THINK INDIA JOURNAL

ISSN:0971-1260
Vol-22- Issue-14-December-2019

The Roles of Facilitating Conditions, Perceived Risk and Personal Innovativeness in Perceived Ease of Using Mobile Payment Services

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Abstract

The main objective of this study is to investigate the effect of facilitating conditions, perceived risk, and personal innovativeness on user's perception of ease of using mobile payment services (MPS) in Ethiopia. To identify the nature and magnitude of effects of these factors on the perceived ease of use, the study population was selected based on a typical case sampling method. The study population is characterized by different demographic features that are supposed to represent the target population. The convenience sampling technique was used to select 406 final respondents from MPS users of M-Birr and HelloCash. The collected data were analyzed using structural equation modeling (SEM) with the support of AMOS. Besides, SPSS was used to assess mostly the reliability of the collected data. The findings of the study show that facilitating conditions (FC) and personal innovativeness (PI) influence perceived ease of use (PEUO) positively and significantly. On the other hand, the study has found that perceived risk (PR) has a significant negative effect on perceived ease of use (PEUO).

Keywords: Facilitating conditions, mobile payment systems, perceived risks, personal innovativeness, perceived ease of use

I. INTRODUCTION

New technologies are shaping the ways of doing business and the daily functions of final users of the technologies. Organizations can create value by finding opportunities in the dynamic business environment and in the digitalized life of customers. Accordingly, mobile devices are among the most noticeable consumer that supports the digitalization of life of the people. The several services provided with the support of mobile devices have rapidly become basic requirements of day-to-day life all through the world. Within a recent decade, several countries have practiced a significant achievement in promoting financial services inclusion with the support of mobile payment services.

Osafo-Kwaako [1] gives good reasons for MPS as it provides a dual advantage: as an instrument of financial inclusion for the national development, and as a business opportunity for service providers. The authors explain that success in financial inclusion involves reaching individuals and small scale enterprises with different financial products that go beyond payments and can considerably improve their financial positions. For those who provide digital financial services, mobile money is a means of entering into huge unreached potential markets.

Mobile payment provides unique advantages over other bank payment systems [2]. In view of that, MPS benefits the users to maintain purchase records in a mobile device and tackle the problem of lost paper-based receipts and the rejected purchase returns. The authors further described that MPS benefits for better payment security. Thus, MPS can produce information about the individual user, security features on the device, location information, and one-time account identifiers to more successfully verify buyers' identity, in so doing to achieve more secure transactions wherein harm created by stolen credit card numbers is reduced and make it more problematic to take part

ISSN:0971-1260
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in credit card fraud. Moreover, MPS also reduces the overall cost of transactions. For instance, fees absorb 2-3% of the money traded in a credit card transaction; whereas mobile payments offer additional value to both buyers and merchants by easing payments in remote and proximal transactions [2]. Furthermore, Wenner et al. [3] noted that as MPS becomes more widespread, many different entities are using them to achieve multiple goals. They specified that MPS promotes saving habits, facilitates access to microfinance institutions, improves security, trims down overhead costs, and enhances accessibility for the underserved. Regarding saving advantage of MPS, financial resources such as banks are scarce in developing countries, and by using MPS, the unbanked/under-banked people can use MPS to encourage their saving habits [3].

According to [5], the perceived ease of use (PEOU) is an essential determinant of adopting mobile payment services. Venkatesh et al. [4] found that PEOU is mainly significant during the early adoption stage of technology. Besides, a number of previous studies have found that there is a positive association between PEOU and intention to use technical innovations like mobile payment services [5]. This implies that users who perceive MPS is not complex to use will have intentions to use the services. Therefore, it is very important to determine factors affecting perceived ease of use (PEOU) like facilitating conditions, perceived risks, and personal innovativeness.

In 2017, there were only 0.3% of adults who had a mobile payment account in Ethiopia [6] while there were about 34.70 million mobile phone subscribers [7]. This, in part, shows that there is a low level of MPS adoption rate in Ethiopia, and one of these factors may be the perceived complexity of the mobile payment system. In return, the perception of complexity (the opposite of perceived ease of use) can be influenced by individual user's fear of several risks, their personal innovativeness, and/or absence facilitating conditions to use the technology.

II. LITERATURE REVIEW

The characteristics of a particular technology and of individual users affect the acceptance of technologies (Davis, 1989; [4]. Among these dominant characteristics, facilitating conditions (FC), perceived ease of use (PEOU), perceived risks (PR), and personal innovativeness are the most determinants of technology or innovation adoption.

The characteristics of technology that affect its acceptance by people classified into two main kinds [8]. The first category is usage characteristics which relate to the actual usage of the technology by users. These characteristics include the perceived ease of use and facilitating conditions. The second category is outcome-of-usage characteristics which relate to the benefits and costs of using the technology for users and include perceived risks.

Additionally, Van Ittersum et al. [8] classified the characteristics of individual users as demographics and psychographics characteristics. Demographic variables include age, gender, education, occupation [9], and income. Psychographic characteristics include variables like personal innovativeness or technology readiness. Psychographic variables are more challenging to measure, and they require more in-depth tests than demographic factors. Nevertheless, psychographic factors usually provide better insights into the reason why people do or do not adopt new technologies [8].

Venkatesh et al. [4] found that the influence of FC on an intention to use a technical innovation is not significant but it has a significant effect on actual usage of innovation. The absence of both dimensions of facilitating conditions represents barriers to actual usage and may hinder the formation of behavioral intention to use [10]. This does not mean that the presence of FC encourages actual usage [10]. In addition, FC is significantly associated with the actual usage of a system [11].

Nonetheless, training and support kinds of facilitating conditions have no effect on PEOU [12]. More specifically, Venkatesh et al. [4]

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concluded that FC, without adding any moderator, is not significant to predict intention to use a system when the construct of effort expectancy (or perceived ease of use) is used in the same model, but when it is moderated by users' age and experience; it had a strong effect for older users with increasing experience.

Research on the influence of risk and uncertainty in the acceptance of technologies is limited; however, the general consensus of the limited previous studies [13] is that high perceived risk level decreases user's acceptance of technologies. Risk is one of the important reasons for individual potential users not to accept a new technology [14]. Therefore, the perceived risk is an important factor in the decision-making process of technology acceptance.

Personal innovativeness (PI) is defined as an individual's predisposition to use new and different products and brands rather than remain with existing products [15]. According to [16], personal innovativeness affects new product (e.g. technology) acceptance positively. In addition, Parasuraman [17] identified that innovativeness not only directly affects the acceptance of new technologies but also affects it through its positive influence on readiness, which in turn influences acceptance of the technology positively.

According to Venkatesh & Davis [18] and Moore & Benbasat [19] perceived ease of use (PEOU) refers to the degree to which the potential user believes a technological innovation is free of effort in using it. Most studies like [20] found that the acceptance of technologies increases with an increase in the perceived ease of use. Among others, Davis [20], and Venkatesh & Davis [18] concluded that an increase in PEOU results to a high level of intentional acceptance of a given technological innovation.

III. OBJECTIVES AND HYPOTHESES OF THE STUDY

Objectives of the Study

The three objectives of this study are:

1. To determine the effect of facilitating conditions on perceived ease of use;
2. To identify the influence of perceived ease of use on perceived ease of use; and
3. To examine the impact of personal innovativeness on perceived ease of use.

Research Hypotheses

In order to achieve the mentioned objectives of the study and based on the already done previous studies, the following hypotheses have been formulated.

H_1: Facilitating conditions have a positive and substantial effect on users' perception of ease of use of mobile payment services.

H_2: Perceived risk has a negative and significant influence on users' perception of ease of using mobile payment services.

H_3: Personal innovativeness has a positive and substantial effect on users' perception of ease of use of mobile payment services.

Theoretical Framework

The basis for the theoretical framework for this study is technology acceptance models [20], [21], [22] in general and the study hypothesis in particular. All of the constructs are adapted from previous research findings.

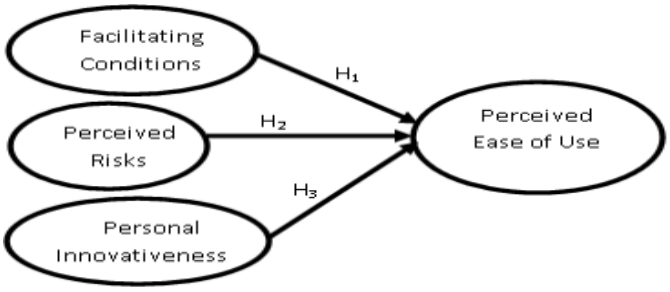

Figure-1: The Study's Framework

IV. RESEARCH METHODOLOGY

The population of this study is the mobile payment services users in Ethiopia who had experience of at least two years in using the MPS of M-Birr and HelloCash. Specifically, the study was carried out in Adama District, Oromia Regional State of Ethiopia. The study is categorized as a cross-sectional study as it targeted the collection of

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data just once, though it took a period of one month. A typical case sampling technique was applied to select the study population, and a convenience sampling technique was used to identify individual MPS users who would participate in this study as a final respondent.

The primary data was collected from the selected research participants where they were taking part in their day-to-day activities, mainly when they visited financial institutions and MPS agents. It was collected via a personally administered questionnaire. The items of the questionnaire were structured based on a 5-point Likert scale. The five alternative scales were used and identified as strongly disagree= 1, disagree= 2, neutral= 3, agree= 4, and strongly agree= 5. For all operationalized constructs of the study, the validated items from prior research works were selected and retested [22], [23].

As the population size (N) was 1,796,595, the appropriate sample size (n) becomes 384 [24]. Having taken into account 85% of the response rate, the self-administered questionnaire was distributed to 442 subjects, and 406 of them were returned and analyzed. The collected data were analyzed using SEM with the support of SPSS and AMOS software. Structural Equation Modeling (SEM) is a technique applied to estimate a series of interrelated associations among variables as well as between items and the respective constructs instantaneously [25].

V. RESULTS AND DISCUSSION

A. Demographic Profile of the Respondents

As indicated in Table-1, gender data of the respondents show that 254 (62.60%) are male and 152 (37.40%) are female. About 21.92% were merchants; 18.72% were self-employed; 18.23% were employees; 16.01% were enterprise owners; 11.82% were farmers, 8.13% were students and 5.17% of them were who had no permanent job.

Table-1: Respondents' Demographic Profiles

Demographic Variables	Category	Frequency	Percent
Gender	Male	254	62.60
	Female	152	37.40
	Total	406	100.0
Occupation	Merchant	89	21.92
	Farmer	48	11.82
	Student	33	8.13
	Employee	74	18.23
	Enterprise Owner	65	16.01
	Other Self-employed	76	18.72
	No Permanent job	21	5.17
	Total	406	100.0
Education	Grade 8-12	174	42.86
	Certificate and Diploma	146	35.96
	Bachelor Degree	62	15.27
	Master Degree	19	4.68
	Ph.D.	5	1.23
	Total	406.00	100.00

The education data of the respondents indicate that 42.86% of the respondents were with education level 8-12 grades; 35.96% of the users were either certificate or diploma holders; 15.27% of them were bachelor degree holders; 4.68% of them were 2nd masters holders; 1.23% of them completed Ph.D.

B. Factor Analysis and Model Fit Assessment

Table-2: Kaiser-Meyer-Olkin and Bartlett's Test

KMO Measure of Sampling Adequacy		.962
Bartlett's Test of Sphericity	Approximate Chi-Square	5067.415
	df	153
	Sig.	.000

All measurement items of the study variables fit the skewness and kurtosis criteria. The overall KMO value is 0.962 (see Table-2) which is above the minimum requirement of 0.60 [26]. Besides, the diagonal values of the anti-image correlation matrix, which represent individual items' KMO values for all observed variables, are greater than 0.90. These in part, indicate that there is superb sample adequacy for EFA [27], [28].

Table-3 also reveals that the factor loading of each item and the values of commonalities are not less than 0.618 and 0.676 respectively. Therefore, the data of the study is much appropriate for EFA [27]. Furthermore, Cronbach's Coefficient Alpha (α) values of all the measured constructs are greater than 0.80 which indicates that data for all constructs are reliable [26].

Table-3: Cronbach's coefficient alpha, factor loading, and communalities

Items	Factor Loading	Communalities		α
		Initial	Extraction	
FC1	.728	1.00	.714	0.83
FC2	.680	1.00	.676	

ISSN:0971-1260
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FC3	.618	1.00	.734	
FC4	.704	1.00	.739	
PR1	-.662	1.00	.642	0.83
PR2	-.702	1.00	.682	
PR3	-.734	1.00	.731	
PR4	-.620	1.00	.756	
PI1	.822	1.00	.759	0.89
PI2	.752	1.00	.752	
PI3	.726	1.00	.694	
PI4	.758	1.00	.691	
PI5	.749	1.00	.796	
PEOU1	.852	1.00	.735	0.92
PEOU 2	.846	1.00	.723	
PEOU 3	.824	1.00	.686	
PEOU 4	.811	1.00	.677	
PEOU 5	.819	1.00	.683	

In addition, Table-4 portrays that the values of univariate skewness and univariate kurtosis are within -1 and 1 which indicates that each measured item of all constructs is normally distributed [29].

Table-4: Assessment of normality

Variable	min	max	Skew	c.r.	kurtosis	c.r.
FC4	1.000	5.000	-.408	-3.356	-.430	-1.770
FC3	1.000	5.000	-.100	-.823	-.673	-2.769
FC2	1.000	5.000	-.361	-2.971	-.527	-2.169
FC1	1.000	5.000	-.225	-1.851	-.702	-2.886
PR4	1.000	5.000	.421	3.466	-.524	-2.155
PR3	1.000	5.000	.350	2.877	-.645	-2.654
PR2	1.000	5.000	.547	4.497	-.308	-1.269
PR1	1.000	5.000	.463	3.812	-.568	-2.336
PI5	1.000	5.000	-.371	-3.052	-.278	-1.142
PI4	1.000	5.000	-.211	-1.736	-.886	-3.643
PI3	1.000	5.000	-.232	-1.905	-.551	-2.268
PI2	1.000	5.000	-.406	-3.341	-.222	-.912
PI1	1.000	5.000	-.351	-2.887	-.680	-2.795
PEOU	1.00	5.00	-.466	-3.836	-.472	-1.943
5	0	0				
PEOU 4	1.000	5.000	-.478	-3.931	-.702	-2.886
PEOU 3	1.000	5.000	-.511	-4.203	-.643	-2.643
PEOU 2	1.000	5.000	-.361	-2.972	-.808	-3.323
PEOU 1	1.000	5.000	-.456	-3.755	-.726	-2.984

N.B.: c.r.= critical ration

As the study constructs had already been identified by a number of studies so far, the inter-items correlations or items' loading >0.40 has been used to assess the convergent validity of the study data [28]. Zikmund [30] also recommends that a correlational analysis is one way of proving construct validity for particular research. Several scholars advocate that the cutoff point of item-to-total correlation (IIC) for a given concept or factor in measuring internal consistency should be at least 0.40 [31], [32]. Furthermore, others have set the minimum value of item-total correlation (ITC) for a factor to 0.30 [33]. Accordingly, the inter-item correlation and item-to-total correlation values are not less than 0.57 (see Table-5).

Table-5: AVE, Items' Loadings, IIC and ITC

Factors	AVE	CR	Min. ITC	Min. IIC	Min. Std. Estimates
FC	0.60	0.83	0.48	0.64	0.657
PR	0.56	0.83	0.45	0.66	0.688
PI	0.60	0.89	0.56	0.74	0.750
PEOU	0.69	0.92	0.61	0.80	0.816

Moreover, various scholars identify the cutoff point for AVE to the value of at least 0.50 for the convergent validity of a study data [26]. Besides, the value of CR should be at least 0.70 and above the value of AVE [26]. Accordingly, AVE and composite reliability (CR) values of the study are not less than 0.56 and 0.83 respectively, and CR>AVE for all factors (see Table-5).

For convergent validity, the standardized estimates or factor loadings should be at least 0.5, and at the same time, it should be significant [26]. In view of this, Fig. 2 shows that all the standardized estimates of the measured variables are greater than

ISSN:0971-1260
Vol-22- Issue-14-December-2019

0.65. These five results satisfy the criteria for construct validity.

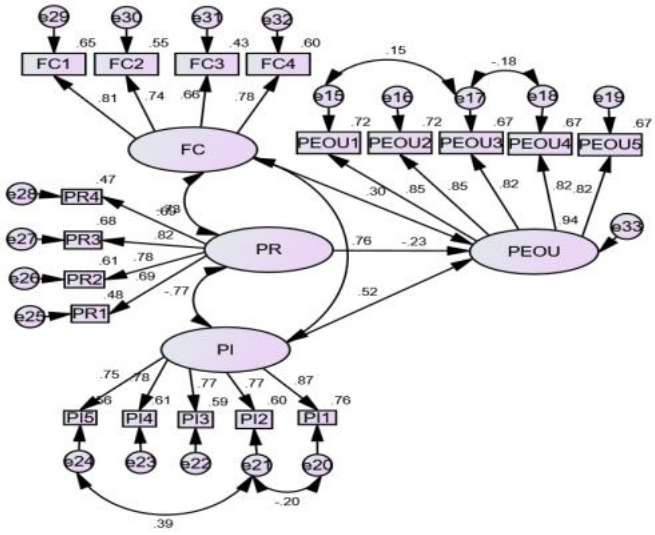

Figure 2: Standardized Path Estimates

In addition, Table-6 reveals that the study model fits the data well since all the listed goodness-of-fit indices are within the prescribed cutoff points [26], [34], [35]; [36].

Table-6: Goodness-of-Fit Indices

Indices	χ^2/DF	GFI	RMR	RMSEA	TLI	CFI	NFI	PNFI	AGFI
Results	1.495	0.951	0.023	0.035	0.985	0.988	0.964	0.787	0.933

N.B.: χ^2= Chi-Square, DF= Degree of freedom, GFI= Goodness-of-fit, RMR= Root mean square residual, RMSEA= Root Mean Square Error of Approximation, TLI= Tucker-Lewis coefficient Index, CFI= Comparative-fit-index, NFI= Normed fit index, PNFI= Parsimony Normed Fit Index, AGFI= Adjusted Goodness of Fit Index

In addition to goodness-of-fit measures, it is important to determine the squared multiple correlations (SMC) of the dependent variable in order to best describe the structural model as it is independent of all units of measurement [37]. Accordingly, SMC of the dependent variable, PEOU is 0.942 which implies that the three predictors (FC, PR, and PI) account for 94.20% of the variance of the dependent variable, PEOU (see Fig. 2).

C. Findings

Table-7 depicts that the estimated values of all paths between each of the three predictors (FC and PI) and PEOU are positive and statistically significant, while the association between PR and PEOU is negative and significant. Therefore, all hypotheses of the study are supported.

Facilitating Conditions: The study result indicates that facilitating conditions have a positive relationship and significant effect on users' perception of services' ease of use (see Table-7). Similarly, several studies have found that facilitating conditions influence directly or indirectly the use of technology [10]. Therefore, H_1 is not rejected.

Perceived Risks: The study result indicates that the perceived risks associated with the adoption of mobile payment services have negative correlation with and statistically significant effect on perceived ease of use of the services. Similarly, several previous studies also support that perceived risk affects significantly the digital financial transactions [38]. Thus, the proposed H_2 of the study is supported.

Table-VII: Structural Path Analysis Result

DV	Paths	IV	Unstandardized Estimates	S.E.	C.R.	P
PEOU	<---	FC	.380	.062	6.095	***
PEOU	<---	PR	-.396	.088	-4.523	***
PEOU	<---	PI	.594	.062	9.629	***

*** P-value is less than 0.001, and significant at the significance level of 0.001

Personal Innovativeness: the user's personal innovativeness plays a significant positive (0.524) role in her/his perception of m-money services' ease of use (see Table 6.3). A number of studies have also proven this study result. For instance, [39], [40] found that personal innovativeness of users has a significant and positive direct effect on perceived ease of use. Hence H_3 of the study is supported.

VI. CONCLUSIONS AND IMPLICATIONS

A. *Conclusions*

There are several factors that affect either positively or negatively and significantly or non-significantly the customers' perceptions of MPS ease of use. Among these factors, this part of the study focuses on facilitating conditions, perceived risks, and personal innovativeness. The study has found that the three predictors (FC and

ISSN:0971-1260
Vol-22- Issue-14-December-2019

PI) have a significant positive effect on the dependent variable (PEOU). On the other hand, PR has a significant negative impact on PEOU. About 94.20% of the variance in PEOU is explained by these three variables. Specifically, PI has the most significant positive effect on PU, followed by FC.

B. Research Implications

The study findings provide direction for future researchers, mobile payment technology and services providers, and policy-makers. The study population was selected based on a typical case sampling technique which allows researchers to select a particular segment possessing the typical characteristics of the target population. The study data were also analyzed using AMOS-SEM which has several advantages over other approaches of testing and analyzing data given that the model fits completely the frequently used goodness-fit indices.

The current study findings have also theoretical implications as they support that FC and PI have a positive and statistically significant effect on PEOU, whereas PR has a significant effect on PEOU. These indicate that mobile payment technology and service providers need to have strategies to provide organizational and technological facilitating conditions and make their MPS with less probability of unwanted consequences. They should also design strategies that allow them to utilize the opportunity of innovative potential users and make other potential users much familiar with the MPS. Likewise, the study results imply that the policy-makers (e.g., National Bank of Ethiopia) need to formulate and implement a policy that increases the availability of facilitating conditions and that reduces the vulnerability of MPS to different kinds of risks.

VII. LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCHERS

A. Limitations of the Study

Though the study population is characterized by inhabitants with different demographics and other sociocultural factors, it may be challenging to generalize the study findings to the whole target population; particularly, for potential mobile users residing in rural areas that are either under-banked or unbanked.

The study sampling technique was one of the non-probability sampling approaches. With such non-probability sampling methods, it may be difficult to generalize the findings for the target population. The study has covered a few variables as a determinant of the perceived ease of using MPS. Perceived ease of use might be affected by different factors like users' knowledge, education, occupation, self-efficacy, intrinsic motivation, and others.

B. Suggestions for Future Researchers

The scope of future study needs to be wide which incorporates under-banked and unbanked potential users. The respondents should also be selected using probability sampling techniques. Furthermore, it is better for future researchers in the areas of MPS if their studies concentrate on users' characteristics like adoption stage, age, knowledge, gender, education, readiness, occupation, and income as moderators between the direct determinants (FC, PR, and PI) and the dependent variable (PEOU). In addition to these three direct determinants, the future study needs to investigate the effects of other factors on PEOU.

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