innovativeness -> Perceived Risk	H2b	2.042	0.041	YES
Perceived Innovativeness -> Relative Advantage	H2c	2.584	0.010	YES
Time Pressure -> Behavioral Intention	H3a	1.203	0.229	NO
Time Pressure -> Perceived Risk	H3b	0.891	0.373	NO
Time Pressure -> Relative Advantage	H3c	1.888	0.059	NO
Perceived Risk -> Behavioral Intention	H4	1.838	0.066	NO
Relative Advantage -> Behavioral Intention	H5	3.575	0.000	YES
Compatibility -> Behavioral Intention	H6	4.016	0.000	YES

Table 10. Indirect Effects, Path Coefficients and Total Effect

Path	Hypothesis	Path Coefficient	Indirect Effects	Total Effects
Social Influence -> Behavioral Intention	H1a	0.078	0.111	0.189
Social Influence -> Perceived Risk	H1b	-0.120		-0.120
Social Influence -> Relative Advantage	H1c	0.318		0.318
Perceived Innovativeness -> Behavioral Intention	H2a	0.207	0.089	0.296
Perceived Innovativeness -> Perceived Risk	H2b	-0.184		-0.184
Perceived Innovativeness -> Relative Advantage	H2c	0.214		0.214
Time Pressure -> Behavioral Intention	H3a	0.055	0.037	0.092
Time Pressure -> Perceived Risk	H3b	0.085		0.085
Time Pressure -> Relative Advantage	H3c	0.166		0.166
Perceived Risk -> Behavioral Intention	H4	-0.141		-0.141
Relative Advantage -> Behavioral Intention	H5	0.296		0.296
Compatibility -> Behavioral Intention	H6	0.333		0.333

Finally, Crosstab analysis shown in tables 11 , table 12 and table 13 was used to analyse the relationship between mobile payment experience and the being an NFC user (Hypothesis 7). Based on the Cross tab analysis, it was found that there is a significant relationship between these two constructs. Accordingly, Hypothesis 7 was also validated.

Table 11. Mobile Payment Experience * NFC User Crosstabulation

		NFC user		Total
		No	YES	
Mobile payment experience	I never used before	45	0	45
	0 to 1 year	6	9	15
	1 to 2 years	5	12	17
	2 or above	37	26	63
Total		93	47	140

Table 12. Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	39.560	3	.000
Likelihood Ratio	52.489	3	.000
Linear-by-Linear Association	17.547	1	.000
N of Valid Cases	140		

Table 13. Model Chi-Square Analysis

Relationship	Hypothesis	P Value	Supported
Mobile Payment Experience -> NFC User	H6	0.000	YES

5.2.3 Explained variance (R^2)

R^2 result is a measure of the model's predictive power. It shows the combined effect of exogenous latent variables on the endogenous latent variable. R^2 value of 0.75, 0.5, or 0.25 are described as substantial, moderate and weak. This study is trying to find out the intention to use the NFC mobile payment so R^2 value of the Behavioral intention is the most important indices to analyse. As can be seen in the table 14, R^2 value of the Behavioral intention is 0.605 which is between 0.75 and 0.5. This value indicates that the model's predictive power on behavioral intention is considered between moderate to substantial.

Table 14. R Square Analysis

	R Square	R Square Adjusted
Behavioral Intention	0.605	0.587
Perceived Risk	0.053	0.032
Relative Advantage	0.237	0.220

5.2.4 Effect size (F^2)

F^2 value of a construct shows its effect on the endogenous construct when it is removed from the model. As shown in the table 15, The effect sizes of Compatibility and Relative advantage on Behavioral intention, and social Influence on Relative advantage are considerably high compare to the other effects.

Table 15. F Square Analysis

	Behavioral Intention	Perceived Risk	Relative Advantage
Compatibility	0.148		
Perceived Risk	0.035		
Perceived Innovativeness	0.086	0.032	0.053
Relative Advantage	0.136		
Social Influence	0.013	0.014	0.126
Time Pressure	0.007	0.007	0.033

5.2.5 Predictive relevance (Q^2)

As suggested, predictive relevance was also analysed in addition to explained variance (R^2) analysis. Q^2 is an indicator of the model's out of sample predictive power and Q^2 value was calculated by blindfolding method. In the analysis, 8 is selected as the omission distance D value. It is suggested that a certain endogenous construct should have a Q^2 value larger than 0 in order to confirm that the model has predictive relevance for that construct. In contrast, values of 0 and below indicate a lack of predictive relevance. As shown in the table 16, all Q^2 values of endogenous constructs -behavioral intention, Perceived Risk and Relative Advantage are higher than zero so it can be deduced that model has a has predictive relevance for all the endogenous constructs.

Table 16. Predictive Relevance (Q^2) Analysis

	SSO	SSE	$Q^2 (=1-SSE/SSO)$
Behavioral Intention	700.000	430.851	0.384
Compatibility	280.000	280.000	
Perceived Risk	280.000	275.555	0.016
Perceived Innovativeness	420.000	420.000	
Relative Advantage	560.000	489.047	0.127
Social Influence	560.000	560.000	
Time Pressure	420.000	420.000	

5.2.6 Effect size (q^2)

Effect size (q^2) is used by researchers to assess the effect of an exogenous construct to an endogenous construct's Q^2 value. The values 0.02, 0.15 and 0.35 respectively indicates that an exogenous construct has a small, medium and large predictive relevance on a certain endogenous variable. As shown in the table 17, the q^2 values of compatibility on Behavioral intention, perceived innovativeness on Behavioral Intention, relative advantage on behavioral Intention and Social Influence on relative advantage are small to medium and all other effect sizes were found as small.

Table 17. Effect size (q^2) Analysis

	Behavioral Intention	Perceived Risk	Relative Advantage
Behavioral Intention			
Compatibility	0.0617		
Perceived Risk	0.0081		
Perceived Innovativeness	0.0276	0.0193	0.0137
Relative Advantage	0.0269		
Social Influence	-0.0032	-0.0061	0.0676
Time Pressure	-0.0065	0.0061	0.0092

5.3 Values and life styles (VALS) and hedonistic scale analysis

In addition to questions which were designed to measure constructs in the model, there are questions which were included to measure VALS and hedonistic values of the respondents in order to compare if there is any difference between people who are using NFC payments and people who are not using NFC payment.

One-way anova was used to test the difference between the means of NFC Users and Non-NFC Users on hedonistic values of people. According to the analysis shown in Table 18, there is a significant difference between the NFC Users and non-NFC Users on feeling happy and feeling usefulness. NFC users feel more happy and useful.

In parallel to these findings, it was also found that as can be seen on Table 19 there is significant difference between the 2+ years mobile payment product users and non-users on feeling usefulness of the mobile payment products. As it can be deduced from the mean values in the Table 20, Feeling useful increases with longer usage experience.

Table 18. Hedonistic Scales – One-Way Anova

		Sum of Squares	df	Mean Square	F	Sig
Feeling Useful	Between Groups	16.424	3	5.475	3.761	0.01*
	Within Groups	197.997	136	1.456		
	Total	214.421	139			
Feeling Happy	Between Groups	10.954	3	3.651	2.855	0.04*
	Within Groups	173.932	136	1.279		
	Total	184.886	139			

Table 19. Hedonistic Scales - Tukey Multiple Comparisons

Dependent Variable	Mobile payment Experience	Mobile payment Experience	Sig.
Feeling Useful	I never used before	0 to 1 year	0.998
		1 to 2 year	0.927
		2 or above	0.011*

Table 20. Hedonistic Scales Descriptives

	NFC USER	Number	Mean
Feeling Useful	NO	93	5.41
	YES	47	5.87
Feeling Happy	NO	93	5.18
	YES	47	5.62

One-way anova was again used to test the difference between the means of NFC Users and Non-NFC Users on VALS values of people. However, there was no significant difference found for any VALS values.

One-way anova was also applied to test the difference between the means of mobile payment users and non-users on VALS values of people. According to the analysis results shown in Table 21, there is a significant difference between the mobile payment users and non-mobile payment users on warm relationship with others, self-fulfilment, self-respect and sense of accomplishment. Table 22 shows that the difference is mainly between non-users and users who have been using a mobile payment product for 1-2 years. As can be seen in Table 23, mean values of all vals scales are higher for non-mobile payment users, however the number of 1-2 years experinced users are very low in the research so there needs to be more users to analyse the difference for vals scales.

Table 21. VALS Scales – One-Way Anova

		Sum of Squares	Mean Square	F	Sig
Warm Relationship with others	Between Groups	22.214	7.405	6.684	0.000*
	Within Groups	150.672	1.108		
	Total	172.886			
Self-fulfilment	Between Groups	16.816	5.605	4.047	0.009*
	Within Groups	188.355	1385		
	Total	205.171			
Self-Respect	Between Groups	20.24	6.747	4.747	0.004*
	Within Groups	193.303	1.421		
	Total	213.543			
Sense of Accomplishment	Between Groups	7.203	2.401	2.813	0.420*
	Within Groups	116.083	0.854		
	Total	123.286			

Table 22. VALS Scales - Tukey Multiple Comparisons

Dependent Variable	Mobile payment Experience	Mobile payment Experience	Sig.
Warm Relationship with others	I never used before	0 to 1 year	0.095
		1 to 2 year	0.001*
		2 or above	0.97
Self-fulfilment	I never used before	0 to 1 year	0.108
		1 to 2 year	0.027*
		2 or above	0.96
Self-Respect	I never used before	0 to 1 year	0.959
		1 to 2 year	0.002*
		2 or above	0.858
Sense of Accomplishment	I never used before	0 to 1 year	0.963
		1 to 2 year	0.032*
		2 or above	0.989

Table 23. VALS Scales - Descriptives

	Mobile Payment Experience	Number	Mean
Warm Relationship with others	I never used before	45	5.92
	1 to 2 year	15	5
Self-fulfilment	I never used before	45	6
	1 to 2 year	15	5.37
Self-Respect	I never used before	45	6.21
	1 to 2 year	15	5.31
Sense of Accomplishment	I never used before	45	6.09
	1 to 2 year	15	5.43

CHAPTER 6

DISCUSSION AND CONCLUSION

This study aimed to find out major determinants affecting NFC mobile payment adoption by using the model which was adapted from Yang et al. (2011). Time pressure was integrated to the model in order to understand the importance of time for NFC mobile payment user. Furthermore, impact of mobile payment experience and VALS and hedonistic values on NFC MP adoption are explored.

According to descriptive analysis, it was found that respondents mostly had high personal innovative characteristics. Most of the respondents were working in IT sector so the goal was to select innovative people for the survey. Secondly, mean value of time pressure result was found high as well. Nearly 70% of respondents work at corporate companies and most of them have busy life style. This might be the reason of the high time pressure perception. Lastly, the mean value of social influence result was low. The reason for this might be the overall profile of the respondents. Nearly 80% of the respondent have either bachelors or masters degree. Educated people are mostly self-confident people and this may the reason of low social influence.

Nevertheless in our study, a positive significant relationship is found between social influence and behavioral intention. This shows that consumers takes into consideration their friends or relatives' opinions about NFC mobile payment usage. This result is parallel with the results of Cabanillas et al(2014). However, the relationship between social influence and risk is insignificant. It shows that consumers tend not to be influenced by their friends and relatives when it comes to the risks of the NFC mobile payment. On the contrary, Social influence has a direct positive significant effect on

relative advantage of NFC mobile payment usage. This shows that consumers are more willing to listen to their social environment when it comes to the advantages of NFC mobile payment.

Perceived Innovativeness in IT (PIIT) has a very strong factor when it comes to the behavioral intention of NFC mobile payment usage. It was found that PIIT has significant effect on behavioral intention, perceived risk and relative advantage. However, according to the findings of Yang et al (2011), PIIT had an insignificant impact on the perceived Risk. This shows that NFC mobile payment technology risks are better understood by the users who are considered as innovative. Probably the main reason for this finding is that this study focuses on specific technology rather than the whole product family of mobile services. Respondents might reply to items related PIIT with a better understanding.

It was found that time pressure is not an important role on the usage of NFC mobile payment. Although NFC mobile payment saves time during the payment process, consumers don't really consider this as a significant important factor for choosing NFC mobile payment over other payment services. One of the possible reasons of this is that credit cards with embedded NFC chips are also performing as fast as NFC mobile payment. Therefore, consumers may not see a significant benefit of NFC mobile payment in terms of time saving.

It was also found that relative advantage has a direct significant effect on Behavioral intentions. One of the advantages of NFC mobile payment is that it reduces the number of items to carry. As NFC mobile payment can be integrated with mobile phones, consumers don't need to carry credit cards.

Another important relative advantage of NFC mobile payment is that it is safer compare to credit cards. Even if a user loses his/her mobile phone, as phone phones are locked with pin code/touch id or even face id, it is not possible to use to credit card integrated to the mobile phone.

Compatibility has a significant effect on behavioral intention of NFC mobile payment. This finding is in accordance with the findings of Li et al(2014). Companies are designing their marketing strategies based on consumers' emotional appeal rather than the functionalities of the NFC payment product. This may be the reason why compatibility is a significant factor.

In the study, the relationship between perceived risk and the intention to use NFC mobile payment was found insignificant, which is parallel with the findings of Li et al(2014). However it is conflicting finding with the Yang's findings and Cabanillas' findings. Yang et al(2011) and Cabanillas et al(2014) found that perceived risk has a significant negative impact on the behavioral intention. One of the main reason of this finding could be the convenience of the NFC payment products, where consumers tend to ignore the associated risks.

Current experience on other types of mobile payment also plays an important role in adopting NFC mobile payment. Consumers who are already experienced with other types of mobile payment types can easily adopt NFC mobile payment services. This finding is also aligned with the findings of Li et al(2014).

According to hedonistic value analysis, there were some significant differences found on hedonistic values of respondents based on NFC payment service experience. NFC users think that NFC products are useful and feel happy while they are using these products. This finding is parallel with the findings of Cabanillas et al(2014) regarding

the significant impact of perceived usefulness on intention to use mobile payment services. Similar to this, same difference was also found between mobile payment users and potential users. Mobile payment users also think that mobile payment products are useful but potential users think the opposite. These findings show that the benefits of mobile payment products may not be clearly understood by the potential users.

Finally, it was found that there is a significant difference between non-users and users who have 1-2 years mobile payment experience regarding life goals such as warm relationship with others, self-fulfilment, self-respect and self-accomplishment.

CHAPTER 7

LIMITATIONS AND FUTURE RESEARCH

This study has two major limitations which negatively affected further detailed analysis. First of all, this survey was conducted at a very early stage of NFC mobile payment technology and hence the sample of NFC users were limited. There were 140 respondents of the survey, 93 of which were potential NFC mobile payment users and 47 of them were current users. 47 is a very low number which is not enough to do a regression analysis and Anova. Therefore, model could not be run separately on each group. Comparison of results of possible separate analysis would be interesting because there could be some significant differences between the responses of current users and potential users. For future research, the similar model can be analyzed with more a survey data including at least 400 respondents.

Secondly, survey could be conducted in different countries where NFC mobile payment was available. If enough data can be collected from different countries with different cultures such as Turkey, US, Germany etc, cultural effect on behavioral adoption can also be analyzed. In this research, cultural effect could not be analyzed because there was not enough respondents in Ireland (14) for further analysis.

APPENDIX
SURVEY QUESTIONS

Construct	Item
Demographics	<p>your age:</p> <p>your gender:</p> <p>your nationality:</p> <p>your education level:</p> <p>your monthly income:</p> <p>your occupation:</p> <p>your mobile payment experience (years)</p>
Grouping User	Do you use your mobile device for NFC payment like Apple pay or Google pay?
Perceived Relative Advantage	NFC Mobile payment is more convenient than internet or off-line payment.
	NFC Mobile payment is more efficient than internet or off-line payment.
	NFC Mobile payment has more advantages than internet or off-line payment because services are not limited by location.
	NFC Mobile payment is more effective than internet or off-line payment in managing a payment account.
Perceived Risk	I would not feel totally safe providing personal privacy information over the NFC mobile payment system
	I am worried to use NFC mobile payment because other people may be able to access my account.
	I would not feel secure sending sensitive information across the NFC mobile payment system.
Behavioral intention	Assuming I have access to the NFC mobile payment system, I intend to use it.
	Given that I have access to the NFC mobile payment system, I predict that I would use it.
	In the near future, I'll use NFC mobile payment more frequently.
	In the near future, I'll use NFC mobile payment in more diverse product and service purchases
	In the near future, I'll intend to purchase more expensive product and services with NFC mobile payment
PIIT	If I heard about a new information technology, I would look for ways to experiment with it.
	Among my peers, I am usually the first to explore new information technologies.
	I like to experiment with new information technologies.
	In general, I am hesitant to try out new information technologies.

Social influences	People who influence my behaviour think that I should use NFC mobile payment.
	My friends think that I should use NFC mobile payment.
	People around me who use NFC mobile payment have more prestige than those who do not.
	People who use NFC mobile payment have a high profile.
	Using NFC mobile payment is considered a status symbol among my friends.
Time Pressure	I seem to be busier than most people I know
	Usually there is so much to do that I wish I had more time
	I usually find myself pressed for time
Compatibility	Using NFC mobile payment is compatible with all aspects of my life.
	Using NFC mobile payment fits into my life style.

Hedonistic scales

SCALE	QUESTION
	This part of the study measures what you feel about NFC mobile payment products and what NFC mobile payment means to you by having you judge them on a series of descriptive scales bounded at each end by one of two bipolar adjectives. Please mark (X) the cell that
Feeling Useful	Useless - Useful
Feeling Valuable	Worthless - Valuable
Feeling Beneficial	Harmful - Beneficial
Feeling Wise	Foolish - Wise
Feeling Happy	Sad - Happy
Feeling Agreeable	Disagreeable - Agreeable
Feeling Nice	Awful - Nice
Feeling Pleasant	Unpleasant - Pleasant

VALS scales (all scales were taken from (Aslihan Nasir & Karakaya, 2014))

SCALE	QUESTION
	Below, you can find a list consisting of something people wish to achieve during their life. After you examine the list carefully, please rate them by taking consideration of the importance of them in your daily life.
Life Goal Sense Of Belonging	Sense of belonging

Life Goal Excitement	Excitement
Life Goal Warm Relationship With Other	Warm relationship with others
Life Goal Self Fulfilment	Self-fulfilment
Life Goal Well Respected	Being well-respected
Life Goal Fun	Fun and enjoyment in life
Life Goal Security	Security
Life Goal Self Respect	Self-respect
Life Goal Sense Of Accomplishment	A sense of accomplishment

Adapted survey questions

Construct	Adapted Item	Original Item	Original Author
Perceived Relative Advantage	NFC Mobile payment is more convenient than internet or off-line payment.	Mobile banking is more convenient than Internet or off-line banking.	(Kim, Shin, & Lee, 2009)
	NFC Mobile payment is more efficient than internet or off-line payment.	Mobile banking is more efficient than Internet or off-line banking.	(Kim, Shin, & Lee, 2009)
	NFC Mobile payment has more advantages than internet or off-line payment because services are not limited by location.	Mobile banking has more advantages than Internet or off-line banking because services are not limited by location.	(Kim, Shin, & Lee, 2009)
	NFC Mobile payment is more effective than internet or off-line payment in managing a payment account.	Mobile banking is more effective than Internet or off-line banking in managing a bank account.	(Kim, Shin, & Lee, 2009)
Perceived Risk	I would not feel totally safe providing personal privacy information over the NFC mobile payment system	I would not feel totally safe providing personal privacy information over the Internet Banking.	(Lee, 2009)
	I am worried to use NFC mobile payment because other people may be able to access my account.	I'm worried to use online banking because other people may be able to access my account.	(Lee, 2009)
	I would not feel secure sending sensitive information across the NFC mobile payment system.	I would not feel secure sending sensitive information across the online banking.	(Lee, 2009)
Behavioral intention	Assuming I have access to the NFC mobile payment system, I intend to use it.	Assuming I have access to the system, I intend to use it.	(Venkatesh & Davis, A Theoretical Extension of the Technology Acceptance

			Model: Four Longitudinal Field Studies, 2000)
	Given that I have access to the NFC mobile payment system, I predict that I would use it.	Given that I have access to the system, I predict that I would use it.	(Venkatesh & Davis, A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies, 2000)
	In the near future, I'll use NFC mobile payment more frequently.	In the near future, I'll consume more organic foods	(Aslihan Nasir & Karakaya, 2014)
	In the near future, I'll use NFC mobile payment in more diverse product and service purchases	In the near future, I'll try other kinds of organic foods which I've not consumed yet	(Aslihan Nasir & Karakaya, 2014)
	In the near future, I'll intend to purchase more expensive product and services with NFC mobile payment	-	-
PIIT	If I heard about a new information technology, I would look for ways to experiment with it.	if I heard about a new information technology, I would look for ways to experiment with it.	(Agarwal & Prasad, 1998)
	Among my peers, I am usually the first to explore new information technologies.	Among my peers, I am usually the first to try out new information technologies	(Agarwal & Prasad, 1998)
	I like to experiment with new information technologies.	I like to experiment with new information technologies.	(Agarwal & Prasad, 1998)
	In general, I am hesitant to try out new information technologies.	In general. I am hesitant to try out new information technologies.	(Agarwal & Prasad, 1998)
Social influences	People who influence my behavior think that I should use NFC mobile payment.	People who influence my behavior think that I should use WIMD.	(Lu, Yao, & Yu, 2005)
	My friends think that I should use NFC mobile payment.	My friends think that I should use WIMD.	(Lu, Yao, & Yu, 2005)
	People around me who use NFC mobile payment have more prestige than those who do not.	People around me who use WIMD have more prestige than those who do not	(Lu, Yao, & Yu, 2005)
	People who use NFC mobile payment have a high profile.	People who use WIMD have a high profile.	(Lu, Yao, & Yu, 2005)
	Using NFC mobile payment is considered a status symbol among my friends.	Using WIMD is considered a status symbol among my friends.	(Lu, Yao, & Yu, 2005)
Time Pressure	I seem to be busier than most people I know	I seem to be busier than most people I know	(Srinivasan & Ratchford, 1991)

	Usually there is so much to do that I wish I had more time	Usually there is so much to do that I wish I had more time	(Srinivasan & Ratchford, 1991)
	I usually find myself pressed for time	I usually find myself pressed for time	(Srinivasan & Ratchford, 1991)
Compatibility	Using NFC mobile payment is compatible with all aspects of my life.	Using a PWS is compatible with all aspects of my life.	(Moore & Benbasat, 1991)
	Using NFC mobile payment fits into my life style.	Using a PWS into my work style.	(Moore & Benbasat, 1991)



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