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# Understanding User Experience of Mobile Money Services in Emerging Markets

Fatuma NAMISANGO<sup>1</sup>, Maria Miiro KAFUKO<sup>2</sup>, Gorretti BYOMIRE<sup>3</sup>

Makerere University Business School, Plot 21A Nakawa, Kampala, 1337, Uganda

Tel: +256776610333, Email: <sup>1</sup> [fnamisango@mubs.ac.ug](mailto:fnamisango@mubs.ac.ug) / [fnamisango@gmail.com](mailto:fnamisango@gmail.com)

<sup>2</sup> [miiro@mubs.ac.ug](mailto:miiro@mubs.ac.ug) / [mariamiro@gmail.com](mailto:mariamiro@gmail.com), <sup>3</sup> [gbyomire@mubs.ac.ug](mailto:gbyomire@mubs.ac.ug) / [bgorretti@gmail.com](mailto:bgorretti@gmail.com)

**Abstract:** Given the increasing role of financial inclusion in Africa, a number of stakeholders are advocating for pathways to sustainable financial inclusion mechanisms among the formal and informal sectors. With the current technology supported strategies, the mobile money service has become utterly popular across all sectors of the Ugandan social structure as well as economic structures. A number of studies have indicated overwhelming adoption of the mobile money service in sub-Saharan Africa. The study sought to apply the DeLone and McLean IS Success Model to explain the success of mobile money services in enabling financial inclusion in Africa. It may be necessary to investigate, test and understand the factors behind the growth of this service in selected cases in Africa e.g. Uganda so as to lay platform and advocacy for its sustainability and successful transfer of such technology innovation to other societies. It was found that factors such as information quality, system quality, service quality and net benefits obtained positively correlate to mobile money service use and user satisfaction. However, these factors moderately explain the variations in the use and user satisfaction of mobile money service.

**Keywords:** Technology Adoption, Mobile Money Services, Financial Inclusion

## 1. Introduction

Financial inclusion is of great concern across governments, donor agencies and researchers. With this growing concern, there has largely been a low rate of financial inclusion in developing countries especially in the informal and the rural communities in these countries [1]-[2]. Originally financial service through formal channels such as banks was the only platform for financial inclusion in developing countries. Today, the unbanked have sought alternative platforms or technology to accommodate their financial needs like depositing and saving, transfer of money, purchase of services and products from within a country. This technology is commonly referred to as mobile money service (MMS). This study takes interest in the mobile money service and its penetration and adoption in Uganda.

The mobile money service was initiated in 2009 and has received significant acceptance and use among the Ugandan population. The number of registered mobile money customers exceeds half the population of Uganda [3]. As of 2015, there were 21.1 million mobile money customers in the country with a value of transactions at 32,506 billion shillings [3]. A study across 89 countries found that Sub-Saharan Africa has the largest adopters of MMS rating at 81% [4]. The number of mobile money subscribers in Uganda has gradually increased since 2009 where 1 in 5 households has at least one mobile money user [5]. Mobile money agents are the largest financial access points in developing countries hence exceeding ATMs [4].

## **2. Problem Description**

Although the number of m-money users has been steadily increasing since 2009, the adoption of MMS beyond sending and receiving money is modest [5]. Mirzoyants [5] indicates that there is barely any convenience, user experience and understanding of MMS beyond sending and receiving money thus preventing Ugandans from adopting MMS at even a much faster pace.

To the researchers' knowledge, investigations on mobile money adoption are mainly focused on the breadth and depth of adoption in relation to locale of MMS with no investigations on the rationalities or patterns on convenience, user experience and understanding of the several MMS products availed. This study sought to investigate the wide growth, penetration and adoption of MMS among the Ugandan population with specific reference to user experience and understanding of the service based on the Updated DeLone and McLean Model of Information Systems Success by [6].

## **3. Objectives**

The objectives of this study was to investigate the contribution of system quality, information quality, service quality and the service's net benefits as presented by the updated D&M IS success model in explaining user experience, convenience and understanding of MMS in Uganda.

## **4. The Mobile Money Service and Financial Inclusion in Africa**

Financial inclusion refers to how easily individuals can access available financial services and products from formal institutions [7]. Financial inclusion is identified as a factor for poverty reduction among the poor and developing societies [8]. There is more reliance on informal money services than formal money services in banks across Africa [1]. Reference [7] provides five basic dimensions of use of financial services on an individual level: accounts, savings, borrowing, payment patterns, and insurance. To understand the usage of financial services [7] call on the observance of the levels and patterns of the use of various products as used by different groups of people in a region such as the poor, youth and women e.t.c. Financial inclusion focuses on what type of accounts are accessed and for what purpose, what and how many transactions e.g. withdraws and deposits are made, how are these accessed, how many save and how do they save, how many borrow, how many make payments or receive payments through formal methods, how many have purchased insurance. All these patterns are observed within a period of 12 months.

Financial inclusion enables governments, policy makers, NGOs, researchers and other interested stakeholders to understand and characterise the way people in a given region use financial products. Understanding financial inclusion fosters way for policy formulation and support towards a given group of individuals. Reference [8] found 41% of adults in developing economies are banked and these are half as likely to be banked as adults in the richest quintile. Technological innovations can lower the cost and inconvenience of accessing financial services [8]. Technologies such as Mobile banking, agent banking, and biometric identification are strong examples of the promise of technology to enhance financial inclusion. Mobile Financial Services have significant potential for enhanced financial inclusion in sub-Saharan Africa [8]. Reference [9] adds that the use of technologies and non-bank retail channels extends the delivery of financial services to clients who would not be reached profitably with traditional branch-based financial services.

As indicated earlier, mobile money service is now a popular prevailing path to financial inclusion across developing societies. According to [4], [9]-[11], mobile money services are a tool to bridge the financial inclusion gap between the formal and informal communities.

The Bank of Uganda (BOU) [12] defines mobile money as the e-money (electronic money) available to a user to conduct transactions through a mobile phone. For an individual to access the mobile money service, an account is created basing on the current mobile SIM owned by the person. The mobile money wallet/mobile money account is an e-money account which receives electronic value either after the account holder deposits cash via an agent or receives a payment/remittance directly from a person or through an agent. Generally, mobile penetration correlates to Gross Domestic Product (GDP) whereby it is easier for all micro and small business to trade irrespective of the place and time. Munyegeera et al [13] found that using mobile money is associated with a 69 percent increase in household per capita consumption with higher level of remittances among family members and friends in different areas. Mobile money service has facilitated remote and proximity payments such as airtime and data purchases, electricity and water payments, health care and school fees, transport fares, purchase of groceries at supermarkets, cultural attractions such as cinemas and several other purchases.

## **5. Financial Services and Mobile Technologies**

Mobile technology is commonly applied across industries. Here we recognize its support and adoption in the field of financial services at individual level. Mobile technology is the primary method of interaction with service providers and is therefore reforming user engagement dramatically due to mobile's ubiquity and ease of use, users are hitched to their mobile devices more than any other technology [14]. The changing user engagement has therefore increase user expectation of mobile technology for any given setting or need. The success of mobile technology is reliant on three aspects i.e. increase in adoption, leveraging the technology for current capabilities, and prepare for the future [14]. Understanding the adoption of mobile technology takes centre stage in leveraging mobile technologies for now and the future for improved engagement. Reference [14] adds that the adoption of mobile technology for financial services is not uniform across the sector. The underlying metrics remained unexplained in the study. Mobile financial services are quite profitable and therefore the ability to add and retain mobile financial service users is vital to the provider's growth and profitability [14]-[15]. However, [15] indicates that players in financial services landscape are quite uncertain of what to strive for in terms of adoption metrics for the mobile financial services availed to customers.

### *5.1 The Mobile Money Service Operations in Uganda*

Mobile money services in Uganda involve partnerships between Mobile Network Operators (MNOs) and commercial banks [16]. The MNOs play a dominant role in the partnership by contracting a network of agents and operating the telecommunications infrastructure for effecting transactions and storing virtual money. The role of the bank in the partnership is primarily to hold an account (termed variously as a settlement account or escrow account) in which all of the agents of the network hold balances and which are debited/credited when an agent sells/buys mobile money for cash. The mobile phone operators cannot access these accounts to fund their own operations. The principal liability for the funds in the settlement account lies with the bank in which they are held.

Sub-Saharan Africa has the largest number of registered and active mobile money accounts [4]. Munyegeera et al [13] continues to show that by the end of 2013, there were more registered mobile money accounts than banks accounts in Cameroon, the Democratic Republic of Congo, Gabon, Kenya, Madagascar, Tanzania, Uganda, Zambia and Zimbabwe. In East Africa, specifically, there is almost one mobile money account for every two mobile connections [4]. There are 3 common MNOs operating mobile money service in Uganda; MTN (Mobile Money), Uganda Telecom (m-sente) and Airtel (Airtel Money). Mobile Money services were introduced in Uganda by MTN in 2009 after it had been

successfully introduced by M-Pesa in Kenya in 2007. The Uganda Communications Commission (UCC) indicated that the number of mobile money subscriptions had increased to approximately 17.6 million in financial year 2013/2014. UCC [17] indicated that there 238,618 billion transactions worth 11,872 billion Uganda shillings between January – June 2014. Ssetimba [3] indicates an increased number of subscribers to 21.1 million in the year 2015 and a value of transactions to 32,506 billion Uganda shillings.

Explicitly, the transaction flows in the mobile money system that deliver individual benefits to users include; (1) domestic P2P transfers which have remained the most common transactions [4]. Among these, mobile money is largely used for (1) sending and receiving money rather than saving money; (2) international remittances were also noted as the fastest growing product in 2014 (65.5%); (3) mobile payments like consumer to business, business to business and people to government [11]. In this regard, [4] found that airtime top ups present the largest volume of mobile money payment. Bills and merchant payments were also found to increase by December, 2014; (4) A2A/cross-net P2P transactions that involve bank account to mobile money account are increasing becoming common. Mobile money has improved financial inclusion in Uganda [4], [10]. On this, [4] continues to explain that mobile payments have become a powerful socio-economic tool. Additionally, poor households can actively manage their financial needs as they arise using a range of formal, semi-formal and informal services [9]. Generally, the mobile money service are time and cost saving [4].

## **6. Developing the Theoretical Framework**

The use and user experience with MMS is due to the robust indicators that may be explained in line with technology success theories that have been tested in different contexts. Among the various technology use models, [6] present an updated IS success model that seeks to provide the reasons behind the success of technology innovations. Studies by [18]-[21], have supported the updated D&M IS success model indicating that the model bases on overall user satisfaction as a basis of measurement of a system success and adds a new measure of service quality hence providing the ability of the model to specifically reflect the IS context to which it is applied. The model dimensions have been found to have a high impact on IS success by [20]. In support of [20], [19] mentions that the D&M IS success model was found to offer a descriptive tool with six dimensional possibilities to explore and describe a given technology environment from several approaches. According to [6] the model was updated in recognition of the changes in user perception of information systems aspects that measure the impact of an information system as well as the variations in the impacts of an information system which range from national economic impacts, individual impacts to societal impacts. DeLone and McLean [6] therefore suggested a unified recognition of information system impacts as net benefits. According to [6], several researchers have commented on the difficulty of applying the original D&M IS Success Model in order to define and operationalize IS success in specific research contexts. Studies by [22] and [23] generally indicate that users recognise other success measures which significantly determine their view and appreciation of an information system depending on the type of system. The updated D&M IS Success Model redefines quality in three major dimensions which are: “information quality,” “system quality,” and “service quality” to understand user satisfaction and use/intention to use a given system. User satisfaction, use and intention to use a system affect the net benefits of system [6]. The net benefits also have an effect on user satisfaction, use and intention to use of a system [6].

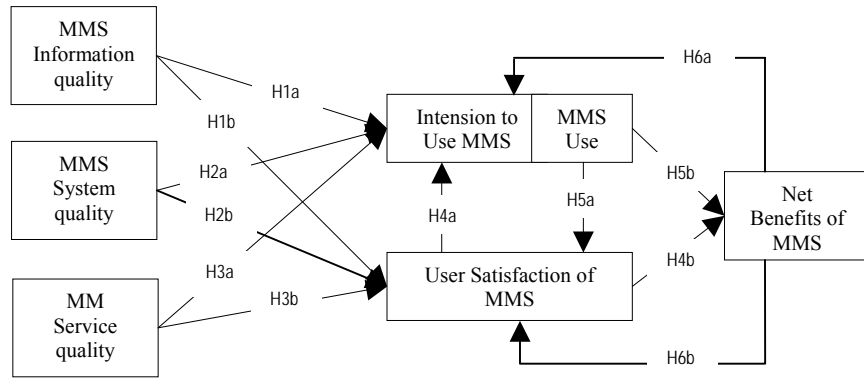


Figure 1: Theoretical Framework (Adapted from Updated D&M IS success model [6], p.24)

The constructs for measuring the MMS successful adoption in Uganda were largely based on the updated D&M IS Success Model. The scale items used under different constructs are presented in the table below;

Table 1: Constructs for Measuring MMS user experience in Uganda

<b>Information Quality [6]</b> <ul style="list-style-type: none"> <li>– Completeness</li> <li>– Ease of understanding</li> <li>– Personalization</li> <li>– Relevance</li> <li>– Security</li> </ul>	<b>System Quality [6]</b> <ul style="list-style-type: none"> <li>– Response time</li> <li>– Adaptability</li> <li>– Availability</li> <li>– Reliability</li> <li>– Usability</li> </ul>	<b>Service Quality [6]</b> <ul style="list-style-type: none"> <li>– Assurance (assured service)</li> <li>– Empathy (relates to societal needs)</li> <li>– Responsiveness (flexibility) – MMS easily adjusts to my needs</li> </ul>
<b>Intention to Use/Use [6]</b> <ul style="list-style-type: none"> <li>– Nature of use (transactions)</li> <li>– Navigation patterns</li> <li>– Number of visits (frequency)</li> <li>– Number of transactions executed</li> </ul>	<b>User Satisfaction [24]</b> <ul style="list-style-type: none"> <li>– Meets MMS needs</li> <li>– Trust</li> <li>– Contented with MMS</li> <li>– Hedonic desires (enjoy using MMS)</li> <li>– Comfort</li> <li>– Overall satisfaction</li> </ul>	<b>Net Benefits</b> <ul style="list-style-type: none"> <li>Transactional Benefits [4]                             <ul style="list-style-type: none"> <li>– Accomplish local payments</li> <li>– Make transfers</li> <li>– Purchase airtime/data bundles</li> <li>– Access bank account</li> <li>– Deposits and Saving</li> </ul> </li> <li>Generic Benefits [25]                             <ul style="list-style-type: none"> <li>– Time saving</li> <li>– Cost saving</li> <li>– Convenience</li> <li>– Social integration &amp; cohesion</li> </ul> </li> </ul>

### 6.1 Investigating MMS User experience in Uganda

**Information Quality** – indicates how good the MMS is in terms of its information output as was tested by Hellsten & Markova (2006) in KMS.

*H1a – Information Quality influences intension to use/use MMS*

*H1b – Information Quality influences user satisfaction of MMS*

**System Quality** – indicates how good the MMS is in terms of its operational efficiency as was tested by Hellsten & Markova (2006) in KMS.

*H2a – System Quality influences intension to use/use MMS*

*H2b – System Quality influences user satisfaction of MMS*

**Service Quality** – indicates how good the MMS is in relation to delivering user's expectations and satisfying user needs.

*H3a – Service Quality influences intension to use/use MMS*

*H3b – Service Quality influences user satisfaction of MMS*

**User satisfaction** – reflects the user's feel of joy, pleasure, displeasure or disgust with use of the MMS. Delone & Mclean (2003) describe user satisfaction as the extent to which an application helps the user to create value for him/herself.

*H4a – User satisfaction of MMS affects intension to use the MMS*



*H4b – User satisfaction of MMS affects the individual’s net benefits from the MMS*

**Intension to use/use** – use of MMS relates to user behaviour in the course of interaction with the MMS.

*H5a – Use of the MMS affects user satisfaction of MMS*

*H5b – Use of the MMS affects the individual’s net benefits from the MMS*

**Net benefits** – reflects an individual’s derived impact from use of the MMS

*H6a – The derived benefits of using MMS influences intension to use the MMS*

*H6b – The derived benefits of using MMS influences user satisfaction of MMS*

## 7. Methodology

A quantitative approach was undertaken to identify the factors for mobile money adoption in Uganda. The factors studied were based upon the D&M IS success model. There is a population of 21.1 million people who have different experiences and reasons for adopting mobile money services [3]. Although [4] noted an increase in mobile money services penetration among rural communities, [26] shows that most of the mobile money customers are urban than rural. We hence focused on urban mobile money customers living or working in and around Kampala district in Uganda. Respondents of the study were therefore mobile money users within the central region of Uganda which is the most urbanised region. We derived a study sample of 400 respondents basing on [27]’s sampling technique as cited by [28]. The above sample as indicated by [27] is derived at  $\pm 5\%$  precision where confidence interval is 95% and maximum variability is .5. A physical administered questionnaire was used as the instrument for data collection. Data was therefore quantitatively analysed using SPSS v.20 to generate a constructivist interpretation on user experience of mobile money services as purported in various studies.

## 8. Results

A reliability test of the questionnaire items indicated a Cronbach’s Alpha of .920. In the study, most respondents were aged between 31-40 i.e. 48%. Most were female 51.2% and most had a first degree 34.5%. Among the MMS available in Uganda, MTN mobile money is the most used service 92.5%, followed by Airtel Money 82%. Many respondents indicate that they use 2 MMS concurrently. With the reliability output the data collected was used to analyse the contribution of DeLone and McLean’s IS Success Model in explaining MMS adoption in Uganda. The following observations were obtained.

Findings on the relationship between information quality and use and user satisfaction of MMS is presented in the table below;

*Table 2: Correlation between information quality and use and user satisfaction of MMS*

		I Use MMS	I am Satisfied with MMS	MMS Provides all information I need	Information is easy and clear to understand	MMS Provides personalized information	Information is relevant	MMS Provides security
I Use MMS	Pearson Correlation	1	.404**	.102*	.565**	.249**	.274**	.212**
	Sig. (2-tailed)		.000	.042	.000	.000	.000	.000
	N	395	389	395	395	395	395	395
I am Satisfied with MMS	Pearson Correlation	.404**	1	.331**	.593**	.445**	.625**	.613**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	389	394	394	394	394	394	394

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

*H1a – Information Quality influences use of MMS*

*H1b – Information Quality influences user satisfaction of MMS*

Pearson Correlations for use and user satisfaction of MMS and Information Quality indicate (*P* values of .000 and *r* values ranging between .102\* and .565\*\* in a test on use while indicating *P* values of .000 on all scale items and *r* values ranging between .331\* and .625\*\* in a test on user satisfaction)  $P < 0.01$  &  $P < 0.05$  (2-tailed) while *r* values are also positive ( $1 \geq r > 0$ ), indicate that information quality (IQ) was found to positively and strongly influence the use and user satisfaction of the MMS used.

R square .344 was obtained in a regression analysis of information quality and use of MMS. Results indicate that information quality accounts for 34.4% variation in the use of mobile money services. An R square of .521 was obtained in the regression of information quality and user satisfaction of MMS. The results therefore indicate that information quality explains 52.1% variation in user satisfaction of MMS.

Findings on the relationship between system quality and use and user satisfaction of MMS is presented in the table below;

*Table 3: Correlation between system quality and use and user satisfaction of MMS*

		I Use MMS	I am Satisfied with MMS	Responds quickly	Suites my financial needs	Always available	Reliable	Easy to use
I Use MMS	Pearson Correlation	1	.404**	.465**	.173**	.357**	.373**	.576**
	Sig. (2-tailed)		.000	.000	.001	.000	.000	.000
	N	395	389	395	393	395	395	395
I am Satisfied with MMS	Pearson Correlation	.404**	1	.576**	.523**	.678**	.568**	.229**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	389	394	394	392	394	394	394

\*\* . Correlation is significant at the 0.01 level (2-tailed).

*H2a – System Quality influences use of MMS*

*H2b – System Quality influences user satisfaction of MMS*

Pearson Correlations for use and user satisfaction of MMS and System Quality indicate (*P* values of .000 to .001 and *r* values ranging between .173\*\* and .576\*\* in a test on use of MMS while indicating *P* values of .000 for all scale items and *r* values ranging between .229\*\* and .678\*\* in a test on user satisfaction of MMS)  $P < 0.01$  &  $P < 0.05$  (2-tailed) while *r* values are also positive ( $1 \geq r > 0$ ), indicate that system quality (SQ) positively and strongly influences the use and user satisfaction of the MMS used.

R square .393 was obtained in a regression analysis of system quality and use of MMS. Results indicate that system quality accounts for 39.3% variation in the use of mobile money services. An R square of .499 was obtained in the regression of system quality and user satisfaction of MMS, therefore system quality explains 49.9% variation in user satisfaction of MMS.

A test of the relationship between service quality and the use of MMS and user satisfaction with MMS was conducted and the following results were obtained;

*Table 4: Correlation between service quality and the use of MMS and user satisfaction with MMS*

		I Use MMS	I am Satisfied with MMS	Assured service	Responsiveness	Fits into my societal needs
I Use MMS	Pearson Correlation	1	.404**	.437**	.271**	.243**
	Sig. (2-tailed)		.000	.000	.000	.000



	N	395	389	395	393	393
I am Satisfied with MMS	Pearson Correlation	.404**	1	.717**	.558**	.487**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	389	394	394	392	392

\*\* . Correlation is significant at the 0.01 level (2-tailed).

*H3a – Service Quality influences use of MMS*

*H3b – Service Quality influences user satisfaction of MMS*

Pearson Correlations for use and user satisfaction of MMS with service quality indicate (*P* values of .000 for all service quality scale items used and *r* values ranging between .243\*\* and .437\*\* in a test on use of MMS while indicating *P* values of .000 for all scale items and *r* values ranging between .487\*\* and .717\*\* in a test on user satisfaction of MMS). As earlier indicated,  $P < 0.01$  &  $P < 0.05$  (2-tailed) with positive *r* values ( $1 \geq r > 0$ ), indicate that service quality (SERVQUAL) positively and strongly influences the use and user satisfaction of MMS.

R square .198 was obtained in a regression analysis of service quality and use of MMS, therefore, only 19.8% variation in the use of mobile money services may be explained by service quality otherwise other factors are more determining. An R square of .583 was obtained in the regression of system quality and user satisfaction of MMS. Unlike the case of MMS use, service quality counts for 58.3% variation in user satisfaction of MMS.

The study provides findings on the relationship between User satisfaction and net benefits attainable by the user of MMS. The findings are provided in the table below;

*Table 5: Correlation between User satisfaction and net benefits attainable by the user of MMS*

		I Use MMS	I am satisfied with MMS	MMS fulfils my financial needs	MMS saves time	MMS saves costs	MMS provides convenience	MMS connects me to family & friends
I Use MMS	Pearson Correlation	1	.404**	.081	.447**	.452**	.635**	.063
	Sig. (2-tailed)		.000	.109	.000	.000	.000	.213
	N	395	389	389	389	389	389	389
I am satisfied with MMS	Pearson Correlation	.404**	1	.057	.375**	.635**	.494**	.187**
	Sig. (2-tailed)	.000		.256	.000	.000	.000	.000
	N	389	394	394	394	394	394	394

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

*H4a/H5a – User satisfaction of MMS affects use the MMS / Use of the MMS affects user satisfaction of MMS*

*H4b/H6b – User satisfaction of MMS affects the individual's net benefits from the MMS*

Pearson Correlations for user satisfaction of MMS and use and vice versa plus the correlation on user satisfaction of MMS and the net benefits attained from use of MMS indicate (*P* value of .000 and *r* value of .404;  $P < 0.01$  &  $P < 0.05$  (2-tailed) while  $1 \geq r > 0$ ) in the test of the relationship between user satisfaction and use of MMS. We conclude that user satisfaction and use of MMS are positively and strongly correlated hence affecting each other. Additionally, results indicate, *P* value of .000 for MMS saving time, costs, providing convenience to the user and enabling family connections. These net benefits were found to be significantly affected by user satisfaction of the MMS. However, user satisfaction with MMS and fulfilment of the user's financial needs indicates a  $P > 0.1$ , .256

confirming that user satisfaction with MMS has no effect on ability of MMS to fulfil the financial needs of the user.

R square .382 was obtained in a regression analysis of use and user satisfaction, and .320 for a regression analysis of user satisfaction and use of MMS. Therefore, the variations in the use of mobile money services and user satisfaction of MMS are to a small extent explained by these two variables. Results imply that other factors such as information quality, system quality and service quality are actually more influential in the use or user satisfaction of MMS.

#### *H5b/H6a – Use of the MMS affects the individual's net benefits from the MMS / The derived benefits of using MMS influences use of MMS*

The study further provides findings on the relationship between Use of MMS and net benefits attainable by the user of MMS and vice versa. The findings are provided in the table above indicate *P* value of .000 for MMS saving time, costs, providing convenience to the user with *r* values .447<sup>\*\*</sup>, .452<sup>\*\*</sup>, .635<sup>\*\*</sup> respectively. The results therefore indicate a positive and strong correlation between use of MMS and attainable net benefits. However, correlation results on use of fulfilment of financial needs and connecting to family and friends (*P* .109, *P* .223 and *r* .081, .063 respectively) indicate no correlation therefore MMS is not satisfactorily associated with all financial needs of the users and connection of users to family and friends.

R square .419 was obtained in a regression analysis of use of MMS and net benefits obtained, and .433 for a regression analysis of user satisfaction and the net benefits obtained. Therefore, the variations in the use of mobile money services and user satisfaction of MMS are to a moderately explained by the net benefits obtained from the service.

Results therefore suggest that information quality, system quality, service quality and net benefits play a moderate role in the actual use of MMS and comparatively explain the variation in user satisfaction of MMS.

## 9. Conclusion

Although information quality, system quality, service quality and net benefits were found to positively and significantly correlate to mobile money service use and user satisfaction, these were found to moderately account for the user experience of mobile money services in Uganda. There may be several other factors that explain the growth of mobile money services in an emerging market like Uganda.

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