

Moderating Effects of Gender on Mobile Money Services Adoption in Ethiopia

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Abstract

The major objective of the study was to identify the moderating effect of users' gender in their intention to continue the usage of mobile money services in Ethiopia; particularly in Adama City and Adama District. A cross-sectional quantitative research approach was used. The research design for this study was explanatory or cause-effect research design. The sampling unit for the study is individuals who were users of mobile money services delivered as M-Birr and Hello-Cash. The sample size, 406 mobile payment services users, was conveniently and purposively selected from M-Birr and Hello-Cash mobile money system users. SEM was used to test the proposed study model. In view of that, the study results show that gender has a significant moderating effect on the relationship between perceived usefulness and continuous usage of mobile payment services. Similarly, gender significantly moderates the relationship between perceived ease of use and intention to continue the usage of mobile money services. The study also found that perceived usefulness is a more important factor for male users in predicting their intention to use m-money, while perceived ease of use is a stronger factor in influencing female's intention to use mobile money than that of male users. The study is novel that it has not only identified the moderating effect of users' gender on adoption of mobile money, but also it has identified that perceived usefulness is more important for male users than female users in predicting their intentions to use mobile money services. On the other hand, the study has found that perceived ease of use is more important for female than male in affecting the intention to use the services. The study methodology is also unique as it has applied both Maximum Likelihood Estimation (MLE) and Multi-Group Analysis (MGA) using two techniques: chi-square-based comparison between constrained and unconstrained models of different groups, and pairwise tests of path coefficients comparison of the predetermined groups.

Key words: Gender, intention to use, mobile money services, perceived ease of use, perceived usefulness

1. Introduction

Mobile money is a service letting unbanked and financially excluded individuals sell and/or purchase goods or services using their mobile device, as a substitute for cash. Financial exclusion entails missed opportunities, which has severe ramifications for individuals, families, and the economy. Despite significant efforts to enhance economic opportunity and equality for women in Sub-Saharan Africa, gender gaps in financial inclusion persist, particularly with the emergence of digital financial services. Understanding gender differences in digital financial services usage as well as the extent, nature, and pattern of digital financial services usage among two gender groups, is critical for building solutions that fulfill users' requirements and support their involvement in the formal economy.

A significant number of studies indicate that women's use of digital financial services and access to credit has a substantial impact. According to a recent study, mobile money services assisted women-headed households in Kenya in reducing extreme poverty and providing opportunity to transition from farming to other business services (Suri & Jack, 2016). (TertiltMichèle and Matthias Doepke, 2019) Also found that when women have better access to finance, they are more likely than males to spend on education, food, and health care, leading in enhanced family welfare.

The use of digital financial services has achieved commendable growth around the world, especially in digital payments. The adoption of digital financial services is rising most quickly in a number of developing nations. According to the 2017 Findex report, the percentage of people using digital payments increased by 12 percentage points (44%) between 2014 and 2017 in developing countries.

In sub-Saharan Africa, the gender gap continues despite the sharp rise in financial inclusion. The gender gap in financial inclusion in sub-Saharan Africa averages 11.3%, ranging from 24% in Nigeria to 6% in Mauritius. This underscores the need for collaborative efforts to ensure that the design and delivery of financial products are tailored to the needs of groups left out of society, for instance, women. Hence, the digital financial services providers have to understand the financial needs of women and approach them with the services. Understanding such like customer segments allows the service providers to optimize products and services that provide the most spacious client foundation of both women and men.

The most important current changes in the financial scene across Sub-Saharan Africa have been the remarkable accomplishment of mobile money services. An increasing number of recent literature works have debated that the hasty growth of mobile money services has played a vital role in boosting women's financial inclusion by allowing them to access financial services (Group, 2018).

The GSMA's Mobile Money for the Unbanked Deployment Tracker mentioned that as of May 2015, there were only two mobile money service providers in Ethiopia (GSMA, 2015). There were M-Birr and Hello-Cash. The M-Birr mobile money service was introduced in 2013, allowing clients to make inland or domestic money transfers, take part in withdrawals and savings, check over account balances, complete airtime top-up, make loan repayments, and receive salary payments (Magada, 2017).

The Global Findex report of 2014 remarked that there were only about 0.03% of adults in the Ethiopia who had a mobile money account (Demirguc-Kunt, Asli; Klapper, Leora; Singer, Dorothe; Van Oudheusden, 2015). The country lefts behind its sub-region peer countries in the

development of digital communications and related services, such as mobile money services (Magada, 2017).

Besides, there is no study conducted on the moderating effect of gender on adoption of mobile money services. Therefore, it is deemed to be important to identify the moderating effect of gender on mobile money adoption in Ethiopia. Hence, the findings are expected to benefit the stakeholders of mobile money in particular and the economy of the country in general.

2. Objectives and Hypotheses

Objectives

The study aims at identifying the moderating role of users' gender in mobile money services adoption in Ethiopia. Specifically, the study addresses the following two key objectives.

- To identify the moderating role of gender in the effect of perceived usefulness on intention to use mobile money; and
- To determine the moderating effect of gender on the relationship between perceived ease of use and intention to use mobile money.

Hypothesis

Hypothesis₁: The effect of perceived usefulness on an intention to use MPS is significantly moderated by users' gender.

Many studies (Brosnan, 1999; Gefen, D. and Straub, 1997; Morris, M. G., Venkatesh, V., & Ackerman, 2005; Mundorf, N., Westin, S., & Dholakia, 1993) concluded that individuals' gender differences have an influence on the acceptance of the technology. This is to say gender is associated with differences in perceptions of new technology (Gefen, D. and Straub, 1997). According to (Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, 2003) the effects of perceived usefulness on the intention to use innovation is moderated by gender. (Brosnan, 1999) Also specified that gender has a significant influence on technology acceptance indirectly through perceived usefulness. As said by (Gefen, D. and Straub, 1997) women value perceived usefulness more than men do, while men have a relative tendency to feel more at ease with computers.

Hypothesis₂: The effect of perceived ease of use on an intention to use MPS is significantly moderated by users' gender.

(Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, 2003) Concluded that the effect of perceived ease of use on the intention to use technology is moderated by gender. (Venkatesh, V., Thong, J. Y., & Xu, 2012) Also found that users' gender moderates the relationship between perceived ease of use (i.e., effort expectancy) and behavioral intention of using an innovation.

3. Related Literature Review

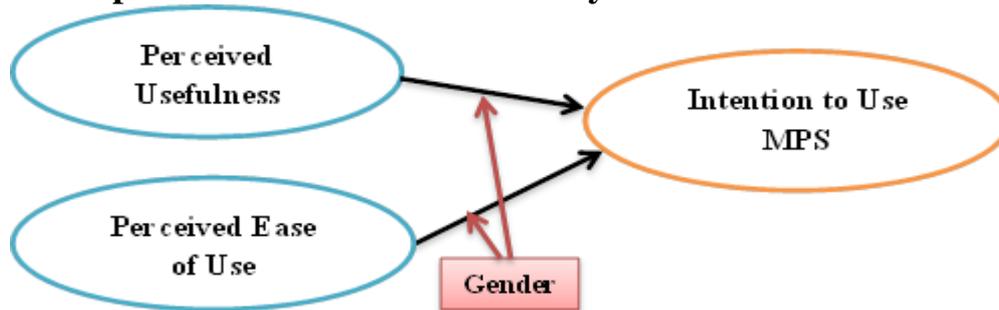
Many studies (Brosnan, 1999; Gefen, D. and Straub, 1997; Morris, M. G., Venkatesh, V., & Ackerman, 2005; Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, 2003) concluded that individuals' gender differences have an influence on the acceptance of technology. (Gefen, D.

and Straub, 1997) Also recognize that gender is associated with differences in perceptions of new technology. In addition, (Brosnan, 1999) specified that gender has influence on technology acceptance indirectly through perceived usefulness. As said by (Gefen, D. and Straub, 1997) women attach importance to perceived usefulness more than men do, while men have relative inclination to feel more at ease of using computers.

Moreover, the study conducted by (Morris, M. G., Venkatesh, V., & Ackerman, 2005) found that attitude toward using technology is relatively a powerful predictor of technology acceptance for men than women. On the other hand, subjective norm (i.e., belief about what others think an individual should do, and can also be termed as social pressure) influences more significantly women potential users' acceptance of technology than men. So, women have a tendency to value the opinions of their social group more than men do, and this makes subjective norms more important for women than men (Morris, M. G., Venkatesh, V., & Ackerman, 2005).

Gender characteristics also come to be salient when hedonic product features (e.g., color) are taken into account. Remarkably, in a study on the effect of these hedonic features on acceptance of information services, (Mundorf, N., Westin, S., & Dholakia, 1993) found that even though women show more acceptance of the service, color highly influenced men's acceptance of the service positively.

Conceptual Framework of the Study



4. Research Methodology

The present study is categorized as a cross-sectional study as it targets the collection of data just once, perhaps over a period of months, but one-shot, to answer the research questions and meet the research objectives. This study is also a quantitative and an explanatory as it establishes cause-and-effect relationships among study variables through path analysis of SEM using AMOS.

The unit of analysis for the present study is an individual who was using mobile payment systems (M-Birr and Hello-Cash) in Adama District of Oromia Regional State. The researcher considered each response as an individual's mobile payment user data source. The primary data was collected from the conveniently selected research participants where they were taking part in their day-to-day habitual jobs, mostly when they visited to financial institutions and MPS agents.

The data for this study was collected via a personally administered questionnaire. The questions of the questionnaire were structured based on a 5-point Likert scale as it is very popular for measuring perceptions and it is simple to administer in processing, analyzing and interpreting the collected information. With the Likert scale, respondents indicate their attitudes by checking how strongly they agree or disagree with each statement that varies from extremely positive to

extremely negative toward the perceptual object. According to (Zikmund, 2003) with Likert scale, respondents select from five alternatives and may number from three to nine or more. For present study, five alternatives were used as they are consistent with the measurement scales used in previous popular studies (e.g., (Pavlou, 2003; Venkatesh, V., & Davis, 2000). The scale were identified as strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree = 5.

The sample size was determined based on (Krejcie, R. V., & Morgan, 1970) sample size determination. The target population size (N) was 1,796,595 (1,100,000 M-Birr users and 696,595 Hello-Cash users) elements. In line with the generalized scientific guideline for sample size determination proposed by (Krejcie, R. V., & Morgan, 1970) as the population size (N) = 1,796,595, the appropriate sample size (n) is 384. With the expected response rate of 85%, the questionnaire was distributed to 442 conveniently selected m-money users. Accordingly, 442 questionnaires had been distributed to the selected individual users, and 406 of them were returned. Among 406 completely returned questionnaires, 247 (60.84%) subjects were M-Birr users and the rest 159 (39.16%) were Hello-Cash users.

The collected data were analyzed using different statistical tools with the support of SPSS and SEM using AMOS. To address the objectives of the study and test the hypotheses, the study used AMOS software in analyzing the results by applying Maximum Likelihood Estimation (MLE) and Multi-Group Analysis (MGA) using two techniques: chi-square-based comparison between constrained and unconstrained models of different groups, and pairwise tests of path coefficients comparison of the predetermined groups.

Unidimensionality Test

The present study has three factors: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), and Intention to Use (ITU). All the identified factors or constructs of the study have at least three manifested variable. The correlations among individual items and between their respective factors/constructs are not less than 0.60 and 0.75 respectively. Table 1 depicts the number of items of each construct and the degree of linear relationship between individual items and the factor under which the items have been categorized.

Table 1: Number of Items under a Factor and their Correlation with the Factor

Factors/ Constructs	Type of Constructs	Nº of Items	Inter-Item Correlation (Min.)	Item-Total Correlation (Min.)
PEOU	Exogenous	5	0.61	0.80
PU		4	0.60	0.77
ITU	Endogenous	4	0.60	0.77

Multicollinearity and Singularity Tests

Various studies have applied squared multiple correlations (SMC) in testing multicollinearity and singularity issues of studied variables. As mentioned earlier, (Yong, A. G., & Pearce, 2013) stressed that an observed variable that has issues with singularity (i.e., wherein SMC close to 0.0) and multicollinearity (wherein SMC close to 1.0) should be deleted from the dataset. Concerning the present study data, the minimum value of SMC is 0.59 and its maximum value

is 0.78 as shown in Table 2, below. This in part shows that the measured variables are free of multicollinearity and singularity issues.

Table 2: Squared Multiple Correlation (SMC) of the Observed Variable of the Study

Factors/Constructs	N ^o of Items	Squared Multiple Correlation (SMC)	
		Minimum	Maximum
Perceived Ease of Use	5	0.64	0.72
Perceived Usefulness	4	0.59	0.70
Intention to Use	4	0.60	0.78

Suitability Test

For the present study, the overall KMO value is 0.976 (as shown in Table 3) and 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.

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.976
Bartlett's Test of Sphericity	Approx. Chi-Square	9846.861
	df	496
	Sig.	.000

As stated by Hair et al. (1998), a significant value less than 0.05 of Bartlett's Test of Sphericity is desirable. With regard to the present study, as indicated in Table 5.3 above, the result of Bartlett's Test of Sphericity with χ^2 (≈ 9846.861) and d.f. ($=496$) is less than 0.05 (i.e., $0.000 < 0.05$) which manifests that there is a significant correlation among the observed variables are considerable and adequate for EFA.

Reliability of the Instrument

The present study has used Cronbach's coefficient alpha (α) which is the most commonly used and popular test of inter-item consistency reliability (Sekaran, 2003). Cronbach's coefficient alpha tests the consistency of respondents' responses to all the items in an instrument. To measure the extent that items are independent measures of the same concept, all items were correlated with one another in line with (Sekaran, 2003) suggestions, and corrected item-total correlation is computed for each item as shown in Table 4.

Cronbach's alpha, as a method of measuring internal consistency reliabilities, for all factors is greater than 0.70. This in part shows that there is internal consistency among items of each factor in predicting or measuring their respective factors. In other words, the items in each factor are positively interconnected to one another. Items in each factor are independent measures of the same variable and indicate precision in measurement. Additionally, there are three methods that can be used to measure internal consistency: the item-to-total correlation and the inter-item

correlation (Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, 2006) as well as corrected item-total correlation (Bearden, W. O., Hardesty, D. M., & Rose, 2001).

For the present study, all the inter-item correlations values exceed 0.40 and all the item-to-total correlations values exceed 0.50. Several scholars (e.g., (Loiacono, E. T., Watson, R. T., & Goodhue, 2002; Wolfinbarger, M., & Gilly, 2003), advocate that the cutoff point of item-to-total correlation for a given concept or factor in measuring internal consistency should be at least 0.40. Furthermore, (Cristobal, E., Flavián, C. and Guinalú, 2007) have set the minimum value of item-total correlation for a factor to 0.30. Accordingly, the collected data through the questionnaire survey was a reliable measurement tool based on the values of overall Cronbach’s alphas, Cronbach’s alphas if item deleted, inter-items correlations, corrected item-total correlation, and item-to-total correlations (see Table 4).

Table 4: Cronbach’s Alpha, Inter-Item Correlations and Item-to-Total Correlation

Factors/Constructs	Cronbach’s Alphas (α)	Cronbach’s Alphas if item deleted (Max.)	Inter-Item Correlation (Min.)	Corrected Item-Total Correlation (Min.)	Item-Total Correlation (Min.)
Perceived Ease of Use	0.92	0.90	0.61	0.76	0.80
Perceived Usefulness	0.88	0.85	0.60	0.71	0.77
Intention to Use	0.89	0.87	0.60	0.73	0.77

The validity of the Instrument

In order to validate the instrument, the current study has considered construct validation using analysis of moment structures software (AMOS) with maximum likelihood (ML) in line with Hamid et al. (2011) suggestion. This way of validity test is known as confirmatory factor analysis (CFA) which is a more advanced approach as the hypothesized models are based on the foundation theories (Hair et al., 2010). For the present study, CFA was used to determine the construct validity of the questionnaire survey items and concepts or factors. It indicates how well the construct explained the variables (i.e., items) under the concept or factor (Hair et al., 2010). This is to say when the correlation of the items within the same construct or concept is relatively high (Robinson, J. P., Shaver, P. R., & Wrightsman, 1991), it is said to have construct validity. Additionally, the factor loading (i.e., the regression weight and the squared multiple correlations (SMC) of the items are significantly correlated to the specified construct or concept contribute to the construct validity of a study data (Ab Hamid, M. R., Mustafa, Z., Idris, F., Abdullah, M., & Suradi, 2011).

Therefore, convergent validity was tested by checking that the factor loadings or standardized estimate of the confirmatory model using AMOS with ML was higher than 0.60 and statistically significant at level of 0.001 along with suggestion forwarded by (Sanzo, M. J., Santos, M. L., Vázquez, R., & Álvarez, 2003). For further explanation, the detailed result is demonstrated below in Table 5.

Table 5: Regression Weights for Unstandardized and Standardized Estimates

Items	Paths	Factors	Unstandardized Estimate	Standardized Estimate	P
PU1	<---	PU	1	0.84	***
PU2	<---	PU	0.953	0.77	

PU3	<---	PU	0.98	0.78	***
PU4	<---	PU	0.836	0.82	***
ITU1	<---	ITU	1	0.88	***
ITU2	<---	ITU	0.809	0.77	***
ITU3	<---	ITU	0.933	0.78	
ITU4	<---	ITU	0.912	0.85	***
PEOU1	<---	PEOU	1	0.83	***
PEOU2	<---	PEOU	0.897	0.85	***
PEOU3	<---	PEOU	0.971	0.80	
PEOU4	<---	PEOU	0.859	0.83	***
PEOU5	<---	PEOU	0.873	0.83	***

*** Significance of correlation where $p < 0.001$

In addition, convergent validity can be assessed by average variance extracted (AVE) and composite reliability (CR). Various authors (e.g., (Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, 2006; Urbach, N., & Ahlemann, 2010) identified the cutoff point for AVE to the value of at least 0.5 for convergent validity of a study data. (Bagozzi, R. P., & Yi, 1998) stressed that a construct/factor with less than 0.40 AVE value should be eliminated from the study model. Besides, the value of CR should be at least 0.7 and greater than the value of AVE (Hair, J.F., Black, W.C., Babin, B.J., & Anderson, 2010).

The CR values for all constructs or factors exceed 0.70 (the minimum cutoff point). Additionally, the AVE values of all constructs or factors are above 0.50 (the minimum cutoff point). (Malhotra, N. K., & Dash, 2011) remarked that AVE is usually too strict, and convergent validity (sometimes termed as internal reliability) can be established through CR alone. Therefore, the factor with AVE less than 0.50, but has CR greater than 0.70, is valid based on the latter criterion as suggested by (Malhotra, N. K., & Dash, 2011). Furthermore, items' loading was also used to measure convergent validity where its loading exceeds 0.4 on all items of a construct (Sanzo, M. J., Santos, M. L., Vázquez, R., & Álvarez, 2003). In conclusion, the study data has satisfied the criteria for convergent validity as illustrated in Table 6.

Table 6: Average Variance Extracted, Composite Reliability and Factor Loadings

Factors/Constructs	Average Variance Extracted (AVE)	Composite Reliability (CR)	Items' Loadings (Min-Max)
Perceived Ease of Use	0.69	0.92	0.820-0.850
Perceived Usefulness	0.64	0.88	0.785-0.830
Intention to Use	0.67	0.89	0.784-0.849

5. Results

The aim of this study is to investigate the moderating effect of gender on users' intention to continue m-money services usage. The numbers of female and male respondents were 152 (37.40%) and 254 (62.60%), respectively. Besides, according to information from the National Bank of Ethiopia (NBE), the actual number of current mobile service users in Ethiopia is dominated by male users. Therefore, the difference in the sample size of female and male respondents is mainly due to the fact that a large number of m-money users are male.

In order to test the research hypotheses, the researcher used AMOS software in analyzing the results by applying Maximum Likelihood Estimation (MLE) and Multi-Group Analysis (MGA) using two techniques: chi-square-based comparison between constrained and unconstrained models of different groups, and pairwise tests of path coefficients comparison of the predetermined groups.

Initially, it was deemed important to examine the effect of users' perception of mobile payment services' usefulness and ease of using the service on their intention to continue using its services. In view of this, the following exhibit depicts the paths where gender moderates the relationship between the independent variable and dependent variable in the model. In addition, the following table illustrates the regression weights between the predictors and dependent variable for both occupation groups.

Table 7: Regression Weights on the Paths of Interest for Moderator (Gender)

Groups	Paths	Label	Standardized Estimate	Unstandardized Estimate	S.E.	C.R.	P
Female	ITU<---PU	f1	-0.243	-0.245	0.47	-0.521	0.603
	ITU<---PEOU	f2	1.241	1.120	0.427	2.622	0.009
Male	ITU<---PU	m1	1.169	1.334	0.521	2.561	0.010
	ITU<---PEOU	m2	-0.153	-0.140	0.403	-0.348	0.728

Table 7 illustrates that the probability of getting a critical ratio as large as 2.622 is 0.009 for female m-money users. In other words, the regression weight for PEOU in the prediction of ITU is significantly different from zero at the level of significance 0.01 (two-tailed test) for female users of mobile payment services. For male users of the services, the probability of getting a critical ratio as large as 0.348 is 0.728. That is to say, the regression weight for PEOU in the prediction of ITU is not significantly different from zero at the 0.05 significance level (two-tailed test) for male users. Therefore, the effect of users' perception of ease of using m-money services on their intention to continue its usage is strong and significant for female users while it is weak and not significant for male users.

On the contrary, the effect of users' perception of the usefulness of m-money services on their intention to continue its usage is strong and significant for male users while it is weak and not significant for female users of the services. As it is shown in Table 7, the probability of getting a critical ratio as large as 2.561 is 0.010 for male users. This indicates that the regression weight for PU in the prediction of ITU is significantly different from zero at a significance level of 0.01 (two-tailed test). On the other hand, the probability of getting a critical ratio as large as |0.521| is 0.603 for female users. In other words, the regression weight for PU in the prediction of ITU is not significantly different from zero at the 0.05 level (two-tailed).

To determine the significance of the moderating role of users' gender on the association between their perception of usefulness and ease of use of m-money services, and their intention to continue the usage of the services, the chi-square-based comparison between constrained and

unconstrained models of both male and female groups were performed. The paths of interest to test the moderator effect of gender are PU to ITU and PEOU to ITU. As shown in Table 8 and Table 9, this technique has not produced consistent results among male and female groups in measuring the moderating effect of gender on the relationship between PU and ITU. As chi-square is usually affected by sample size, and as it is impossible to refine or reclassify the respondents' gender, the researcher used the alternative technique of pairwise tests of path coefficients comparison to more examine the moderating effect of users' gender on the association between PU and ITU.

In performing chi-square-based multi-group analysis, the constrained and unconstrained models for each group are required and the difference of chi-square values and the degree of freedom of each model for a group are computed once at a time. The models should fit the data based on goodness-of-fit indices which have been used frequently. The following tables depict detail information related to the chi-square-based multi-group analysis of testing the moderation effect of users' gender on the relationship between the predictors and dependent variable in the model.

Table 8: Chi-Square Values of Constrained and Unconstrained Models for Male

The moderation effect of gender between PU and ITU											
Default Models	CMIN	DF	P	CMIN/DF	GFI	RMR	RMSEA	TLI	CFI	NFI	AGFI
Unconstrained	73.258	56	.061	1.308	.958	.019	.035	.990	.993	.972	.932
Constrained	62.619	57	.287	1.099	.943	.025	.026	.995	.997	.963	.909
Difference	10.639	1									
The moderation effect of gender between PEOU and ITU											
Default Models	CMIN	DF	P	CMIN/DF	GFI	RMR	RMSEA	TLI	CFI	NFI	AGFI
Unconstrained	73.258	56	.061	1.308	.958	.019	.035	.990	.993	.972	.932
Constrained	91.534	57	.003	1.606	.946	.021	.049	.981	.986	.965	.914
Difference	18.276	1									

Table 8 indicates that all the models fit the data that is used to measure the moderation role of users' gender between the relationship of perceived usefulness and intention to use as well as the association between perceived ease of use and intention to use m-money services. Particularly, the difference between chi-square values of unconstrained path model and constrained path model of PU to ITU for male respondents is greater than 3.84 (i.e., the value of chi-square with 1 degree of freedom). Therefore, this indicates to some extent that the moderation effect of gender is significant as the difference in chi-square value between the constrained and unconstrained models for the male group exceeds 3.84. Subsequently, the next step is performing the test of moderation for the same variable (i.e., gender) using the second dataset (female group) following the same procedure undertaken for the male group.

Table 9: Chi-Square Values for Constrained & Unconstrained Models for Female

The moderation effect of gender between PU and ITU											
Default Models	CMIN	DF	P	CMIN/DF	GFI	RMR	RMSEA	TLI	CFI	NFI	AGFI
Unconstrained	73.258	56	.061	1.308	.958	.019	.035	.990	.993	.972	.932
Constrained	65.497	57	.206	1.149	.941	.026	.031	.993	.995	.961	.905
Difference	7.761	1									

The moderation effect of gender between PEOU and ITU											
Default Models	CMIN	DF	P	CMIN/DF	GFI	RMR	RMSEA	TLI	CFI	NFI	AGFI
Unconstrained	73.258	56	.061	1.308	.958	.019	.035	.990	.993	.972	.932
Constrained	62.036	57	.301	1.088	.942	.025	.024	.996	.997	.963	.906
Difference	11.222	1									

Table 9 depicts that all the models fit the data that is used to measure the moderation role of users' gender between the relationship of perceived usefulness and intention to use in addition to the association between perceived ease of use and intention to use m-money services. The difference between chi-square values of unconstrained path model and constrained path model of PU to ITU for female respondents is greater than 3.84 (a value of chi-square with 1 degree of freedom). Therefore, the moderation effect of gender is significant as the difference in chi-square value between the constrained and unconstrained models for the female group is greater than 3.84.

As the chi-square values difference for male and female groups show a consistent result: for male and female groups, the value is greater than 3.84. Therefore, it can be concluded to conclude that gender moderates significantly the relationship between PU and ITU. In order to further test and more describe the moderation effect of gender on the relationship between perceived usefulness and intention to use, pairwise tests of path coefficients comparison technique in AMOS was used and resulted in the same conclusions that had been generated from chi-square-based comparison technique (see Table 10).

Table 10: Critical Ratios for Differences between Parameters

Groups	Paths of Interest for Moderator	Label	f1	f2	m1	m2
Female	ITU <--- PU	f1	0			
	ITU <--- PEOU	f2	1.528	0		
Male	ITU <--- PU	m1	2.250	0.319	0	
	ITU <--- PEOU	m2	0.169	-2.146	-1.601	0

The above table highlights part of the matrix that is of most important to test the moderation role of gender on the association between PU and ITU as well as PEOU and ITU using the pairwise coefficients comparison. As shown in the following exhibit, f1 and f2 are paths of interest for gender between PU & ITU, and PEOU & ITU respectively, for which only female data set was used. On the other hand, m1 and m2 are paths of interest for gender between PU & ITU, and PEOU & ITU respectively, for which only male data set was used.

In the pairwise coefficients comparison method, a z-test for the difference between coefficients from the female group model to male group model was computed to determine the moderation effects of gender between the relationship of PU and ITU as well as PEOU and ITU. As a general rule, the value of a z-test for the difference between coefficients must be greater than the absolute value of 1.96 for the difference between paths to be statistically significant at $p < 0.05$ for a two-tailed test.

From Table 10, it is observed that the z-value for the cell (f1, m1) is 2.250. This value exceeds the critical value of 1.96 (i.e., $2.250 > 1.96$). Therefore, at a significance level of 0.05 (two-tailed

test), it can be concluded that there is a statistically significant difference between the paths - 0.245 in female users’ model and 1.334 in male users’ model (see Table 7). Hence, users’ gender moderates the relationship between their perception of the usefulness of m-money services and their intention to continue using the services, given that $\alpha = 0.05$ (and $\alpha/2 = 0.025$).

Regarding the moderating role of gender in relation with the effect of perceived ease of use on the intention to use m-money services, the difference between chi-square values of unconstrained path model and constrained path model of PEOU to ITU for male respondents is greater than 3.84 (see Table 8 which depicts that $18.276 > 3.84$). Therefore, this indicates to some extent that the moderation effect of gender is statistically significant as the difference in chi-square value between the constrained and unconstrained models for the male group is greater than 3.84. But this result from one group cannot be a sole criterion to make a decision related to the moderation effect of gender. As a result, the next step is related to performing the test of moderation for the same variable (i.e., gender) using the second dataset (female group) following the same procedure undertaken for the male group.

Consequently, the difference between the chi-square values of the unconstrained model and constraint path model of PEOU to ITU for female respondents is greater than 3.84 (see Table 9 that $11.222 > 3.84$). Therefore, this shows in part that the moderation effect of gender is significant as the difference in chi-square value between the constrained and unconstrained models for the female group is greater than 3.84. These two results from the male group and female group models lead to the same conclusion (i.e., gender moderates significantly the relationship between PEOU and ITU).

Furthermore, pairwise tests of path coefficients comparison results indicate that there is a significant difference between male and female users of m-money in the effect of their perception of services’ ease of use and their intention to continue the usage of the services (see Table 10). In determining the moderation effects of gender between PEOU and ITU, a z-test for the difference between coefficients from the female group model to male group model was computed, and the z-value for the cell (f2, m2) is -2.146 (see Table 9). Absolute value of -2.146 exceeds the Z-critical value of 1.96 (i.e., $2.146 > 1.96$). Therefore, it can be concluded that there is a statistically significant difference between the paths 1.120 in female users’ model and -0.140 (see Table 7) in male users’ model both at a significance level of 0.05. In other words, evidence from the study result suggests that the paths are different across the two models (female group model and male group model). Hence, users’ gender moderates the relationship between their perception of ease of using m-money services and their intention to continue using the services, given that $\alpha = 0.05$ (and $\alpha/2 = 0.025$).

In summary, both the formulated hypotheses were tested using AMOS software for correlation analysis, regression analysis, chi-square-based comparison, and pairwise coefficient comparison tools of data analysis. Both hypotheses have been supported as the results are summarized in Table 11.

Table 11: Results of the Tested Hypotheses

Research Hypotheses	Sig. Level	Result
H ₁ : The effect of perceived usefulness on an intention to use mobile money is significantly moderated by users’ gender.	0.05	Supported

H ₂ : The effect of perceived ease of use on an intention to use mobile money is significantly moderated by users' gender.	0.05	Supported
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Discussion

The results from both chi-square-based comparison and pairwise comparison techniques across models show that the gender of users moderates significantly the relationship between users' perception of mobile payment services' usefulness and their intention to continue the usage of the services. In other words, there is statistically significant evidence that shows the moderation role of gender on the association of PU and ITU. Therefore, there is a difference between female users and male users in relation to the effect of perceived usefulness on intention to use m-money services. Hence, PU is a more important factor for male users in predicting ITU (see Table 7). Likewise, (Sanzo, M. J., Santos, M. L., Vázquez, R., & Álvarez, 2003) found that the effect of PU on ITU is more powerful for male users than female users. (Brosnan, 1999; Hamza, A., & Shah, 2014; Ong, C. S., & Lai, 2006; Wood, W., & Li, 2005) also recognized that male users are more affected by PU than female users in the intention to use m-payment. Further, (Hamza, A., & Shah, 2014) identified that the effect of PU had not shown difference between the male and female MPS users. Nevertheless, the current study result has proven that the effect of PU on ITU mobile payment service is stronger for male users than these female users.

The chi-square-based comparison for the female group and pairwise comparisons across models showed the same results that gender moderates significantly the relationship between users' perception of mobile payment services ease of use and their intention to continue the usage of the services. In other words, there is statistically significant evidence that shows the moderation role of gender on the association of PEOU and ITU. Therefore, there is a significant difference between female users and male users in relation to the effect of perceived ease of using m-money services on their intention to continue using the services. Accordingly, PEOU is a more important factor for female users in predicting ITU (see Table 7). Likewise, several previous research works found that gender moderates the relationship between PEOU and the adoption of technology (Hamza, A., & Shah, 2014; Hernan E. Riquelme, 2010; Okazaki, S., & Mendez, 2013). In view of that, (Chinyamurindi, W. T., & Louw, 2010) found that the moderating role of gender on the relationship between PEOU and ITU is stronger for female users than male users, while the effect of PU on ITU is more powerful for male users than the female users. On contrary, (Hamza, A., & Shah, 2014; Ong, C. S., & Lai, 2006; Wood, W., & Li, 2005) recognized that male users are more affected by PEOU and PU than female users in the intention to use m-payment. Further, (Hamza, A., & Shah, 2014) identified that PEOU has a stronger positive influence on male users than female users, but the effect of PU had not shown differences between the male and female MPS users. Nevertheless, the current study result has proven that the influence of PEOU on ITU mobile payment service is stronger for female users than these male users.

6. Conclusions

The major objective of the study was to determine the moderating role of gender in between the effect of perceived usefulness on intention to use mobile money, and the effect of perceived ease of use on intention to use mobile money services of M-Birr and Hello Cash. Accordingly, the study has found that there is a significant difference between female users and male users in relation to the effect of PU and PEOU on their intention to continue using the mobile money

services. Therefore, PU is a more important factor for male users in predicting ITU, and the influence of PEOU on ITU mobile money service is stronger for female users than these male users. Therefore, in undertaking their marketing functions, mobile money service providers need to take into account the effect of users' gender. For example, when the service provider promotes its business via TV, the participants in the promotion campaign have to represent users from both genders. Besides, these participants must include individuals who are expected to have referent power over different social groups.

Declarations

Ethics approval and consent to participate

Ethical clearance and permission letters were obtained from the Mizan-Tepi University - Institutional Review Board (MTU-IRB). Permission was obtained from the all the participants in this study. All study participants were informed about the purpose of the study, their right to deny participation, anonymity, and confidentiality of the information. Written informed consent was also obtained before participation in the study.

Consent to publish: Not applicable.

Availability data and materials: The data set is handled by the corresponding author and can be provided upon a reasonable request.

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Author contribution: MM and BG is involved in the conception, design, and acquisition of data, analysis, and interpretation of the results. DB was involved in data acquisition, funding, and supervision. MM drafted the manuscript and all authors approved it for publication.

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