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Identifying and ranking the factors affecting the establishment of mobile payment systems (A case study of Iran)

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Abstract

The purpose of this study was to identify and rank the factors affecting the establishment of the mobile payment systems. The present study was based on implementation of the mix in the qualitative part of the foundation data and the method of data collection in the field approach. Qualitative community of experts working in a mobile telecommunication company in the city of Tehran, which 19 people were selected as a sample by snowball method to the extent of theoretical saturation. In a small part of the middle and upper level administrative staff of the mobile telecommunication company, which according to the method of exploratory factor analysis, sampling was sufficient for this method, and finally 145 samples were selected by randomly available methods. In the qualitative part of the present study, in order to determine the validity of the measurement tool from the expert judgment approach on face and content validity and construct validity by exploratory and confirmatory factor analysis and reliability by two methods of agreement coefficient and Cronbach's alpha were calculated and confirmed. According to the results, the establishment of the mobile payment systems has 5 dimensions and 31 items. According to the research findings, five factors with a service load of service agents with 6 items 0.84, software agents with 14 items 0.80, security agents with 6 items 0.67, hardware agents with 3 items 0.59 and agents access with 4 items with a factor load of 0.58 was identified and ranked.

Keywords: Mobile payment systems, Mobile Payment Model, Grounded Theory, Iran

1 Introduction

Mobile payment is an area of telecommunication business that allows you to pay for goods/services, paying bills, buying charges via mobile phone, Paying anytime and anywhere, with very low costs of development are the prominent features of mobile payment systems. Also, the possibility of daily micropayments and integration with banks are very important capabilities of mobile payment systems (Hampshire, 2017). One of the benefits of mobile payment is the use of a mobile wallet. By having a SIM card and also installing the relevant user software, the information related to bank cards can be stored on the SIM card and safely, and also do all the transactions and payments quickly by bringing the phone close to the receiver or entering the star and square command codes without having to enter the password (Bagla and Sanchi, 2017). Mobile payment services can be implemented both offline and online. In offline mode, the software person charges his/her mobile wallet up to a certain limit and then pays without the need for an internet connection in a device-to-device connection up to the charge limit. However, in the online mode, the mobile wallet software is supported online by the bank account and the person can make (purchase) payments without any limit up to the balance of his account. Other features of this technology include the following:

- Ability to define different types of wallets with cash cards
- Easy and fast payment
- No need to carry multiple bank cards or cash
- Ability to define more than one bank card on the SIM card
- Ability to immediately deactivate services in case of loss of the phone
- Ability to view and manage transactions on the mobile payment application
- Ability to transfer money between subscribers' wallets via mobile without the need to visit bank branches (Madan & Yadav, 2016)

This product will increase security at the end-user point because the user no longer has to worry about copying their bank card information. In addition, due to the fact that we no longer have the usual card drawing process and the user only pays by ticketing and entering without a password, it brings its speed to the process. Also, the user no longer needs to have multiple bank cards in his bag or pocket and has them all in one service on his mobile, which makes the user comfortable. In addition, the user no longer needs to go to limited recharge centers at specified times to recharge his wallet, such as a ticket card (Taylor, 2015).

In this system, because all payments are offline, significant efficiency in cost management occurs; This means that to move

the transaction, just bring the phone and the card reader close. During all this time, the card reader doesn't make any contact with the bank. So there is no problem like phone interruption or lack of antenna, and each night the system connects to the bank and performs transactions automatically. Also, ensuring that end-users are paid creates significant value from the perspective of sellers and acceptors. Because the customer's account is already charged - even if the connection to the receiving bank is disconnected, he is always sure that he will receive the payment from the customer and the possibility of error is reduced. Offline payment is another feature of some payment methods. In this way, payment can be made even with the phone turned off. Even if the SIM card is stolen, disabling it can eliminate the possibility of abuse. From the point of view of the acceptor or the seller, a very important advantage of speed can be mentioned. Especially for small businesses facing queues; Such as bakeries, newsstands, or similar businesses that often either do not use a bank card or if they do, The long process of pulling the card and entering the password creates a queue, which is solved in mobile payments. Another point is that due to the offline nature of this system, the vendor will no longer have to worry about occasional network outages because it does not need to be connected to the network continuously (Taylor, 2015). The heavy costs of energy and time in using traditional methods and even online has caused. With the pervasiveness of payment technologies over the past years as a serious space for payment, we are witnessing the marginalization of traditional payment methods from cash payments to in-person referrals to banks and other methods. In such an environment, turning to the field of financial technologies and mobile payments has become so necessary that ignoring it in the payment industry takes us away from today's competitive market and makes us lose these important capacity to increase sales and market share. (Fun et al. 2018).

Therefore, by examining all the issues raised and clarifying the problems and weaknesses of the country's payment industry, the need for offline payment solutions is felt more than ever. On the other hand, due to the high penetration rate of mobile in the country, this opportunity can be used to implement and establish mobile payments. Currently, the penetration rate of mobile phones in Iran is higher than 80%. In addition to the high number of micro-payments or the same payments under 50,000 Tomans, it shows that the mobile payment solution can help in the field of micro-payments due to its high speed and offline features. Also, in a more comprehensive view, the volume of investments made in other parts of the world in this field cannot be easily overlooked. The tendency of end-users to use this payment method, the economic and social benefits of the current method, and the change in market structure and its competitiveness, emphasize the importance of mobile payment development. For the past two decades, there has been a rapid shift towards mobile payment projects, especially in the development and strengthening of infrastructure, the provision of new electronic services and innovations. Equipped infrastructure is constantly evolving, which has made transactions more popular, both in number and quantity. However, not all projects, innovations, and projects have been successful. But the fact that the penetration rate of smartphones in Iran has reached above 80%, can be one of the points to increase the speed of mobile payment acceptance among people. This is because people may forget to take their bank cards or wallet with them, but it is less common for them to leave their mobile phones behind (Bagla and Sancti, 2017).

While mobile payment projects have been completed, they have been very successful in some underdeveloped countries such as Afghanistan, Kenya, and Nigeria. Therefore, given Iran's power in financial and technological infrastructure over these countries, extensive research seems to be more vital than ever. Most research in this area so far has focused on consumer acceptance of innovation and the development of technology acceptance models that have examined the factors influencing acceptance as well as its barriers, while the existing gap is not related to consumer acceptance. Most of these studies have been quantitative and focused on explaining user acceptance from a technology perspective. If the establishment of this method of payment is not confirmed only by users' understanding of technology. Therefore, conducting more in-depth research in this area and determining the parameters affecting the establishment and implementation of mobile payment is critical (Jack and Suri, 2014). Therefore, this study generally identifies the factors influencing the establishment of mobile payments in Iran after a broad review of the literature by looking at the experience of successful and unsuccessful countries, and finally extracting the factors through in-depth interviews with experts to identify and rank factors affecting the establishment of mobile payment system in Iran have been studied and finally the framework for the development of mobile payment in Iran has been presented.

2 Methodology

The present research is in terms of development-applied purpose and in terms of descriptive survey implementation and data collection in the field. Also, in terms of data collection, it is among the mixed (quantitative-qualitative) researches, consecutive exploratory plan. Since in this study, qualitative data (obtained from interviews and review of texts) were used to prepare quantitative tools (questionnaire) and as a complement to the quantitative part (before starting the main part and to identify variables and items of the questionnaire). In this study, experts active in the mobile telecommunication company in Tehran have been selected as the statistical population of the study. In this study, sampling was continued until the research structures reached the data saturation level. So that conducting newer interviews did not add a newer variable to the previous variables. This saturation is obtained in the fifteenth interview. However, to ensure the expressed saturation, four more interviews were conducted and the number of sample members reached 19.

Administrative staff of the mobile telecommunication company was used as the sample. According to the exploratory factor analysis method, sampling was continued sufficiently for this method, and finally, 145 samples were selected by randomly available methods. In the qualitative part of the present study, in order to determine the validity of the measurement tool, the expert judgment approach on face validity and content has been used. The decision was made based on the opinions of seven academic experts. The face validity score and the content of the interview protocol were 87.42%. For Chin (1998) This value is very desirable (Chin, 1998). Hence the validity of the interview protocol is supported. According to this study, the reliability coefficient for the interview protocol in this study is equal to 74.12%. This amount is a desirable amount from the researchers' point of view.

To design the research tool (closed answer questionnaire with 34 initial items), first, the theoretical literature of the research and the background were carefully examined and analyzed.

Exploratory factor analysis was performed on a 34-item questionnaire on the dimensions of establishing a mobile payment system. According to the results, if the amount of extraction was less than 0.5, that item was removed from the questionnaire. The 31-item questionnaire was finally analyzed that the Kaiser Meyer test (sampling adequacy index) was 0.813, the Bartlett test was 0.001 with a degree of freedom of 820 and the significance level was 0.05. In factor analysis, the sampling adequacy index (KMO) should be at least 0.7 and preferably higher. Also, the result of the Bartlett test of sphericity should be statistically significant. Therefore, the values confirm the adequacy of the sample size for factor analysis and the ability to factorize the questions. The results of factor analysis by the Varimax method show that after 6 rotations, the best factor solution has 5 factors. The amount of variance explained by these factors is equal to 69.908 percent. Therefore, the establishment of a mobile payment system has 5 dimensions. In order to check and confirm the validity of the mobile payment system establishment questionnaire based on the dimensions and items extracted from exploratory factor analysis, the second-order factor analysis model was used. The fit indicators for this tool are described in Table 1.

Table 1: Fit indicators related to the validity of the instrument

	χ^2	χ^2/df	RMSEA	GFI	AGFI	NFI	NNFI	SRMR	CFI	result
Allowed limitation	P>0.05	Less than 0.05	Less than 0.08	More than 0.9	More than 0.9	More than 0.9	More than 0.9	Less than 0.05	More than 0.9	
questionnaire	2461.08=χ^2 495=df 0.001=P	0.201	0.079	0.91	0.91	0.92	0.91	0.048	0.94	Acceptable fit

The reliability of the instrument was also determined using the internal matching method and Cronbach's alpha test. The reliability of the tool was calculated as software factor with 14 items 0.906, service agent with 6 items 0.866, hardware agent with 3 items 0.788, security agent with 6 items 0.864, and access factor with 4 items 0.753, respectively. This issue shows the internal correlation between the variables to measure the desired concepts and therefore the questionnaire of the dimensions of the establishment of the mobile payment system has the necessary reliability. Due to the fact that in this study, two categories of data were collected, data analysis was performed at both qualitative and quantitative levels. Exploratory factor analysis (validity of instrument structure) and confirmatory factor analysis (in order to present the model) in Spss-23 and LISREL software were used to analyze the data in a quantitative part.

3 Findings

First, the categories taken from the interview were done using the open, centralized, and selective coding method data method. Open coding was characterized by shredding, comparing, conceptualizing, and categorizing data from interviews with category and component experts. In axial coding, links were made between categories. In the selective coding of the kernel category on a regular basis and linking it to other categories, validating the relationships and filling in the blanks with the categories that need to be modified and expanded.

Table 2: Summary of axial coding results

Selected codes	Axial codes	Open codes
Features of appropriate payment system	services	Providing the necessary reports for the user and the acceptor, the possibility of charging from various sources, having international standards, optimal support of services, payment according to the type of need, level of service fee
	availability	Acceptance of service by the user, variety of facilities available to the customer for payment, availability, simplicity
	Soft wares	Ability to pay offline, flexibility (speed and cost of upgrading), up-to-date technology, acceptance by the governance system, bearing the burden of transactions at peak times, multiple users, variety of operators, acceptors, transaction speed, ease of payment, ease of settlement, Ease of charging, ability to integrate with other systems, ability to develop the system, speed of creation and operation
	safety	Security and privacy, minimum possibility of fraud, minimum transaction error, anti-fraud mechanism, post-crisis recovery capability, reliability
	Hardware	Ability to integrate multiple cards, system size range, preferential payment ceiling

According to the findings of exploratory factor analysis, for the establishment of the mobile payment system, six dimensions consisting of 31 items have been extracted, which is presented in the following model of confirmatory factor analysis.

In the standard estimation mode, the model shows the operating loads of each of the dimensions of the mobile payment system and the relevant items. As shown in the figure, the factor load of all dimensions and items is more than 0.5 and is acceptable. Among the dimensions of establishing a mobile payment system, the highest factor load is related to "factors related to services with factor load (0.84), software factors with factor load (0.80) and security factors with factor load (0.67)" and The lowest factor load are related to "access factors with factor

load (0.58) and hardware-related factors with factor load (0.59)". Finally, the output of LISREL in relation to the fit indicators of the second-order factor analysis of the establishment of the mobile payment systems, in general, indicates an acceptable fit of the model.

Table 3: Impact of involved factors

Determinant of acceptance	Involved factors	Impact on acceptance	Dynamic effect depending on the situation of use
Comparative advantage	Shopping independent of time and place	+	Yes
	Avoid queuing	+	
	Availability of auxiliary payment tools	+	
	Supplement for cash payment	+	
Compatibility	Top with digital services and content	+	No
	low value purchases at the point of sale	+	
	high value purchases	-	
Complexity	SMS templates, codes, complex service numbers	-	No
	Difficult management of independent accounts	-	
	Complex registration procedures	-	
Costs	Low pricing, high transaction costs	-	No
Network breadth	Lack of widespread acceptance of sellers	-	No
	Dedicated tools / services	-	
the trust	To sellers	+	No
	To telecom operators	+	
	To financial institutions	+	
Perceived security risk	Unauthorized use	-	No
	Transaction errors	-	
	Lack of transaction records and documentation	-	
	Ambiguous transactions	-	
	Concerns about the reliability of tools and networks	-	
	Concerns about privacy	-	

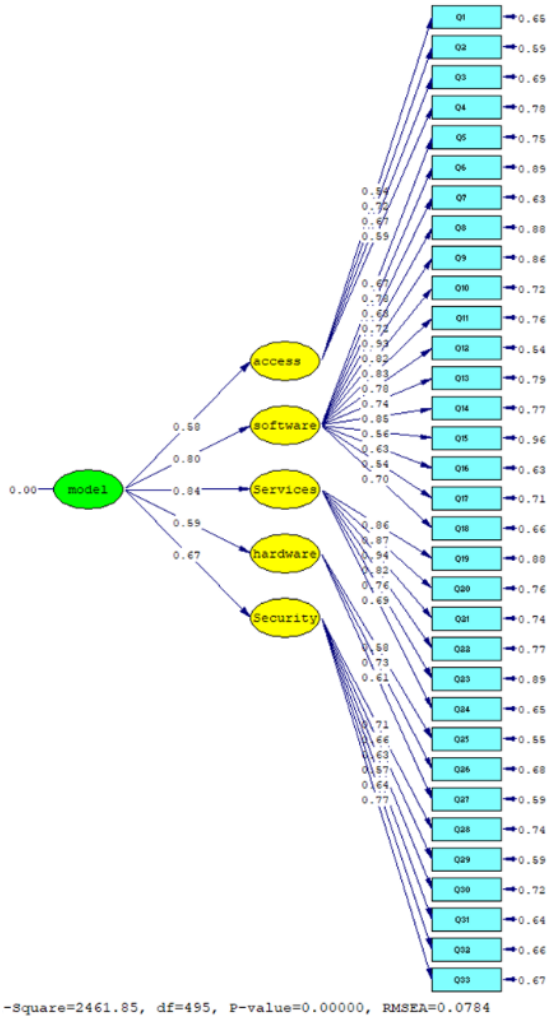

Figure 1: Second-order factor analysis model for deploying a mobile payment system in standard estimation mode

4 Conclusion

The purpose of this study was to identify and rank the factors affecting the establishment of mobile payment systems in Iran. Security factors with 6 items were identified as 0.67, hardware factors with 3 items as 0.59, and access factors with 4 items with a factor load of 0.58. The habits of users and their needs on the one hand and the development of offline payment systems and

online sales, on the other hand, are the contexts of the customer level for this framework. Customers will not be attracted to the system unless there are enough acceptors for mobile payment. This requires that there won't be any cumbersome rules in the field of mobile payment acceptance licenses and that acceptors be able to provide these services for transactions without much difficulty. At the macro level of the society, the capable workforce is very important to support and implement the mentioned infrastructures and the general literacy of the society is very important in benefiting from the computer and software platform. According to the research findings, economic stability and prices are two important underlying factors in the economy for the establishment of the payment systems. The existence of an interactive business model between stakeholders that is agreed upon, because it will lead to more participation from them, provides the basis for the success of the system. The government, as the determinant of macro-payment policies and central bank regulations, is accompanied by macro-areas affecting payment in terms of setting preferential ceilings and how to exchange monetary value, along with codified and transparent laws. In a competitive environment where there are multiple PSPs, the level of competition, healthy competition environment, and other technologies that are constantly changing internationally are very important. Creating this environment and updating the prevailing technologies will pave the way for the emergence of startups that will expand the field of mobile payment competition and increase the level of system acceptance by providing various incentives to users.

The analysis of the Competitive agents of mobile payment market describes the five internal dimensions of the framework in this market. These factors include customer power, vendor power, traditional payment services (barriers to entry), new electronic payment services (alternatives), and mobile payment service providers. Customers create a special demand for a mobile payment solution and measure its success by using it. In other words, the success of a mobile payment solution depends on the number of participants and the volume of their transactions. Vendors play an important role in the development of payment systems because they create a market for financial institutions and other payment service providers. Some of the failures of the payment strategy are explained by the lack of vendor participation in its development and application. A consortium of vendors can have significant bargaining power over payment service providers (for example, due to high commission rates). The threat that some vendors become mobile payment service providers in certain circumstances should also be taken seriously (Dahlberg, Mallat, Ondrus, Zmijewska, & applications, 2008). A seller's intention to provide mobile payment is to create services and products, while the government intends to collect taxes and create government services. In addition, governments may provide funding for new mobile payment instruments to remove market barriers and empower new industries (Pousttchi et al., 2009). The extent of mobile payment determinants, determines whether mobile payment procedures exist regionally, nationally, or internationally. Regional scope meets the needs of customers in a particular geographic area, such as a region's public transportation or park systems. The national scope varies from country to country based on the banking policies and telecom infrastructure. Internationally, there is a need for common mobile payment procedures in different countries (Pousttchi et al., 2009).

The expansion of the mobile payment market has led to easy payment services, which have grown the fastest among financial technology services. Mobile payment refers to the use of mobile tools (online, offline and consolidated) to perform far and near payment transactions. The financial value of the transaction is transferred from various sources such as bank account, user credit, or in the form of an invoice from the customer to the receiving account so that the customer can purchase the digital content, physical goods, and services. This system needs software and hardware infrastructures that are provided by the government, regulators, central bank, etc., and Shapark and FATA police also play a role in supporting that system. With the expansion of system acceptors in the form of public and private transportation, restaurants, and a variety of stores, the acceptance of mobile payment among end-users will increase. Customer usage encryption and PSP data encryption help increase the security of the framework. The macro-policies of the Central Bank in defining the preferential payment ceiling and issuing the necessary licenses to connect the banking system with the communication platform and on the other hand the difficulty or ease of obtaining a license by the acceptor affect the expansion of the framework. To expand the use of this framework, collections with a large audience can be used as a critical mass. Sectors such as social security have a national scope because they maintain the risk of this framework within a certain range and highlight the strengths, weaknesses, threats, and opportunities in this area. Long-term mobile payments will reduce the nature of paper and card deletions by reducing the cost of printing money and the transaction costs and operating costs of each stakeholder. The sum of the mentioned factors brings benefits to the society that all stakeholders will benefit from.

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