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***Research paper***

# Near Field Communication Enabled Mobile Payments: Preliminary Study

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**Abstract**

The ubiquitous computing has made consumers life easy, it has given the new way to interact with family and friends and perform many activities which were impossible in previous time. One of the profound achievement of ubiquitous computing is Mobile Payment and an advanced mode of the mobile payment is the near field communication mobile payment. In this study the authors have proposed theoretical near field communication mobile payment model that is based on extended unified technology acceptance and use of technology (UTAUT2) .In this paper, the author have performed the pilot study to validate the variables and to verify their reliability among the proposed items. The results has proven that there is a reliability among the items in variables, as the Cronbach's alpha value for the variables is above or equal to 0.7.

***Keywords*** NFC; Near Field Communication; Mobile Payment; Proximity Payment.UTAUT2.

## 1. Introduction

Mobile payment has remained a hot topic for researchers. Although mobile payment has increased its advantages and converted into one of the useful tools, its adoption in Pakistan is very slow as compared to other countries. The reasons behind this can be the risk associated and insufficient knowledge.

The mobile payment is defined as payment carried out by a mobile device [1]. Essentially mobile payments fall into two categories such as Remote Mobile Payment and Proximity Mobile Payment. In past years, mostly mobile phones were equipped with carrying out remote mobile payment transaction where customer and merchant set up an account with MPSP (Mobile Payment Service Provider) for completing the payment process and this is the ideal process for the unbanked population. Remote mobile payment uses WAP, SMS, and Mobile applications, while Proximity mobile payment has the same financial industry infrastructure where a consumer can store credit and debit card information in mobile and can use it for a variety of service at POS (Point of Sale) System [2]. Mobile payments have gained the huge attention of financial technology providers, the main area of this is to achieve a centre point to deal with all sort of consumer activities. Nowadays more than half of the world population have a smartphone, which is used for almost every purpose. Wherever monetary activity is involved user al-ways try to make sure it is smooth and safe from any threats [3]. Mobile phone payments have gained success in few countries and the global mobile payment technology will be worth of US$ 1773.17 billion by the year 2024 as compared to US$ 338.72 billion in the year 2015 [4]. The increase in digital and smart devices has also increased the financial channels Now a days to facilitate the end user. The acceptance of any new technology has always worried the companies to launch a new product in the market [5].

The major share of mobile phone users is still far away to get the benefit of mobile payment services even though mobile phone payment is in support of the unbanked population of the world. Thus, to facilitate and provide secure monetary transaction near field communication (NFC) was introduced that operates at a very short range by using Radio Frequency Identification (RFID) technology [6], [7].

## 2. Background

Nowadays mostly devices are equipped with NFC technology and that has opened a door for the research community to measure and analyse its adoption in diverse backgrounds and cultures, especially in consumer services. NFC is quite different from web-based mobile payment methods due to its functionality in proximity settings where smartphone enabled with NFC and a POS system operates on a secure information exchange protocol [8]. Basically, NFC is used for communicating two devices unnecessarily of physical touch and it is based on RFID technology with ISO/IEC 18092 standards which makes it ideal for payment transactions [9]. Each time a new technology is introduced, its adoption has remained a hot topic for the research community. [10]. In the last 2 decades, mobile payment service has remained a hot topic for researchers and many services were introduced and failed due to lack of attraction for customers, banks, and merchants and difficult to operate. At present interest for mobile payment has shown a new sign for researchers due to the successful deployment of

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PayPal and Visa electron [11]. In this study UTAUT2 (Extended Unified Technology Acceptance and Use of Technology) has been taken as baseline theory. The constructs taken from UTAUT2 are performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, and habit with external variables such as compatibility from IDT (Innovation Diffusion Theory), risk, personal innovativeness in information technology and NFC payment knowledge.

# 3. Methodology

Pilot study method has been used to conduct this study. To conduct the pilot study and to calculate the reliability the Statistical Package software SPSS 23.0 was used perform tests.

## 3.1. The pilot study

The pilot study always plays an important role in the re-search. It can be defined as pre-testing of questionnaire and instruments before conducting the final version of the study. The pilot study itself does not promise the outcomes of final study but it could be helpful for the re-searcher by providing a glance for the outcome of the final study. A pilot study can be based on qualitative and quantitative methods from small to large scale research [12]. In quantitative research, pilot study helps a re-searcher with pre-testing of the questionnaire and outlines the understanding of questionnaire by the desired respondents.

In this study author conducted the pilot study to check the validity of the questionnaire. The questionnaire was prepared in the Google form and distributed online among the targeted respondents through personal emails and social media network. The five metropolitan cities of Pakistan were chosen for the data collection. A total number of 43 questionnaires were distributed and 36 respondents filled up the questionnaires with overall response rate was 83.72%. In the next section, the author will discuss the descriptive analysis of the pilot study.

## 3.2. 2 Background information of respondents

In this section, the author will describe respondent's background information for the pilot study. Table 1 shows basic information about the respondents

**Table 1:** Attitudes towards internet usage

| Do you own a smartphone? | | |
|---|---|---|
| Category | Frequency | Percent |
| Yes | 36 | 100 |
| No | | |
| How long have you been using smartphone? (years) | | |
| Category | Frequency | Percent |
| < 1 | 1 | 2.8 |
| > 5 | 20 | 55.6 |
| 1-2 | 3 | 8.3 |
| 3-4 | 12 | 33.3 |
| Total | 36 | 100 |
| Are you familiar with mobile payment? | | |
| Category | Frequency | Percent |
| No | 9 | 25 |
| Yes | 27 | 75 |
| Total | 36 | 100 |
| Have you ever used mobile payment? | | |
| Category | Frequency | Percent |
| No | 23 | 63.9 |
| Yes | 13 | 36.1 |
| Total | 36 | 100 |
| Do you know about NFC MP before? | | |
| Category | Frequency | Percent |
| No | 21 | 58.3 |
| Yes | 15 | 41.7 |
| Total | 36 | 100 |
| Do you know your smartphone is embedded with NFC? | | |
| Category | Frequency | Percent |
| No | 21 | 58.3 |
| Yes | 15 | 41.7 |
| Total | 36 | 100 |

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The respondent's background information shows among 36 respondents each have a smartphone and the frequency of using smartphone shows 55.6 % of respondents have been using a smartphone for more than 5 years and only 2.8% have been using it for less than 1 year. The familiarity with mobile payment shows that 75% of respondents are familiar with it and only 25% are unfamiliar which indicates that people are well aware of mobile payments. However, usage of mobile payment indicates that 63.9% of respondents have not used and 36.1% have experienced mobile payments. Familiarity about NFC indicates that 58.3% respondents do not know about NFC and 41.7% have information about the technology. The percentage for having knowledge about NFC in the mobile device of consumer 58.3% respondents do not know about it and 41.7% know that their mobile device is embedded with NFC.

## 3.3 Demographics of respondents

In this section, the author discuss respondent's demographic information. Table 2 shows data of respondents.

**Table 2:** Demographic Profile

| Gender | | |
|---|---|---|
| Category | Frequency | Percent |
| Female | 11 | 30.6 |
| Male | 25 | 69.4 |
| Total | 36 | 100 |
| Age (years) | | |
| Category | Frequency | Percent |
| 21 – 30 | 5 | 13.9 |
| 31 – 40 | 24 | 66.7 |
| 41 – 50 | 6 | 16.7 |
| 51 – 60 | 1 | 2.8 |
| Total | 36 | 100 |
| Education | | |
| Category | Frequency | Percent |
| Graduate | 6 | 16.7 |
| Post Graduate (MS) | 20 | 55.6 |
| Post Graduate (PhD) | 10 | 27.8 |
| Total | 36 | 100 |
| Occupation | | |
| Category | Frequency | Percent |
| Businessman | 4 | 11.1 |
| Government Employee | 17 | 47.2 |
| Private Employee | 7 | 19.4 |
| Student | 8 | 22.2 |
| Total | 36 | 100 |
| Monthly Income in Pakistani Rupees | | |
| Category | Frequency | Percent |
| < 20,000 | 5 | 13.9 |
| > 100,000 | 10 | 27.8 |
| 21,000 to 40,000 | 2 | 5.6 |
| 41,000 - 60,000 | 3 | 8.3 |
| 61,000 - 80,000 | 11 | 30.6 |
| 81,000 - 100,000 | 5 | 13.9 |
| Total | 36 | 100 |
| In which city do you live | | |
| Category | Frequency | Percent |
| Islamabad | 8 | 22.2 |
| Karachi | 12 | 33.3 |
| Lahore | 7 | 19.4 |
| Peshawar | 4 | 11.1 |
| Quetta | 5 | 13.9 |
| Total | 36 | 100 |

The demographic data of respondents indicate that in gender group male (n=25, 69.4%) and female (n=11, 30.6%). The age of respondents shows that the majority of respondents are from age 31-40 which is (n=24, 66.7%) and (n=1, 2.8%) from 51-60 with lowest, whereas education of respondents shows that majority holds a postgraduate degree in masters (n=20, 55.6%) and (n=10, 27.8%) with PhD. On occupation, the government employee has a higher percentage (n=17, 47.2%) and businessman with lowest (n=4, 11.1%). Whereas on monthly income in Pakistan rupees (n=11, 30.6%) falls in the group of 61,000-80,000 then (n=10, 27.8%) > 100,000 and the group of lowest earnings on the monthly basis which =< 20,000 (n=5, 13.9%) respectively. Residents of Karachi having highest number of respondents (n=12, 33.3%) then Islamabad (n=8, 22.2%), Lahore (n=7, 19.4%), Quetta (n=5, 13.9%) and Peshawar (n=4, 11.1%). Further overall response rate was highly encouraging

### 3.4. Reliability of Questionnaire

To test the reliability of research instrument is crucial for all studies [13]. Cronbach's alpha test helps to measure the reliability of items. The results for Cronbach's alpha are acceptable if the values are equal and above 0.7 [14-16]. Table 3 shows overall Cronbach's alpha of items.

**Table 3:** Overall Cronbach's alpha

| Case Processing Summary | | |
|---|---|---|
| | N | % |
| Valid | 36 | 100 |
| Excluded | 0 | 0 |
| Total | 36 | 100 |
| Reliability Statistics | | |
| Cronbach's Alpha | | N of Items |
| 0.968 | | 42 |

The overall value of Cronbach's alpha for pilot study is 0.968 which is excellent. However, value for a single variable is shown in table 4.

**Table 4:** Individual Cronbach's Alpha Value

| Construct | No. Of Items | Cronbach's Alpha | Reliability Result |
|---|---|---|---|
| Performance Expectancy | 3 | 0.935 | Excellent |
| Effort Expectancy | 4 | 0.915 | Excellent |
| Social Influence | 3 | 0.937 | Excellent |
| Facilitating Conditions | 4 | 0.822 | Good |
| Hedonic Motivation | 3 | 0.885 | Good |
| Habit | 3 | 0.874 | Good |
| Compatibility | 3 | 0.955 | Excellent |
| Personal Innovativeness In IT | 4 | 0.81 | Good |
| Risk | 4 | 0.812 | Good |
| NFC Payment Knowledge | 8 | 0.921 | Excellent |
| Behavioural Intention | 3 | 0.919 | Excellent |

## 4. Discussion

Payment through mobile has gained huge success and it has facilitated unbanked population of the world to get the benefits of financial industry services. Nowadays smartphone has become an important gadget of everyday use that permits the end user to surf internet and control home appliances through their handset. Thus, smartphone embedded with NFC provides numerous facilities for the consumers and most important in the field of mobile payment is proximity payment which provides tap and go or wave and go facility.

## 5. Conclusion

In this paper author presented pilot study results, which indicates that the value of Cronbach's alpha for the items is excellent and supportive of the main study, which shows that there is strong relation between the items in proposed variables. The author will processed further with the actual data.

## References


[1] Ali, Najma Imtiaz, Suhaila Samsuri, Muhamad Sadry,Imtiaz Ali Brohi, and Asadullah Shah. 2017. "Online Shopping Satisfaction in Malaysia: A Framework for Security, Trust and Cybercrime." Proceedings - 6th International Conference on Information and Communication Technology for the Muslim World, ICT4M 2016, 194–98. doi:10.1109/ICT4M.2016.43.

[2] Antovski, L., and M. Gusev. 2017. "M-Payments." In IEEE Transactions on Image Processing, 95–100. Univ. Zagreb. Accessed May 5. doi:10.1109/ITI.2003.1225328.

[3] Cheng, YH, and TY Huang. 2013. "High Speed Rail Passengers' Mobile Ticketing Adoption." Transportation Research Part C: Emerging. http://www.sciencedirect.com/science/article/pii/S0968090X13000314.

[4] Cronbach, Lee J. 1951. "Coefficient Alpha and the Internal Structure of Tests." Psychometrika 16 (3): 297–334. doi:10.1007/BF02310555.

[5] Curran, Kevin, Amanda Millar, and Conor Mc Garvey. 2012. "Near Field Communication." International Journal of Electrical and Computer Engineering (IJECE) 2 (3): 371–82. http://iaesjournal.com/online/index.php/IJECE.

[6] Dahlberg, T, N Mallat, and J Ondrus. 2006. "Mobile Payment Market and Research–past, Present and Future." Presentation. at helsinki https://www.researchgate.net/profile/Tomi_Dahlberg/publication/269114169_Mobile_Payment_Market_and_Research__Past_Present_and_Future/links/0f3175395492b4b53f000000.pdf.

[7] Hair, Joseph F, William C Black, Barry J Babin, and Rolph E Anderson. 1998. "MULTIVARIATE DATA ANALYSIS A Global Perspective." https://pdfs.semanticscholar.org/6885/bb9a29e8a5804a71bf5b6e813f2f966269bc.pdf.

[8] Karnouskos, Stamatis. 2007. "{NFC}-Capable Mobile Devices for Mobile Payment Services." Encyclopedia of Mobile Computing and Commerce, no. ISBN: 978-1-59904-002-8. http://diktio.dyndns.org/files/2007_NFC.pdf.

[9] Khosravi, Mohsen, Mostafa Karbasi, Asadullah Shah, I.A. Brohi, and N.I. Ali. 2017. "An Adoption of Halal Food Recognition System Using Mobile Radio Frequency Identification (RFID) and Near Field Communication (NFC)." Proceedings - 6th International Conference on Information and Communication Technology for the Muslim World, ICT4M 2016, 70–75. doi:10.1109/ICT4M.2016.74.

[10] Khosravi, Mohsen, Zulkefli Muhammad Yusof, Asadullah Shah, Mostafa Karbasi, Najma Imtiaz Ali, and M Y Koondhar. 2017. "Halal Products Recognition Using Rfid/Nfc Technology." Science International (Lahore) 29 (3): 687–92. http://www.sciint.com/pdf/636330333888022627.pdf.

[11] "Mobile Payment Technologies." 2018. Accessed January 7. https://www.transparencymarketresearch.com/mobile-payments-market.html.

[12] Morosan, Cristian, and Agnes DeFranco. 2016. "It's about Time: Revisiting UTAUT2 to Examine Consumers' Intentions to Use NFC Mobile Payments in Hotels." International Journal of Hospitality Management 53: 17–29. doi:10.1016/j.ijhm.2015.11.003.

[13] Smart Card Alliance. 2007. "Proximity Mobile Payments: Leveraging NFC and the Contactless Financial Payments Infrastructure." A Smart Card Alliance Contactless Payments Council White Paper, no.September:1–39. http://www.mobiltarca.com/media/documents/smart-card-alliance-proximity-mobile-payments-leveraging-nfc-and-the-contactle.pdf.

[14] Van Teijlingen, Edwin R., and Vanora Hundley. 2001. "Social ResearchUpdate.," no. 35. http://aura.abdn.ac.uk/handle/2164/157.

[15] Ahmed, S. F. (2007, December). A new approach in Industrial automation application" Embedded system design for Injection Molding Machine". In Multitopic Conference, 2007. INMIC 2007. IEEE International (pp. 1-5). IEEE

[16] Ahmed, S. F., Desa, H., Azim, F., Surti, A., & Hussain, W. (2013, April). Remote access of SCADA with online video streaming. In Computer Science & Education (ICCSE), 2013 8th International Conference on (pp. 270-274). IEEE.