

Factors Influencing the Adoption of Electronic Payment Cards in Urban Micro-Payments

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Abstract

Many factors affect the way that information technology is used in societies and organizations. In this research, the researcher has aimed to analyze the factors affecting the adoption of electronic payment cards in urban micro-payments. This research is based on six hypothesis, analyzing the relationship between the adoption of electronic payments cards and some factors such as satisfaction, compulsion, ease of use, usefulness, norms and network externality. Data analysis has been done by the SPSS software. In this research, researcher has used non-probability random sampling, the means of this research was the questionnaire, after interviewing with the citizens, factors affected the adoption of electronic payment cards in urban micro-payments were explained. The questionnaire included close-ended questions based on Likert scale with 5 sets of 28 questions. The reliability and validity of the questionnaire showed that the questionnaire has acceptable reliability and validity. From 450 questionnaires, 421 of them were returned back to the researcher. Data analysis has been done on two levels of descriptive and inferential analysis. The participants were citizens of shiraz who were over eighteen years old and who use this card in their payments. The results of this research revealed that all of these 6 factors on the acceptance of electronic payment cards in urban micro-payments are a significant impact on the citizens payments. Prioritization of these factors is as follows: usefulness, ease of use, satisfaction, compulsion, network externality and norms.

Keywords: adoption, electronic payments cards, micropayments

Introduction

Despite huge investments in IT systems is performed, for different reasons detailed information of the result of these investments is not available. However, evidence suggests that the failure of these investments has been more than their success. Organizations can't achieve their expected effectiveness and efficiency of investment. The application of this technology are faced with the dilemma of productivity. On the other hand, customer demand for the company's decision to use an innovation is important. Profitable operation of an innovation, especially innovation in service depends on the acceptance by the community (Bagheri, Hamidi Beheshti and Alidoosti, 2009).

Diverse perspectives on the understanding of the factors influencing the decision to adopt IT users there. There is logic behind this approach is that the success or return on investment in information technology depends on the tendency of users to apply and use of the systems (Ghorbani zadeh, Deljoo and Amiri, 2008). Today, with the development of electronic commerce, requires appropriate methods of electronic payment strongly felt. With regard to electronic payment services around the world, digital money is still in the early days of its life. The main role of financial institutions in Iran is present electronic payment services. It is time that people decide to use electronic payment systems pay for themselves instead of the traditional way (Keramati, Haji ha and saremi, 2009).

Transactions involving micropayments, irrationality contains our daily payments. According to the Central Bank of the Islamic Republic of Iran, paid less than 50 million Rials (about 1470 dollars), are micropayments. Programs in many countries around the world to replace cash and coins with micropayments cards. However, most programs in Iran particularly in order to transform society into a society without money, have been failed (Mashreghi, 2011).

While these days the central bank of Iran, seeks to amend and delete the zeros front of the currency of the country, Iran's economy is faced with a micropayments problem. Tabnak site reported (2011), in many cases, the goods or services you receive have not round amount. The crisis sometimes has shown itself to logomachist between seller and buyer will take. Turnover of money that never take to the buyer and seller is estimated very high. Perhaps millions of Rials that must be paid to the buyers and sellers not paid and because of the sheer volume of money is divided among many people, it may not matter much for people, but it's Macroeconomic an acute illness.

Ansar bank site (2011) said that establishment of an integrated system of electronic payment card is very helpful. And causes the change in community problem solving, as well as micro-payments done faster.

The objective of this study was to investigate the factors influencing the adoption of electronic payment

cards in urban micro-payments that if the benefit and use of payment cards in community spread and the factors affecting the adoption of this card specified, government strategies can provide the infrastructure to use the card in the community and the implementation of electronic micro-payment system will solve the problems related to micropayments in the community and the movement of money is minimized.

Literature review

Buying and selling goods implies payment, this is what always was happening. In the past, this activity was done using money (notes) but with growing technology people started to use different technologies for payment. At first, people used Internet but they experienced limitations. One of the important limitations was related to the fact that a connection to Internet is needed to fulfill the transaction. This problem can now be resolved by wireless connectivity (Taeb, 2009). According to the central bank's of Iran, payments less than 50 million dollars, are micropayments. Due to the amount of the payment, all payments, except electronic checks, are micropayments (Mashreghi, 2011).

Different researchers have different characteristics to assess the micro-payment systems. Schmidt and Muller (1999), discuss about 3 dimensions, technical (security, reliability, scalability and latency), economic (cost of the transaction, the exchange integral, customer base) and social (anonymity, the point-to-point). Parhonyi et al. (2005), discuss about 2 dimensions, technical (ease of use and convenience, anonymity, scalability, reliability, security, interoperability) non-technical dimension (privacy, and security coverage) and Kinberg (2002), discuss about ease of use, reliability, coverage network, transaction costs, speed up the evaluation process as a feature called micro-payment systems.

The adoption of new technologies and the factors affecting them, several conceptual models have been proposed in recent decades, several models have been proposed in the field of technology acceptance. The basic concept underlying all models of technology acceptance by Venkatesh et al. (2003) shows in Figure 1.

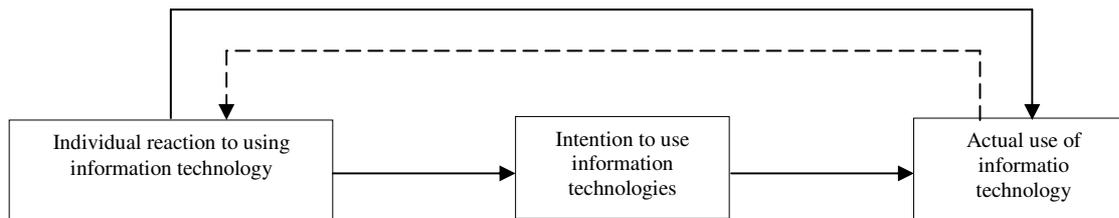


Figure 1: Fundamental factors in user technology acceptance model

Source: Venkatesh et al., 2003

Adoption of new technologies influence user behavior, Fishbein and Ajzen (1975), proposed the theory of reasoned action. The theory of reasoned action discuss about behavior is only under the control of behavioral intention, therefore, this theory is limited on voluntary behavior.

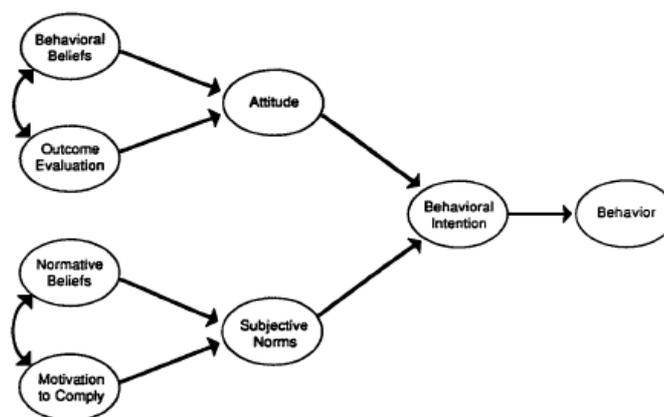


Figure 2: The theory of reasoned action

Source: Vallerand et al., 1992

Davis (1989), proposed the first and most common technology acceptance theory in 1983. The theory named "technology acceptance model". This model is widely used to describe technology adoption over the past 2 decades. In this model, perceived usefulness and ease of use, are the most important factors of behavioral intention to use technology.

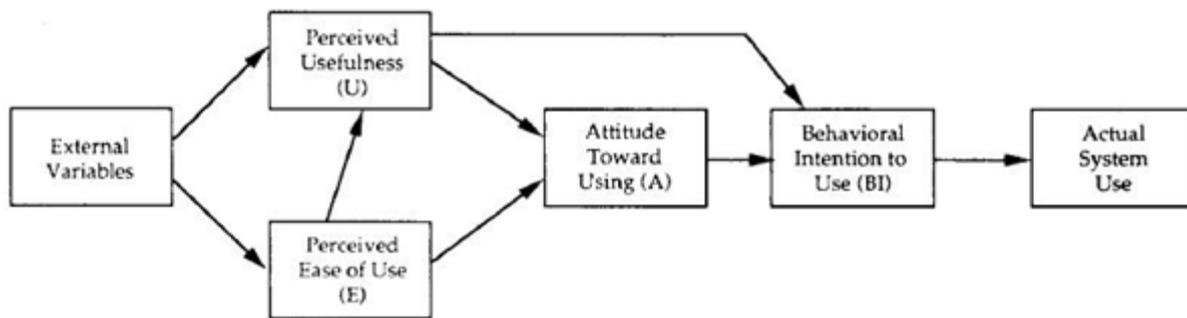


Figure 2: main models of technology adoption
 Source: Ghorbanzadeh, Deljoo and Amiri, 2008

In 1991, Moor and Benbasat proposed perceived characteristics theory and they add several factors to Rogers model. This theory is based on that people accept innovations that have a comparative advantage, compatibility, testable, observable, and less complexity.

The theory of planned behavior (Ajzen, 1991) is based on the theory of reasoned action (Fishbein and Ajzen, 1975). Mechanism of the theory of planned behavior is based on the assumption that behavior is influenced by individual desires. According to the theory of planned behavior, human behavior formed with three categories of beliefs, behavioral, normative and control. The theory of planned behavior, claiming that the main factors that determine behavioral tendencies are: attitude toward the behavior, subjective norm and perceived behavioral control.

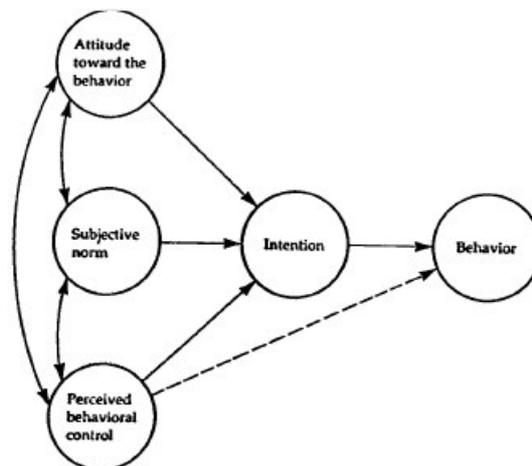


Figure 3: Theory of planned behaviour
 Source: Ajzen, 1991

Diffusion of innovations theory (Rogers, 1995), tries to gather information about the appropriate method to change an innovative design from invention phase to use phase. This theory specified about innovative decision making in use of inventions, that four characteristics that affect innovation are: relative advantage, compatibility, trainable, the visibility.

According to these models, now describe some researches about adoption of new technologies around the world and Iran. The findings of research conducted in 2001 by Dennis Brazvych on "electronic payment systems: user acceptance issues", suggests that user acceptance issues and guiding principles of electronic payments in the form of a user high level payments can be a key point of understanding the development of electronic payment systems. Eastin (2002) in an article entitled "The popularity of e-commerce: analysis of acceptance four e-commerce activities," wrote 4 activities reviewed include online sales, online banking, online investing and electronic payment. Factors influencing the adoption of this research was perceived convenience, profit, previous experience, confidence and internet use. The results showed that the 6 factors each play a certain role in the acceptance process. Also, when users decide to accept one of these activities tend to accept the other's factors. Lee et al. (2003) did research, "the adoption of smart cards in the University of Singapore and Australia" and their acceptance factors based on the model of Rogers, Moore and Ben Basat and Davis, the factors were: relative advantage, compatibility, testability, ease of use, visibility, perceived usefulness, information, thought and visible results. The results of this research showed that both university students believe that compatibility and relative advantage of the technology are two main factors of acceptance of technology. Native students are also more willing to accept the technology and the campus environment is also effect on acceptance. Changsv

Kim et al 2009 did research entitled "Understanding the customers of security and trust in electronic payment systems", the research findings indicate that customer perceptions of electronic payment systems is a key factor in the development of e-commerce in the market. It also suggests a conceptual model that shows security factors, trust and their effects on online purchases. Sevgi Ozkan et al. (2010) did research entitled, Facilitating the adoption of e-payment systems: theoretical constructs and empirical analysis, In this study, factors for acceptance were: relative advantage, compatibility, complexity, risk, cost, security, web reliability and trust. Three key factors that is enough for acceptance are: perceived risk, trust and usability of electronic payment system that leads to acceptance by consumers.

Mohammad Ali Bagheri et al., (2009), published article entitled "Acceptance of Internet Banking in Iran: extend technology acceptance model" This paper, taking the characteristics of internet banking environment, has developed the technology acceptance model. This article uses the features of internet banking environment, has developed the technology acceptance model. For better and more using of internet banking service offered solutions including website design, development, hardware equipment, providing Internet kiosks in places of public affairs. In a research entitled "Factors affecting the adoption of electronic banking using pikkarainen model" Baniasadi M. et al, (2009), factors affecting the adoption of e-banking customers based on pikkarainen model are: usefulness, ease of use, enjoyable, information on e-banking, security, confidentiality and quality of the Internet connection. Results showed that all six factors affecting the adoption of e-banking customers have a positive effect. The most important features of e-banking adoption, are: first, Security and confidentiality of (4.21) ,second factor in the adoption of e-banking customers in the point of view of Parsian bank is information on e-banking (3.86), third factor is benefit and useful (3.37), ease of use (3.30) The fourth factor, fifth factor is the Internet connection (2.3) and sixth factor is enjoyable (3.05).

Many models attempting to predict and describe the adoption of technology by individuals. Each of the models offer variety of factors. In this study, the factors with regard to the other elements of the technology acceptance model and the conceptual model presented from interviews with citizens.

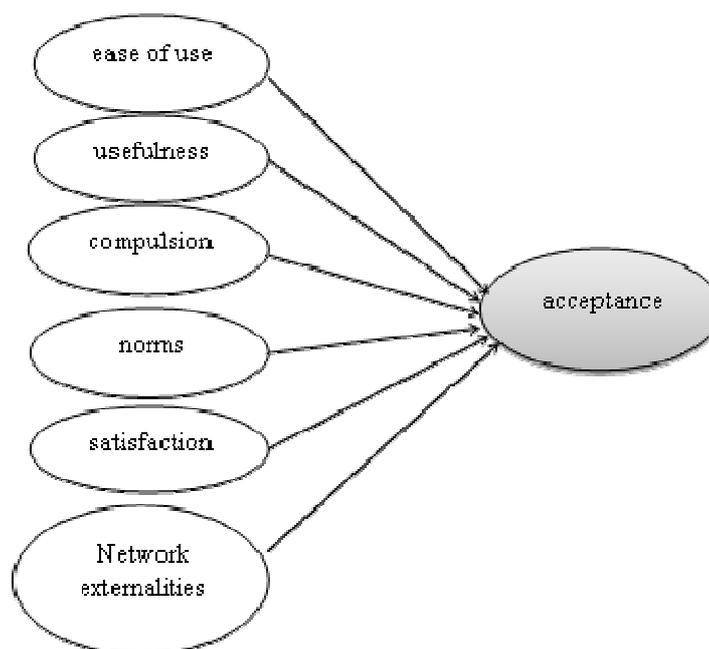


Figure 4: Conceptual model

Research methods

Research purpose is an important thing, which should be considered. Within this highlighted, how the way in which asked the research question would result in descriptive, explanatory or exploratory. In descriptive study, research will be done for the purposing of producing an accurate representation of person, events or situation (Robson, 2002). the main objective of the most researches in human sciences, is to investigate a field study that can be said that the aim of this research is in the area of applied researches. Considering that in this research used field study, such as questionnaires, it can be said that the present study, based on the nature and methods of data collection is a descriptive study.

Population and sample

Statistical population of research, were citizens over 18 years that used electronic payment card in urban

micropayments. Since in this study, the population size is unknown, the sample size was calculated from the formula Cochran and we got 384, from formula. As expected, some questionnaires not return to the researcher, 450 questionnaires were distributed. Study of random sampling. The method of sampling of this study is random.

Collecting data method

Methods of data collection was field study. In this study after study models of technology acceptance and interviews with citizens, Factors influencing the adoption of electronic payment card and conceptual model presented. The questionnaire was designed for the citizens of Shiraz that used payment card. From 450 questionnaires that distributed, 434 questionnaires were returned to the researcher that 421 questionnaires were valid.

The questionnaire included 5 questions about personal information of respondents and 23 main questions. Questions were closed questions based on 5 Likert scale that each spectrum includes strongly agree, agree, no idea, disagree and strongly disagree.

Readability and validity

Reliability implies that the measuring instrument in the same conditions gives the same results (khaki, 1382). In this study, a reliability test was done twice. The first measurement, distribute 20 questionnaire among people to measure the quality of questions, before distribute to the larger sample. Cronbach's alpha was used to assess the reliability of the questionnaire. Cronbach's alpha for the pre-test questions, was 0.846, also Cronbach's alpha for 421 questionnaire was 0.771. and for all factors were greater than 7.0, which shows the reliability of the questionnaire. To evaluate the validity, the exploratory factor analysis was used. Examine the factor structure of the questionnaire with principal component and varimax rotation indicate that the scale includes 6 factors that explained in total 74.13% of the total variance. In this analysis, KMO value of sampling adequacy was 0.75. In addition, Bartlett's test was significant at the level of 0.0001.

Data analysis

Data was analyzed by SPSS software and descriptive and deductive statistics were conducted. Research hypotheses were tested using one-sample t-test. In part of deductive due to the uncertainty of the spatial variables and not be sure the same assumptions variances, determine to use non-parametric statistics instead of parametric statistics. For study the effects of gender and marital status with the main variables, the Mann-Whitney U test was used. The effects of age, educational level and occupational status variables with the main variables, tested with the Kruskal-Wallis test (nonparametric analysis of variance).

The results of the descriptive analysis showed below in table that men less than women were in the sample, people between 30-39 years were more than the others, it shows that this range of age were more than the others are in the society and work or study, in education, people who have undergraduate license were more than the other level of education, it shows that most of the people in society study in university. People who works in private sector in society were mo re than the others, and married people were more than singles.

Table 1: Results of descriptive analysis

percentage	frequency	variables	
50.59	213	female	gender
49.41	208	male	
2.38	10	Under 20 years	age
26.13	110	Between 20 - 29	
35.63	150	Between 30 - 39	
29.22	123	Between 40 - 49	
6.65	28	Between 50 - 59	
4.28	18	Under diploma	Education
22.09	93	diploma	
10.69	45	Up diploma	
47.98	202	undergraduate	
8.79	37	Master of degree	
6.18	26	Ph.D	
23.99	101	Government employees	job
37.29	157	private employees	
18.76	79	free	
7.84	33	student	
6.18	26	House wife	
5.94	25	Unemployed	
30.64	129	single	Marital status
69.36	292	married	

Hypothesis 1: "The ease of use has positive effect on electronic payment card acceptance"

With 95% confidence and level of significance 0.0001, there was no evidence to reject this hypothesis. The results showed that the impact of the ease of use among men and women, married and single people were alike, but the effect is not the same at different ages and greatest impact on the ages of 30 and 39 years old. The effects of this factor on the electronic payment card acceptance were different in educational levels. This factor had the greatest effect on people with an up diploma degree. The effect of this factor in the employment situation was different, and the greatest impact on employees in the private sector. The average of ease of use of the card was 4.58 and 0.53 was the standard deviation.

Hypothesis 2: "Usefulness has positive effect on electronic payment card acceptance"

With 95% confidence and level of significance 0.0001, there was no evidence to reject this hypothesis. The results showed that the impact of the usefulness among men and women, were alike and there was different between married and single people, so that the effect of this factor on single people was more than married people and the effect of usefulness is not the same at different ages and greatest impact on the ages of 30 and 39 years old. The effects of this factor on the electronic payment card acceptance were different in educational levels. This factor had the greatest effect on people with master degree. The effect of this factor in the employment situation was different, and the greatest impact on employees in the free job sector. The average of the usefulness of the card was 4.66 and 0.44 was the standard deviation.

Hypothesis 3: "norms have positive effect on electronic payment card acceptance"

With 95% confidence and level of significance 0.0001, there was no evidence to reject this hypothesis. The results showed that the impact of the usefulness among men and women, were not alike so that the effect of this factor on men was more than women and there was not different between married and single people, and the effect of norms is not the same at different ages and greatest impact on the ages of 30 and 39 years old. The effects of this factor on the electronic payment card acceptance were different in educational levels. This factor had the greatest effect on people with an undergraduate degree. The effect of this factor in the employment situation was different, and the greatest impact on employees in the private sector. The average of norms was 3.17 and 0.81 was the standard deviation.

Hypothesis 4: "compulsion has positive effect on electronic payment card acceptance"

With 95% confidence and level of significance 0.0001, there was no evidence to reject this hypothesis. The results showed that the impact of the compulsion among men and women, were alike and there was different between married and single people, so that the effect of this factor on single people was more than married people, and the effect of compulsion is not the same at different ages and greatest impact on the ages of 20 and 29 years old. The effects of this factor on the electronic payment card acceptance were different in educational levels. This factor had the greatest effect on people with an up diploma degree. The effect of this factor in the employment situation was different, and the greatest impact on employees in free job sector. The average of compulsion was 4.28 and 0.59 was the standard deviation.

Hypothesis 5: "Satisfaction has positive effect on electronic payment card acceptance"

With 95% confidence and level of significance 0.0001, there was no evidence to reject this hypothesis. The results showed that the impact of the satisfaction among men and women, were not alike so that the effect of this factor on women was more than men and there was not different between married and single people, and the effect of satisfaction is not the same at different ages and greatest impact on the ages under 20 years old. The effects of this factor on the electronic payment card acceptance were different in educational levels. This factor had the greatest effect on people with an under diploma degree. The effect of this factor in the employment situation was different, and the greatest impact on house wife. The average of satisfaction was 4.37 and 0.55 was the standard deviation.

Hypothesis 6: "network externalities have positive effect on electronic payment card acceptance"

With 95% confidence and level of significance 0.0001, there was no evidence to reject this hypothesis. The results showed that the impact of network externalities among men and women, married and single people were alike, but the effect is not the same at different ages and greatest impact on the ages under 20 years old. The effects of this factor on the electronic payment card acceptance were different in educational levels. This factor had the greatest effect on people with an under diploma degree. The effect of this factor in the employment situation was different, and the greatest impact on employees in the government sector. The average of network externalities of the card was 3.37 and 0.48 was the standard deviation.

Table 2: The results of the one-sample t-test to test the hypothesis

Significance level	d.f	T	Hypothetical average	Standard deviation	average	Number of responders	variables
0.0001	419	61.86	9	1.58	13.75	420	Ease of use
0.0001	420	78.05	12	1.74	18.62	421	usefulness
0.0001	420	4.20	12	3.24	12.66	421	norms
0.0001	420	44.92	9	1.76	12.85	421	compulsion
0.0001	420	51.19	9	1.65	13.11	421	satisfaction
0.0001	420	16.07	12	1.91	13.50	421	Network externalities

To investigate which of the average of independent variables, was higher and prioritization factors and comparison of dimensions, the Friedman test was used. Table 3 shows the Friedman test.

Table 3: Friedman test

Significance level	d.f	Chi square	Number of responders	Ranking average	Standard deviation	average	variables
0.0001	5	1178.23	420	4.87	0.43	4.66	Ease of use
				4.70	0.53	4.58	usefulness
				3.97	0.53	4.58	norms
				3.83	0.59	4.28	compulsion
				1.86	0.43	4.66	satisfaction
				1.77	0.81	3.17	Network externalities

According to the table above, usefulness, network externalities, satisfaction, ease of use, compulsion and norms had the highest mean, and in terms of ranking of usefulness, ease of use, satisfaction, compulsion, network externalities and norms in order have highest average ranking in the electronic payment card acceptance.

Conclusion

The findings of this research showed that age, gender, education, employment and marital status did not significantly related to electronic payment card acceptance. Donnelly (1970) and Lee (2000) in their research concluded that age, income and education have a direct impact and gender has not direct impact on technology adoption. Taylor and Todd (1995), Gefen and Straub (1997) stated that men are more willing to accept computer technology. Kolodinsky (2004) and Taeb (2009) in their research concluded that married people are more willing to accept technology.

The results of this research, network externalities, has a significant effect on the electronic payment card acceptance. Mashreghi (2011), concluded that network externalities, have significant positive correlation with the acceptance of bank issued credit cards in micropayments. Taeb (2009), showed that network externalities factors, have not positive relation with acceptance of mobile payments. Mallat (2007), concluded that network externalities, have not significant relation with mobile payments acceptance.

Findings of this research showed that the ease of use, has a significant effect on the electronic payment card acceptance. Taeb (2009) and Mashreghi (2011) in their research showed that the ease of use has positive effect on new technology acceptance. Dahlberg and Orni (2007), Lee, Cheng and Depickere (2003) and Al-Gahtani (2001), Rose and Straub (1998), Baniasadi, Sharifi and Poor nabi, concluded that ease of use has significant relationship with acceptance technology. Warshaw, Davis and Bagozzi (1989), indicated that ease of use has low impact on technology acceptance. Also Pan, Sivo and Brophy (2003), showed that the ease of use of technology acceptance has not significant relationship among in the academic environment.

Findings of this research showed that the usefulness has significant effect on the electronic payment card acceptance. Taeb (2009) and Mashreghi (2011) in their research showed that the usefulness has positive effect on new technology acceptance. Dahlberg and Orni (2007), Lee, Cheng and Depickere (2003) and Al-Gahtani (2001), Rose and Straub (1998), Baniasadi, Sharifi and Poor nabi, concluded that usefulness has significant relationship with acceptance technology. Also Pan, Sivo and Brophy (2003), showed that usefulness of technology acceptance has not significant relationship among in the academic environment.

The findings showed that compulsion and satisfaction, have significant effect on the electronic payment card acceptance. The result of same research, Mashreghi (2011), showed that compulsion and satisfaction, have significant effect on the electronic payment card acceptance.

The findings showed that norms have a significant effect on the electronic payment card acceptance. The result of same research, Taeb (2009), showed that norms have significant effect on the electronic payment card acceptance

As regards, all of the factors like usefulness, ease of use, satisfaction, compulsion, norms and network externalities have significant effect on acceptance of electronic micropayments card, suggest that other researchers study about the other factors like culture, or compare micropayments electronic cards in Iran with another countries, also study about IT infrastructure that needed to perform same systems like mobile payments, that classic city change to electronic and modern city. This research did on citizens who used this type of payments in their micropayments other researchers also can do research on people who are service provider like seller.

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