MOBILE MONEY AND ARCHETYPE FOR UNDERSTANDING END-USERS ADOPTION BEHAVIOURAL FACTORS VIZ. SOCIOECONOMIC, CULTURAL AND POLITICAL FACTORS IN SUB-SAHARAN AFRICA

EMMANUEL MATTHEW IKART[1]

[1]*Department of Justice, Corrective Services New South Wales, Australia*

*Corresponding author: emmanuel.ikart@justice.nsw.gov.au

ABSTRACT: Whilst there has been considerable research on innovation adoption and diffusion in the rapid growth of mobile money, fewer studies have been conducted on the active engagement with the technology using a reference theory particularly studies in the context of SSA. Past studies of mobile money based on case studies, interviews and reviews of secondary data have focused on potential benefits, features, and implementation. Research studies on mobile money about SSA are mixed. The existing studies on mobile money adoption based on reference theories focused largely on Southeast Asia and developed nations. Most of these studies presume mobile money is readily available but the anus of accepting or rejecting it resides with end-users. This assumption falls short of realities for SSA, because SSA trails behind the rest of the world in modern technological infrastructures. This study investigates the precursors pertinent to understanding the adoption of mobile money in the context SSA as well as the implications of the interplay between technological infrastructures for mobile money with socioeconomic and political forces. The study makes important contributions to the literature and managerial practice by providing adequate understanding of the factors inherent to SSA contributing to poor mobile money adoption behaviour, building a modified TAM for mobile money adoption for SSA and establishing adequate knowledge for policymakers, governments, private investors, and NGOs in mapping-out key factors managers may have control over for investment in mobile money.

KEY WORDS: Mobile money, socioeconomics factors, adoption, modified TAM, SSA

1. INTRODUCTION

In the wake of today's competitive business landscapes, countless businesses have embedded new and innovative technological infrastructures in their business structures with the aim of bolstering their present in the marketplace. One such innovative product is the mobile money (MM) (also, called mobile financial services) (MFS) introduced into the banking industry. Mobile money has revolutionised the ecosystem of global banking and payment industry (Fang et al. 2014; Gupta, 2013; Wong, et al. 2012; Quan, et al. 2010; Puschel et al. 2010). The use of MM offers banks a renewed need to providing added conveniences such as new products and services at lower transaction costs and to reaching large numbers of the unbanked

and underserved adults by formal financial institutions in both urban and rural areas (Gupta, 2013). Thus, mobile money is an engine of financial inclusion due to its ability to outreach millions of people in remote areas and those living at the bottom of the pyramid.

Financial inclusion of the unbanked adults plays a significant role in reducing poverty, empowering the underprivileged and enabling the deprived adults to invest, spend, borrow and takeout insurance against loss of assets so that they can live a comfortable life. MM serves as an electronic wallet for peer-to-peer transfer (P2P), salary payouts and government disbursements to staff (G2P). Also, it promotes positive socioeconomic impacts on the world poorest economies particularly, the economies in Sub-Saharan Africa (SSA) markets. The ubiquity of mobile money allows the unbanked adults to access basic financial services including bill payments, micro-savings, SMS alerts, and account history checks amongst others (GSMA, 2020; Reena, 2016; Gencer, 2011; Fang et al. 2014).

Whilst there has been considerable research on the innovation adoption and diffusion, especially in the rapid growth of mobile money, a review of the literature suggests that fewer studies have been conducted on the real use (that is, the active engagement) of mobile money. Past studies on MM focused on its potential benefits, features, and adoption by the unbanked and underserved adults by formal financial institutions. However, many of these studies utilised case studies, interviews, and reviews of secondary data (e.g., Wadada, 2019; Alhassan & Koaudio, 2019; Reena, 2016; Gencer, 2011; Donner, 2007). The studies on this area are far-reaching and exhaustive and they formed the bulk of the literature than the studies on the active engagement with the mobile money. Nonetheless, of the fewer studies on the active engagement with the mobile money, very limited numbers employed appropriate reference theories addressing the mobile money usage as a behaviour (e.g., Odia, 2012; Wong et al. 2012; Puschel, et al. 2010; Quan et al. 2010; Pousttchi & Wiedemann, 2007). Furthermore, research studies on mobile money about SSA are mixed (e.g., Odia, 2012; Oluoch et al. 2013). Apparently, the existing studies on MM adoption mostly focused on the emerging economies in Southeast Asia and developed nations in North America and Europe (e.g., Nguyen, 2016; Oluoch et al. 2013; Yang et al. 2007; Pousttchi & Wiedemann, 2007; Wang et al. 2006). Surprisingly however, most of these studies presume that mobile money is readily available, and that the anus of accepting or rejecting it resides with the end-users. Whereas this assumption falls short of realities for SSA, because countries in this region falls behind the rest of the world in terms of basic socia-cultural, economic, political, and technological factors namely, literacy, healthcare, electricity, telecommunication infrastructures and economic productivities relevant for everyday use of the technology (Tankha, 2016; Musa et al. 2003; Gencer, 2011).

Fundamentally, an adoption of mobile money is never a choice to most African families because adequate technological infrastructure does not exist to facilitate the adoption (Gencer, 2011; Musa, et al. 2003). Therefore, given this gap, this study seeks to investigate the precursors relating to a successful (or an unsuccessful) adoption and diffusion of the mobile money in the context of SSA. The study also evaluates the implications of the interaction between these precursors with socia-cultural, economic, and political forces of the region.

Whereas roughly 80% of the adult population in SSA has no access to basic financial services (Ouma et al. 2017), research suggests that SSA market has the fastest growth of mobile phone subscribers of about 11.9% annually (e.g., Tankha, 2016; GSMA, 2020). More so, the conventional wisdom is that extensive use of mobile phones for financial services has enabled many financial service firms to outreach their consumers living in the remote areas where the banking service is lacking. Mobile money has thus far, promoted the likelihood of savings at the household level and caused an increase in the amounts saved, due to the frequency and convenience with which transactions can be undertaken using a mobile phone (Ouma et al. 2017). Specifically, mobile money has entered the mainstream of business, and it is potentially, the path to financial inclusion for a low-income region such as SSA (Fang et al. 2014; GSMA, 2020).

The motivation of this study is marked limited research on the actual use of mobile money in SSA and lack of appropriate reference theories of socia-cultural, economic, and political factors explaining the adoption of the technology in question. The primary aim of the study is to explore the precursors pertinent in understanding the adoption and diffusion of the mobile money in the context of SSA. The study further examines implications of the interaction between mobile money infrastructure with socia-cultural, economic, and political forces. This study will make contributions to the literature and managerial practice on mobile money including, establishing adequate knowledge and understanding of the innate forces to SSA contributing to the poor technology including MM adoption; building a modified technology acceptance model (TAM) with social factors and perceived behaviour control and facilitating conditions variables for MM adoption behaviour which shows some factors that hinder the exposure of SSA to MM which leads to the limited adoption of the technology in question, and finally, the outcome of the study will allow policy makers, practitioners, researchers, investors, and NGOs to map-out those factors that managers will have some control over for investment in mobile money.

The rest of the paper is organised as follows: First, Section 2 presents the objective of the study. Second, Section 3 reviews the literature on mobile money; this is followed by the presentation of previous research studies on mobile money in Section 4. Third, Section 5 examines the precursors to mobile money adoption for SSA. Fourth, Section 6 assesses the influence of the perceived behaviour control (PBC) model from the Decomposed Theory of Planned Behaviour (DTPB), (Taylor & Todd, 1995a) and the influence of social factors (SF) model and facilitation conditions (FC) model from the Traindis' (1979) framework in the modified TAM, for mobile money adoption for SSA. Next, Section 7 explores implications of the interaction between mobile money infrastructures with socia-cultural, economic, and political factors. A modified TAM for actual mobile money infrastructure available is then presented in Section 8, and finally, Section 9, concludes the paper with discussions and implications and lessons learnt.

2. RESEARCH OBJECTIVE

Whilst the previous section presented the introduction to the research study, this section examines the objective of the study including measurements of information systems usage.

In their study, Lucas (1975) encouraged the measurement of IS usage because if an IS system is not used it is not considered successful. It is also important to find out why individuals elect to use or not to use an IS when they have a choice (Mathieson et al. 2001). In the view of Bruwer (1984), the most attractive indicator of an IS success from a measurement standpoint is its usage. Furest and Cheney further reinforced that, unless an IS system is used it will have no benefit to the organisation implementing it. In their view of utilisation as key dependent variable in most streams of IS research (e.g., DSS and end-users computing), Trice and Tracey (1988), asserted that system use is a necessary condition through which an IS such as mobile money can affect performance. Utilisation also becomes critical from a practical standpoint particularly, in computing environment that is increasing driven by voluntary use. As a result, Trice and Tracy recommended that as a behaviour whose determinants are not well understood in an IS research, system use can best be explained by referring to an appropriate reference theory. More so, a referenced theory would help IS developers to build the systems that people will want to use and, to find out why potential users avoid the existing systems (Mathieson, et al. 2001).

Given this advice, several theoretical frameworks have been used to explain individuals' behaviours to an IS. Among these theories include: the theory of plan behaviour (TPB) (e.g., Mathieson, 2001), the decomposed theory of planned behaviour (DTPB) (e.g., Taylor & Todd, 1995a), diffusion theory (e.g., Mao, 2002), task technology fit model (e.g., Dishaw & Strong, 1997), social cognitive theory (e.g., Compeau, et al. 1995), technology acceptance model (TAM) (e.g., Davis, 1986) and Triandis' framework (e.g., Triandis, 1979). Whilst this body of research has produced some useful insights into cognitive, affective, and behavioural reactions to technology and into factors that influence their reactions. Despite this much valuable research and body of theories on IS use, none of these theories addresses unequivocally the various precursors including socia-cultural, economic, and political factors inherent to SSA context that could explain the success (or lack thereof) of mobile money adoption by the inhabitants.

An area of innovation diffusion and adoption that have received considerable attentions especially in information technology research studies is the research that predicts whether individual will accept and voluntarily use a given technology. One of the most referenced models in this area is the TAM model. The model suggests that the use of an IS technology is dependent on the perceived usefulness (PU) and perceived ease of use (PEOU). Researchers have studied TAM from various perspectives. Whilst one perspective looks at the influence of habits, facilitating conditions and social factors, SF, (e.g., Ikart, 2006; Bergeron et al. 1995), another perspective looks at the influence of perceived user resources, PR, (e.g., Mathieson, et al. 2001) and another perspective looks at the effect of PBC (e.g., Taylor & Todd, 1995a). The PBC model accounts for the user's perception of the presence of the adequacy or inadequacy of resources. Also, the social factors reflect the user's perception of the presence of social influence on their behaviour intentions and facilitating conditions reflect socioeconomic factors of the environment influencing system use (Triandis' 1979; Bergoren et al. 1995; Ikart, 2006). Pursuing this extension of the TAM, we intend to analyse a situation in the context of SSA, where adequate technological infrastructures and technological skills and experiences do not exist. Hence, the individual beliefs about the presence

of resources including social factors and facilitating conditions (or lack thereof) to facilitate and/or impede the performance of the behaviour.

Therefore, the primary purpose of this study is to investigate the various precursors relating to a successful (or an unsuccessful) adoption and diffusion of mobile money in the context of SSA. As noted, the study also assesses the implication of the interaction between the socia-cultural, economic, and political forces with these precursors.

Specifically, this study investigates the following research question:

1. What are the precursors relating to a successful (or an unsuccessful) adoption and diffusion of mobile money in the context of Sub-Saharan Africa?

2. How do socia-cultural, economic, and political factors in Sub-Saharan Africa interact with these precursors? And what does it imply?

3. LITERATURE REVIEW OF EXISTING STATE OF MOBILE MONEY IN SSA

Section 2 examined the objective of the study. This section reviews the related literature on mobile money. We commence the section with the existing state of mobile money in SSA. This will be followed by global perspectives of mobile money.

In SSA, most people in the population do not have access to banking services, with about 20% of the population having access to bank accounts. For instance, Benin, with the population of 7 million had only 35 bank branches and only 30% of the householders in Kenya had access to financial services in 2007. The limited access to banking services in SSA is caused by factors including inadequate infrastructure, financial illiteracy, and inaccessibility. All of which culminate into a high cost of providing banking services. Uganda, Ethiopia, and Tanzania for e.g., each have less than a bank branch per 100,000 people. However, this ratio shows a high disparity across SSA with countries e.g., Zimbabwe having more than three, Namibia have more than four and Nigeria have more than 5 bank branches per 100,000 people (Gencer, 2011; Ondiego, 2010).

Whilst the high number of the unbanked adults has impacted the regional GDPs and economic activities of SSA, SSA has experienced the lowest retail banking penetration at about half the global average for emerging markets and poor growth in the number of adults with a formal bank account (GSMA, 2020; Gencer, 2011).

However, the penetration of mobile phones in SSA in recent times has been high. Research suggests that SSA market has the fastest growth of mobile phone subscribers of about 11.9% annually, with transaction volume and transaction value of 19.7% and 27.5% (e.g., Tankha, 2016; GSMA, 2020). The region is now considered the epicentre of mobile money with over 50 million mobile money subscribers per annum and with a sizeable distributed registered mobile money account across the region including East Africa 53%, West Africa 35%, Central Africa 10%, and Southern Africa 2%. Also, there are more than 747 million Sims connections in SSA representing 75% of the population, with smartphones sales of 6.6% of the global market (EY, 2014; GSMA, 2020).

The impacts of mobile money in SSA have redefined the concept of banking across SSA. Transaction services have diversified to include, mobile to-ups, bill payments, remittances, P2P transfers amongst others. Furthermore, over 2.1 billion worth of mobile financial transactions have been carried out in the region. Recently, the World Bank Global Findex report projected the Fintech opportunity in SSA due to mobile money for micro and small business banking at $57billion, and personal banking at $22billion respectively (EY, 2012). More so, the extensive use of mobile phones for financial services has enabled many financial service providers to outreach their consumers living in the remote areas where the banking service is lacking. Mobile money has thus far, promoted the likelihood of savings at the household level and caused an increase in the amounts saved, due to the frequency and convenience with which transactions can be undertaken using a mobile phone (Ouma et al. 2017). Specifically, mobile money has entered the mainstream of business in SSA, and it is the path to financial inclusion for a low-income region such as SSA (EY, 2014; Fang et al. 2014; GSMA, 2020).

Although SSA faces many challenges in its banking landscape including fewer numbers of bank branches, fragile infrastructure, large wait time to high cost of loan, mobile money service providers serve many African families with low-cost financial services and on-time financial transactions have gained momentum (Bastista & Vicente, 2020). For example, mobile money platform service providers such as Money wave and M-Pesa have made payments and transfers cheaper, simpler, and more accessible by customers living in rural and urban areas. The M-Pesa company accounted for more than 15 million users from over 10 countries and more than 45,000 agents by 2012. The M-Pesa now handles more than US$5.27 billion in P2P transfers per month that account for over 31% of the Kenyan GDP. The service allows users to deposit money into their accounts stored on their cell phones, to send balances using SMS technology to other users (including selling of goods and services), and to redeem deposits for regular money. This shows the growing use of mobile money flatform for transfers, micro-loans, disbursements, insurance, and micro-savings (Batista & Vicente, 2020; Gupta, 2013).

Besides, mobile money-based services offer a unique opportunity for Fintech service firms and start-ups in SSA. As per GSMA report, mobile penetration is projected to attract about 634 million users by 2025 and SSA now leads in mobile money transactions with over 100 million active accounts. Also, lower smartphone prices have provided a much-needed impetus to digital transactions (GSMA, 2020). More than 300 new start-ups including Brach, GetBucks, Wala and Dala have entered payments and remittances, and health management markets. Also, about 57 Fintech firms have invested almost $92 million in SSA which, resulted into an increased in mobile money projects across SSA (EY, 2014).

Banking without a bank has been a key aspect of financial inclusion for most unbanked adults. It has also caused a unique opportunity for mobile money operators in SSA. Nowadays, mobile money firms can cater to the financial needs of a larger rural-unbanked adults and bridge the gap between the growing rural-unbanked adults and urban-banked sector by way of collaboration between banks and start-ups. For example, banks such as Rand Merchant Holdings recently launched Alphacode Club to support Fintech companies in South Africa. This has led to an improvement in the nation's economic development and allowed consumers to enjoy financial independence (EY, 2014; GSMA, 2020).

Despite the aforesaid investments in mobile money and mobile money projects in SSA, several contextual forces including socioeconomic, political, and technological forces have manifested to impact the adoption and diffusion of the new technology amongst many SSA African families.

3.1 Global Perspectives of Mobile Money: Literature Review

Mobile money or mobile financial services is the ability to access and use electronic financial services or digital cash rather than physical cash by means of a mobile phone (Gencer, 2011). The technology is the gateway for transferring electronic money, making payments, and receiving payments using a mobile phone. The system allows the unbanked and underserved people by a formal financial institution to access digital money with their mobile phones. The mobile money ecosystem serves a dual purpose including, providing an engine for financial inclusion and investment opportunities to service providers. The technology prompts a network of physical transactional points which include mobile money agents that are outside of the bank branches and the ATMs that make the service widely accessible to everyone. Moreover, the mobile money ecosystem allows financial service providers to tap into large unexplored markets, even though, the technology is not fully utilised in a continent such as SSA. A recent study underscores the technology as a high priority for mobile network operators (MNOs), telecommunications industries, financial institutions, and government agencies due to its potential in providing a more convenient and lower cost alternatives to traditional banking (Iheanachor & Ozegbe, GSMA, 2020). Companies including those operating in SSA markets like Nigeria, Kenya and South Africa have opened themselves up to submarkets such as, micropayments, data-based financial services, and other digital markets because of the digital financial capabilities and mobile ecosystem (GSMA, 2020; Fang et al. 2014).

More than 2 million poor adults or about 38% of adult's population globally are excluded from a formal financial system, with unmet needs and untapped market potential. The SSA region is a home to almost 340 million of the unbanked adults or, about 17% of the global unbanked adults (DeMirguc-Kunt, et al. 2015). Essentially, the technology plays a key role in reaching the unbanked adults and in providing these people with the opportunity for inclusion into the financial system and financial digital tools to manage their own wealth. The MM ecosystem stores funds in a secure electronic account, called wallet, which is linked to a mobile phone. The wallet serves as a digital repository system of the electronic money, developed, and executed by means of mobile devices, enabling peer-to-peer transactions (P2P) between mobile devices (M2M), from users of the same service provider. The wallet also serves as a payment ecosystem, allowing businesses and individuals to send, store and receive electronic money using their mobile devices (Diniz et al. 2011). Consequently, the MM ecosystem has revolutionised the ecosystem of the banking and payments industry. The use of MM provides banks with a renewed need to providing added convenience to their existence customers and to reaching a large population of the unbanked and underserved adults in both rural and urban areas (Iheanachor & Ozegbe, 2020; Gupta, 2013; Fan et al. 2014).

In recent times, some figures have helped to appreciate the explosive growth of the markets for mobile money. For example, as per the GSMA Report (2020), the market for mobile money was valued at USD690.1 billion and has been projected to reach USD1trillion by 2023. Globally, the mobile money ecosystem is

growing at a compounded annual growth rate (CAGR) of 20%. However, the report by the World Bank shows that over 2.7 billion people globally are unbanked and that, most of the unbanked people are residents of an emerging economy such as SSA. Whereas roughly 469 million mobile phone subscribers in SSA do not have formal bank accounts, about 20% of the African families is said to have a formal bank account. Thus, SSA region has been one of the lowest banking penetrations in the world standing at an average of 16.6% compared to 63.5% of other emerging economies. Consequently, the low level of banking penetration in SSA allows for only 166 banks per 1,000 adults (Ondiego, 2010). Even so, the registration of mobile money accounts in SSA markets has been anticipated to surpass half a billion (GSMA report, 2020). Also, the transaction volume and the transaction value of mobile money in SSA markets were projected to grow above $23.8 billion and USD456.3 billion respectively despite the low adoption rate of the technology by the mass market compared to the global growth of $37.1 billion and USD690 billion (GSMA Report, 2020). The likely reasons for these exponential growth of mobile money services may include, the rapid rising of non-cash payments, existing of new business avenues for stakeholders, increased use of mobile devices in mature markets and by few pockets of innovators and affluence people in SSA, advancement in technology, and the high adoption rate of technology and mobile services in mature markets (GSMA, 2021).

As adopted from the GSMA Report (2021) and Gencer (2011), Table 1 presents the classification of the mobile money products including mobile payments, mobile finance and mobile banking, the sub-category, core values and global growth.

Table 1: Classifications of Mobile Money Products & Core Value & Global Growth

Products	Sub-category	m-Commerce Core Values/Services	Global Growth
Mobile Payments	P2P A2A	Peer-to-peer digital money transfer payments from agent wallet-to-agent wallet/bank-to-wallet at the same or another financial service including domestic remittances (Off-net) or, international remittance (IR)	• About 91% of $22bn digital transactions P2P • Over $1.9bilion processed daily by MM • About $690.1bn (26%) processed annually • IR $7.3bn, of which 2% represents digital-in & 1% a digital-out • Off-net (domestic P2P transfers to unregistered users in the form of a voucher or into the wallet of a different MMO) equal 2%
	C2B	Customer-to-business payments e.g., in-store cash-in & cash-out (proximity) Digital services (e.g., ebay or ringtone) Airtime Purchases/Top Ups Payments platform for utility bills, rent, taxes, school fees and retails payments	About, 57% digital transaction values exceeding cash-in/out valued ***Digital outs:*** Airtime top ups 5% Mobile to banks transfer (M2B) 11% & B2M 13%
	B2B	Electronic payments in supply chain amongst businesses for inventories	Bill payments 17%

	B/G2C	Business/Government salary payouts to staff and/or promotional payments Pension payouts Government social security payouts Rebates/coupons; payments for taxes, licences, fines, public transport, parking & council rates & affordable solar energy-powered systems	Bulk disbursement 16% Utilities, 44% of MM bill payments
	OTC	Over-the-counter transactions by the agent on behalf of a customer for services e.g., bill payments, P2P transfer, international remittance & bulk payments	Around $176 billion, digitized by mobile money agents globally via OTC
Mobile Finance	Credit Insurance Savings/leap-frogging financial services	Asset accrual services Disbursement/repayment Insurance premium/claims Micro-savings leveraging smart phones with high returns on savings (e.g., buffer stock, durables & education savings) Health micro- insurance & wealth management (e.g., maternity, optical care, funeral & hospital services & other low-cost health insurance services) Micro-loan disbursement/repayments leveraging alternative credit scoring algorithms and data	• Savings via mobile money equal $26 million • Over $241 millions transfer to MM enabled saving accounts • Shared of active mobile enabled insurance products: • Agri/crop/weather 2% • Health/hospital 12% • Other insurance 9% • Accident/disability 19% • Combined insurance e.g., health, life, hospital 26% • Life /funeral 32%
Mobile Banking	Digitized Transactions	• Digital bill payments • Travel & ticketing • Merchandise payments (MP) • Brokage services	MP 9% of $22bn in circulation growing by 34% annually Annual digital transaction of $690bn close to 2bn daily Transaction value of over $1trin projected for 2023 & translated to over $2.8bn daily
	Digitized banking Information	• SMS alerts • Account balance checks • Histories/statements/record keeping/credit scores • Bank apps on smartphones • USSD services • Internet banking services	About 73% of customers use online banking at least once a month to update account details About 26% of mobile banking users use smartphone banking apps to update account details About 89% of Americans bank account holders use mobile banking for account management

Source: Hsu et al. 2006; GSMA Report, 2020; 2021 & Gencer, 2011

To summarise, the mobile money products such as mobile payments, mobile finance and mobile banking and its core values are critical mobile money tools for global economic growth.

4. PREVIOUS RESEARCH STUDIES ON MOBILE MONEY

There are various forces contributing to the success (or lack thereof) of mobile money adoption and diffusion in the context of SSA. Most of these forces have been

linked to socio-cultural, economic, political, and technological forces (Tankha, 2016; Gencer, 2011; Musa et al. 2003). However, an early study on an IS system has categorised these forces into four sub-forces namely, technology related, support related, user-related, and behaviour-related forces (Ikart, 2006).

The focus of prior research studies on mobile money usage can be classified broadly into five main groups including (a) the mobile development and implementation in SSA, (b) mobile money and the global payments ecosystem, (c) mobile banking in Africa: taking the bank to the people of Africa, (d) mobile money movement and the catalyst to power-up emerging markets, and (e) factors explaining the adoption of mobile (refer to Table 2 below).

Whereas the studies on group (a) to group (d) focus on the overall benefits of mobile money (e.g., improved decision making, better communication, B2B and B2C), mobile money development and implementation (e.g., micro-insurance, wealth management and mobile banking) and mobile money as payments ecosystem (e.g., digital money transfers, micro-savings, and micro-loans). However, the studies on group (e) focus on factors explaining the adoption of mobile money. Thus, studies on group (e) investigate the active engagement with the technology. Surprisingly however, the research studies on mobile money of group (a) to group (d) are thorough and comprehensive than the studies on group (e), factors determining the adoption of mobile money. Moreover, of the research studies on group (e), only a limited number of studies employed a referenced theory addressing mobile money use as a behaviour (e.g., Odia, 2012; Wong et al. 2012; Quan et al. 2010; Pousttchi & Wiedemann, 2007), without which, studies on the former four groups cannot be realised. Even so, these studies are mixed, and as noted, only a few numbers of these studies employed a referenced theory addressing the problems of adoption of the technology in the context of SSA as a behaviour (e.g., Odia, 2012; Oluoch et al. 2013). Yet, many IS researchers have stressed the need to build IS research on cumulative tradition, using referent disciplines and theoretical arguments as a foundation (e.g., Trice & Treacy, 1988; Davis, 1989). But the lack of theoretical justification in research for example, provides potential explanations for the mixed empirical support found for the hypothesis that attitudes influence computer uses in research exploring the relationship between attitudes and computer use (Lucas, 1975; Davis, 1989).

Table 2: Classifications of Previous Studies on Mobile Money Technology

Research Clusters	Referenced Sources
a. The development & implementation of mobile money in Sub-Saharan Africa	Kola-Oyeneyin, E., Kuyoro, M. & Olanrewaju, M. 2020; Iheanachor, N. & Ozegbe, A. E. 2020; Grameen Foundation, 2014; Okolie, F. 2013; Odia, O.J. 2012; Tankha, M. 2016; Alhassan T.F. & Koaudio, A.J. 2019; Wadada, R. 2019; Ondiege, P. 2010
b. Mobile money and global payments ecosystem	Aron, J., 2018; Reena, A. 2016; Diniz E. H., de Al buerque, J. P. & Cernev, A.K. 2011; Wadada, R. 2019; Gupta, S. 2013; Almazan, M. & Vonthron, N., 2014; EY Report, 2014; Fang, J., Russell R. & Singh S. 2014; Ondiege, P. 2010
c. Mobile banking in Africa: taking the bank to the People of Africa	Hinchliffe, W. 2020; Batista, C & Vicente, P.C. 2020; Wadada, R., 2019; Aron, J. 2018; Tankha, M. 2016; Almazan, M. & Vonthron, N. 2014; Ondiege, P., 2010; Gencer, M. 2011; Alhassan, T.F. & Koaudio, A.J. ,2019
d. Mobile money movement and the catalyst to power–up emerging markets	Iheanachor, N. & Ozegbe, A. E, 2020; Aron, J., 2018; Tankha, M. 2016; Grameen Foundation, 2014; Gencer, M. 2011; Quan, S., Hao, C. & Jianxin, Y. 2010; Gupta, S. 2013; Donner, J. 2007

		Quan, S. , Hao, C. & Jianxin, Y. 2010; Singh, S. & Srivastava, R. K., 2014; ; Oluoch, R.A., Abaja, P.W., Mwangi , J. W. & Githeko, J. 2013; Wong, C.H., Lee, H.S., Lim, H.Y., Boon, H.C. & Tan, W.H., 2012; Wang, Y., Lin, H. & Luarn, P. 2006; Yang, K. C.C. 2007; Dawi, N. M., 2019; Nguyen, N., 2016; Odia, O.J., 2012; Pousttchi , K & Wiedemann, D. , 2007; Hsu,T., Wang,Y. & Wen, S. 2006; Puschel J., Mazzon, J.A. & Hernandez, J. M. 2012
e.	*Factors determining the adoption of mobile money*	

In their study of mobile money projects, Diniz et al. (2011) and associates pointed-out that even though about 120 mobile money projects have been implemented in 70 emerging markets, only a limited number of these projects successfully took-off in SSA markets including, Kenya, South Africa, and Ghana. Specifically, they contended that the M-Pesa model of Kenya has been much celebrated, and that its success has been attributed to a confluence of specific circumstance including the Safaricon's sizeable national market share and the enabling regulatory environment. Finally, they argued that whilst other SSA markets may have conditions like the Kenyan market, they have been unable to replicate the M-Pesa model due to differences in socioeconomic, political, religious practices (Tankha, 2016).

Similarly, McBride (1997p. 277) studied the progress of an IS project within a manufacturing firm in the UK over a-9-year period. The study demonstrates the importance of the interaction between the business environment, organisation environment and the perception and interpretations of events by stakeholders on the success or failure of an IS. Particularly, it illustrates the importance of the organisational context and the dynamic nature of social, cultural, economic, and technical factors critical in shaping adoption and use of IS in an organisation. In conclusion, McBride warned that, no study that concerns itself with how to develop a successful IS and how to avoid failures can reach a reasonable conclusion unless it addresses issue of context and culture.

Based on the conclusions of the above two studies about the importance of contextual factors for an IS project; we note that since mobile money use in the context of SSA relates to behaviour and culture, we need appropriate reference theories to enable us to study it more thoroughly. This study, therefore, seeks to investigate the precursors relating to a successful adoption and diffusion (or lack thereof) of mobile money in the context of SSA. The study further evaluates implications of the interaction between these precursors with socia-cultural, economic, and political forces.

To summarise, there is a marked lack of research studies on mobile money addressing the factors explaining the adoption and diffusion of the technology in the context of SSA using reference theories. Studies on the adoption of mobile has not been well represented with appropriate reference theories in studies done on the adoption and diffusion of mobile money. This deficiency has therefore motivated this research study. This study would make an addition to scholarly discussion papers on mobile money for SSA through:

- Demonstrates adequate knowledge and understanding of those forces inherent to SSA contributing to poor technology and mobile money adoption and diffusion.

- Develops a model for mobile money adoption behaviour which shows factors hindering the exposure of SSA region to mobile money which leads to the limited adoption of the technology.

- Provides adequate information for policy makers, practitioners, researchers, investors, and NGOs to map-out critical factors regarding the technology and mobile money that managers will have control over.

5. PRECURSORS TO MOBILE MONEY ADOPTION FOR SUB-SAHARA AFRICA

There are several factors that may explain the adoption and diffusion rates of mobile money in the context of SSA that are absent in the original TAM model. Whilst past studies have demonstrated that factors such as culture, education, standard of living, religious practices, rural-urban and transactional migration patterns may have different consequences on the adoption and diffusion of information technologies in the context of SSA, one such technologies deeply predisposed by these factors is the mobile money and its related telecommunications infrastructures (Kola-Oyeneyin et al. 2020; Tankha, 2016). Whereas mobile money ecosystem has led to socioeconomic growth in both developed and emerging markets of Southeast Asia, SSA trails behind the rest of the world in terms of socioeconomic growth and technological infrastructure developments for mobile money ecosystem.

It is noted that financial innovations in mature markets in North America, Europe and emerging markets in Southeast Asia have accelerated the mobile payments ecosystem due to the enabling telecommunication infrastructures and growing trends in de-cashing and global acceptance. Clearly, mobile payments ecosystem is crucial in strengthening financial infrastructures that support a long-term economic growth. In line with this, mobile money operators (MMOs) operating in these markets have led with innovations in product developments, product designed usefulness, and affordable products for consumers, and as result, they have created a multiplier effect across the economies; unlocking new business models for financial services, growth in e-commerce and global socioeconomic growth (Kola-Oyeneyin et al. 2020). With regards to SSA however, SSA falls behind the rest of the world in terms of technologies and related telecommunication infrastructures for a standardized mobile money ecosystem. For example, about 20% of the respondents to a survey on key challenges to mobile money adoption in Ghana reported the system and networks quality as key issues (Addo, 2019). Thus, whilst mobile money and telecommunication infrastructures are fundamentally critical for socioeconomic growth in mature markets, poor telecommunication networks, outmoded technology, and lack of investment in modern technological infrastructures have hindered the socioeconomic development in SSA markets and thereby, impacted the adoption and diffusion of the mobile money in question (Gencer, 2011).

The continued upswing of smartphones demand by consumers in both developed and emerging markets of Southeast Asia has led to the rapid growth in data usage. Smartphone data usage in these markets has increased in 10 folds. Also, about 80% of mobile traffic driven by shifting user preferences such as social media, online videos, and news feeds now comes from smartphones with an

average monthly data usage per smartphone increasing more than 50GB. In SSA markets however, GSM/EDGE subscriptions continues to be predominantly higher than smartphones by virtue of the high number of lower income consumers now using the 2G-enabled handsets with the average monthly data of 2.4 GB per handset (Ericson Mobile, 2015; Singh & Srivastava, 2014).

With the smartphone subscriptions more than double, reaching about 6.1 billion globally, and with more than 70% of the world population now using the smartphones, and about 90% of its usage now covered by the mobile broadband networks in mature markets. Yet, SSA wavers behind the rest of the world very badly in terms of advanced mobile technology, big data, and smartphone subscription rate. For example, the broadband and Wi-Fi networks in SSA markets are extremely poor in terms of connectivity, coverage, and affordability. Also, these two networks are too slow and expensive to afford. However, a glimpse into the future of how socioeconomics developments will look like in SSA without the means to acquiring, storing, transferring, and manipulating information technology rapidly and efficiently, demonstrates the importance of modern technological infrastructures such as smartphones, big data, Wi-Fi internet and broadband networks for SSA markets for mobile payments' ecosystem and other digital services ((Ericsson Mobile, 2015).

The recent report by the UNESCO (2017) underscored the need for every adult in the 21st century to have the ability to read and write, use digital media and to be digitally savvy. However, the requirement of this report has not been practicalised in SSA where about one third of the adults, 15 years and above could not read and write. Moreover, with reference to the global benchmark, nearly 27% of the world illiterate people live in SSA continent. Today, most Africans are living a life on a near subsistence livelihood from physical labours. Africans are being subjected to physically and mentally labours due to limitations in socioeconomic developments and technological infrastructures (Fang et al. 2014). Consequently, they have little patient to learn about mobile money and/or to adopt the mobile money because literally, they are unable to read and write and/or to conduct digital transactions by themselves, unless they are assisted by experienced family members or a mobile money agent (UNESCO Report, 2017).

It is claimed that mobile money stakeholders including mobile money operators, investors, NGOs, and government agencies in SSA markets are yet to establish the cumulative tradition on the ecosystem of providers of the new technology that act as the tipping point for mass adoption of the e-wallet. There are relatively fewer merchants including mom and dad brick and mortar stores, Post Offices, petrol stations and other retailers that accept payments or allow customers to store values through e-wallets. This shows that the use of mobile money in most SSA markets is relatively small. Similarly, the mobile money ecosystem in SSA is extremely fragmented because operators of mobile money have chosen to roll out a closed system. The closed system has however, continued to limit its usefulness and the likelihood of success. The cross-border money transfer has also proven a particular use case to solve because of foreign exchange problems, regulatory hurdles, and infrastructure incompatibilities. Therefore, in the absence of interoperability at the domestic and international levels, the required scalability will be unworkable (Tankha, 2016).

Finally, the extra financial burdens that most Africans have been sacrificing to purchase a smartphone and related technologies relative to residents in developed and emerging markets of Southeast Asia can be challenging. Whilst it may cost a smartphone subscriber in the USA, Australia or China, about $40 per month for a 2-year contract with a mobile service provider for services including, unlimited national calls, about 40GB -50GB data access to networks and a new 4G android smartphone; a smartphone subscriber in the SSA market will be required to pay more, at least about $50 to $60 per month, for a service that is practically unreliable due to the poor network coverage by the mobile service providers and poor infrastructure networks. It is troubled that Africans are required to pay upfront for smartphones, airtime, and data services. The fact that most Africans earn less than $200 per month makes it even more difficult to acquiring (much less adopting) the technology and the smartphones in what is one of the poorest regions in the world (News Agency of Nigeria, 2015; Musa et al., 2003).

Thus, it is in consideration of the above precursors, that justify the need to extend the TAM model for the study of the adoption of mobile money in SSA. Given the inadequacy of technological infrastructures in the context of SSA, there are a few factors that could influence the observable level of mobile money adoption (or lack thereof) that are absent in the original TAM. Accordingly, these factors include socio-cultural, economic, education, ability, standard of living, religious practices, and telecommunication networks system.

Section 6 considers the influence of perceived behaviour control and social factors and facilitating conditions models in TAM for MM adoption for SSA.

6. THE INFLUENCE OF PERCEIVED BEHAVIOUR CONTROL, SOCIAL FACTORS, AND FACILITATING CONDITIONS IN TAM FOR MOBILE MONEY ADOPTION

Having looked at the precursors to mobile money adoption for SSA in Section 5, this section examines the main components in the modified TAM model. The section begins with the theoretical foundation for the study followed by the main components in modified TAM in Subsection 6.1.

The theoretical grounding for this study comes from the work of Davis (1989), Triandis' (1979) and Taylor & Todd (1995a). As was noted, this study is an extension of the TAM model with the influence of "perceived behaviour control" (PBC) model (Taylor & Todd, 1995a; Ajzen, 1991) and "social factors" (SF) model and "facilitating conditions" (FC) model (Triandis, 1979). The PBC model, FC model and the SF model are rooted in social psychology theories including the TPB (Ajzen, 1991), decomposed TPB (Taylor & Todd, 1995a; Hsu et al. 2006) and Triandis' (1979) theory. The TAM model also is rooted from the Theory of Reasoned Action (TRA) of social psychology (Ajzen & Fishbein, 1975).

Distinct to the TPB, TAM is an intention-based model developed to provide explanations of the decision-making processes of the end-users as to whether to adopt or not to adopt an IS in organizational settings (Davis et al.,1989). Two specific beliefs including the PU and PEOU are centrally important in TAM to predict the user behaviour towards an IS use. TAM assumes that the decision to use the technology is based upon one's cognitive response (PU & PEOU) to using the technology, which in turn affects one's effective response about whether to use the

technology. The effective response thereby drives the behavioural response about whether to use the technology in question. A pictorial representation of the TAM model is presented in Figure 1 below.

TAM has been the focus of academic attention on IS use from its development (e.g., Venkatesh et al., 2003; Musa et al., 2003; Mathieson et al. 2001). TAM is highly parsimonious, and it is based in a theory of social psychology; TAM performs well empirically and compares favourably with behavioural theories (Mathieson et al. 2001). A review of academic research on IS suggests that TAM has emerged as one of the most influential models in the streams of research (Davis, 2003; Venkatesh et al., 2003, Ikart, 2006). Due to its practicality relative to TPB, TAM is highly popular in IS research. TAM has less constructs when compare with TPB. This makes it easier to apply when predicting an IS acceptance behaviour (Mathieson, et al. 2001). TAM has been replicated and tested extensively to provide empirical evidence on the relationship that exists between PU, PEOU and behaviour (e.g., Ikart, 2006; Taylor & Todd, 1995a; Mathieson et al. 2001; Quan et al. 2010; Wong et al. 2012; Singh & Srivastava, 2014). The sum of these studies has confirmed the validity and reliability of TAM and supported its use with different population and technology choices (Bagozzi et al. 1992; Taylor & Todd, 1995a; Puschel et al. 2010).

Despite its practicality and applicability in IS research, TAM has been found to be lacking in certain respects. First, it assumes that when someone forms an intention to act, they will be free to act without limitation. This suggests that IS use is volitional. More so, previous studies showed that an individual's access to "resources" does, as a matter of fact affect use (e.g., Mathieson et al. 2001; Taylor & Todd, 1995a). For example, there are situations where someone might want to use an IS, but s/he is prevented from doing so due to limited ability, experience, social influences including norms, values, and social situations (Triandis, 1979; Mathieson et al. 2001; Taylor & Todd, 1995a). Also, TAM was based on studies in developed nations, e.g., USA, UK, and Europe where technology is well established (Davis, 1986; Davis et al., 1989). Further, TAM presumes the technology availability is a given and the onus of accepting it or rejecting it rest with end-users. But when it comes to SSA, where the technological infrastructure is grossly inadequate, Davis' model falls short of the reality (Musa et. al, 2003). More importantly, there are socia-cultural, economic, and political forces including briberies and corruptions, regulatory hurdles, education, unemployment, money laundries and political interference impacting the state of technological infrastructures and the adoption of mobile money by end-users. Thus, it will be practically impossible to use TAM in its original form to investigate the adoption and diffusion of the technology including mobile money in the context of SSA (Musa, et al., 2003). Even so, evidence from previous study ((e.g., Pousttchi & Wiedemann, 2007), indicates that if TAM is tested in its originality in emerging nations, the result of its predictive power will vary. As was noted, SSA falls behind the rest of the world when it comes to technological infrastructures, socioeconomic and political developments.
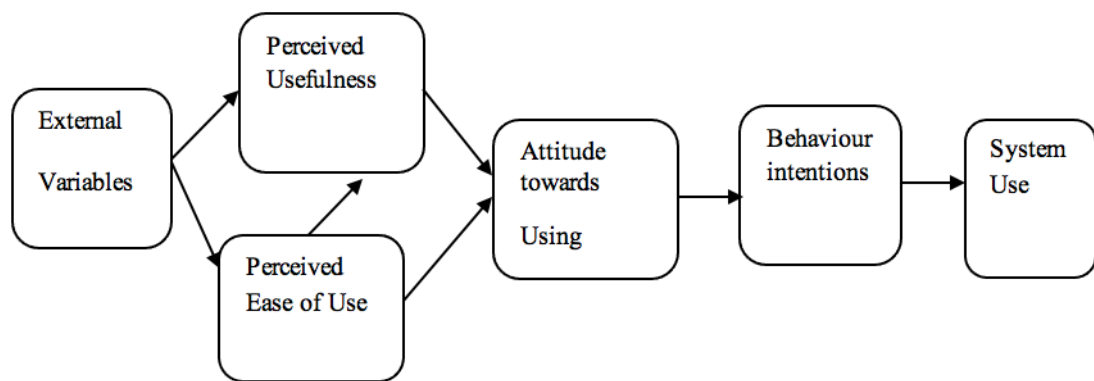
Fig. 1. The Technology Acceptance Model

Source: Adapted from Davis et al. (1989).

Given the rapid globalisation of businesses due to mobile money and m-Commerce technology (e.g., Batista & Vincente, 2020; Gencer, 2011; Diniz et al. 2011), this study is therefore, an effort to respond to, and to satisfy this necessity for SSA, by applying a modified TAM for the study of the precursors pertinent for the adoption (or lack thereof) of mobile money in the context of SSA. Accordingly, this study postulates that factors such as socia-cultural, economic, and political factors would have various consequences in the adoption (or lack thereof) of mobile money (e.g., Tankha, 2016; McBride, 1997) for SSA. Thus, the paper extends the TAM model with the influence of perceived behaviour control model (Taylor and Todd, 1995a; Ajzen, 1991), social factors model and facilitating conditions model of Triandis, (1979) framework. However, a summary of related factors of the TAM model is presented in Table 3.

Table 3: A Summary of Related Factors and Measure of TAM Model

Factors	Measure
Perceived Usefulness	PU defines as the user's subjective probability that using a specific application system will increase his/her job performance
Perceived Ease of Use	PEOU is the degree to which individuals believe that using a particular system would be free of physical and mental effort
Attitude toward Using (behaviour) (ATU)	ATU an individual's positive or negative evaluation of self-performance of the behaviour. It is the degree to which performance of the behaviour is positively or negatively valued.
Behaviour intention (BI)	BI is an indication of an individual's readiness to perform a given behaviour. BI is assumed to be an immediate antecedent of behaviour. It is based on attitude toward the behaviour weighted for its important in relation to the behaviour.
Actual Use	Determines the individual's behaviour based on the BI

Source: Davis et al. 1989; Fishbein & Ajzen, 1975; Ajzen, 1991

6.1 *Components in Modified TAM Model for MM Adoption in SSA*

The essential components in the modified TAM for mobile money adoption for SSA namely, the perceived behaviour control, social factors and facilitating conditions are presented in relation to the existing scenario in SSA as follows.

Perceived Behaviour Control is one of the essential antecedents of the Decomposed Theory of Planned Behaviour (DTPB). The DTPB decomposes three antecedents (e.g., attitude toward the behaviour and subjective norm) of behaviour intention of the TPB into a set of salient beliefs based on the TAM and Innovation Diffusion Theory. The perceived behaviour control (PBC) refers to the individual perceptions of how easy or difficult it would be to carry out the behaviour (Taylor & Todd, 1995a; Ajzen, 1991). Regarding this research, the importance of the influence of the PBC model in the modified TAM reflects the presence of the users' factors or resources (or lack thereof) with respect to facilitating or impeding the performance of the behaviour (i.e., adoption and diffusion of mobile money in SSA). Thus, the users' factors may be measured in terms of education, experience, training, ability, and support services (including support by mobile money agents, relatives, next of kin and social networks groups) (Tankha, 2016; Musa et al. 2003; Ondiege, 2010). However, it should be noted that most potential users of mobile money in SSA Africa do not have the relevance ability, experience and other resources needed to facilitate the adoption and diffusion of the technology in question (Traindis, 1979; Ondiege; Bagozzi et al. 1992).

The PBC model parallels the perceived resource (PR) model (Mathieson, et al. 2001), which measures the extent to which an individual believes that s/he has access to personal, as well as organisational resources needed to use an IS including the mobile money. The PR include factors such as human assistance, software, skills, documentation, money, and time. Mathieson et al (2001) subdivided the PR into two components namely, reflective and formative. While the reflective component measures the overall perception of resources available, the formative components measure the perception of individual resources such as expertise, hardware, ability, money, and training. In an IS context, the provision of training, support, and assistance to users when they encounter problems are some of the ways to reduce barriers to using the technology. However, since these resources capture different items, they are not necessarily correlated (Mathieson et al. 2001). For example, Thompson at al. (1991) found no evidence of a positive relationship between facilitating conditions (operationalized as technical support service) and PC use by knowledge workers.

Social Factors according to Triandis' model, personality internalises the culture way of perceiving the social environment called the subjective culture of the group. The model suggests that the reference group's subjective culture (norms, roles, values, and social situations) of the social factors (SF) influences the individual notion of desirable behaviour. In IS context, this refers to the influence of peers and superior. Thus, the influence of social factors in the modified TAM reflects situations of the users' perceptions of social pressures to perform or not to perform the behaviour in question and the motivation to comply with the specific referent (Traindis, 1979; Fishbein & Ajzen, 1975; Ajzen, 1991). Social pressures have a direct influence on the behaviour intention and indirect influence on behaviour because the formed the attitude of the influential norms surrounding the individuals (Fishbein & Ajzen, 1975; Ajzen, 1991). In the context of SSA, social pressures are rooted in traditional hierarchies, ranks, religious practices, and institutional deities. Therefore, social factors may be measured in terms of the influence of peer group, family, superiors, belief system, religion, and tradition (Tankha, 2016; Gencer,

2011). Moreover, the social factors model parallels the subjective norms (SN) which refer to a person perception (normative beliefs) that most people who are important to him think, he should or should not perform the behaviour in question (Fishbein & Ajzen, 1975; Taylor & Todd, 1995a; Ajzen, 1991).

Davis et al. (1989) reported no significant relationship between social norms and IS usage. As noted, they attributed the finding to the IS context (i.e., use of a word processing) in which their research was conducted upon. Thus, social factors might not necessarily correlate because social factors variables may be context specific and may capture different items.

Facilitating Conditions. Triandis suggests are objective factors that are out there in the environment such that several judges or observers can agree to make an act easy to do. Acts he says are socially defined patterns of muscular movements. Triandis states that behaviour cannot occur if the objective conditions of the environment prevent it. Thus, the influence of the FC in the modified TAM for the adoption of MM in SSA may be measured in terms of the presence of the national economic factors (NEF) e.g., employment, education, wages and education and training, laws and policies impacting economic situations of SSA (or lack thereof). As presented in Section 8 and Table 4, the NEF are subdivided into positive and negative economic factors. Thus, the presence of facilitating conditions (or lack thereof) may influence the adoption of MM in the region of SSA (Triandis, 1979; Bergeron et al. 1995).

Thompson et al. (1991) reported a small, negative relationship between FC (operationalised as technical support) and PC use. Interestingly also, Ikart (2006) reported no effect of FC (operationalised as IS management processes) on behaviour in their study. They attributed the finding to IS context of an IS project. Thus, FC might not necessarily correlate because FC are context specific and capture different items.

Various resources related variables have been studied in IS research. Table 4, whilst not intended to be comprehensive, lists some of the resources including social factors identified in IS literature as useful for empirical IS research into mobile money adoption in the context of SSA. As can be seen, Table 4, categorises these into four main attributes including personal, system, support, and social factors.

It worries that mobile money could be customarily used by most SSA families with high economic status that the poor ones are shy away from adopting. Many African families could also fear other practices regarding mobile money undermining the traditional hierarchies of money transfer including lineages, deities, and gender amongst others in the society (Fang et al. 2014; Tankha, 2016). Having said that, the present study focuses on resources issues with the aim of acquiring adequate knowledge and information that could assist policy makers, investors, NGOs, and researchers to map-out critical success factors for mobile money that managers could have control over. Moreover, the result of the study will keep the modified TAM to be derived for the study highly distinctive from earlier extended TAM models that deal with resources issues for an IS adoption studies (e.g., Ikart, 2006; Mathieson et al. 2001, Musa et al. 2003). Hence, the present study examines situations about the context of SSA where there are no adequate resources available, yet there may be social pressures on individuals to perform or not to perform a given behaviour (in this case, to adopt or not to adopt the mobile money).

Specifically, the study investigates those factors contributing to persistent lack of modern-day technological infrastructures for mobile money in the context of SSA.

Table 4: Resources Issues in the Literature for SSA IS Research Study

Personal Attribute: Category A	
Experience	Fuerst & Cheney (1982), Kraemer et al. (1993) Bergeron et al. (1995), Ikart (2006)
Abilities	Ikart (2006) Mathieson et al. 2001; UNESCO Report (2017), Triandis (1979)
Education	Musa et al. (2003), Tanhka (2016), UNESCO Report (2017)
Training	Musa et al. (2003) Mathieson et al. (2001), UNESCO Report (2017)
Literacy skills,	Musa et al. (2003), UNESCO Report (2017) Tankha (2016)
System Attributes Category B	
Accessibility	Kraemer et al. (1992), Bailey & Pearson (1982), O'Relilly (1982), Barki (1990)
Response time	Furest & Chaney (1982), Trice & Treacy (1988), Westcott (1985)
On-line availability	Westcott (1985)
Documentation available	Bailey & Pearson, (1983)
Software availability	Doll & Ahmed (1983)
Facilitating Conditions	Triandis, (1979), Thompson et al. (1991), Ikart (2006), Bergeron et al. (1995)
Support Service: Category C	
Organisational support and/ or support by mobile money agents,	Amoroso & Cheney (1992), Compeau & Higgins (1991), Tankha, 2016, Gencer, 2016
Experienced relative and/ or next of kin	Tanhka (2016), Gencer (2011)
Social group network group	Tanhka (2016) Gencer (2011)
Social factors Category D	
Subjective norms	Ikart (2006), Triandis (1979), Fishbein & Ajzen (1975), Ajzen (1991), Taylor & Todd (1995a), Davis et al. (1989)
Peers group	Ikart (2006), Thompson et al. (1995), Bergeron et al. (1995), Taylor & Todd (1995a)
Family & Belief system	Tanhka (2016), Triandis, (1979), Thompson et al. (1995)
Religion practice	Tankhka (2016), Fang et al. (2014), Wong et al. (2012)
Social pressures	Thompson et al. (1995), Tanhka (2016), Fishbein &Ajzen (1975), Ajzen (1991)

7. INTERACTION OF MOBILE MONEY INFRASTRUCTURE WITH SOCIA-CULTURAL, ECONOMIC, POLITICAL FACTORS IN SSA

The previous section examined the influence of PBC and SF and FC in TAM for mobile money adoption. This section assesses the implications of possible interactions between mobile money infrastructure with socia-cultural, economic, and political factors in SSA. The major statement of this interaction is that the investment in mobile money projects will promote a much-needed socioeconomic growth to the continent of SSA in terms of, quality of life, good governance, education, economic productivity, better healthcare systems and youth employment opportunities. Furthermore, an inclusion of the unbanked customers into the financial system due to mobile money will result in accessible services and lower cost alternative to traditional banking for consumers including, affordable payments, easy access to value chain, quick loan, flexible savings and investments, online shopping, mortgage service and property management as a shared benefit of becoming a bank customer like the M-Pesa of Kenya. Also, as the danger of credit sometimes become more apparent especially, in the wake of financial crisis, mobile

money will provide consumers including SMBs and unbanked businesses access to financial sector for banking and savings particularly for those where savings in the form of money have been less rational than savings in the form of land and livestock (Tankha, 2016; Fang et al. 2014). The MM ecosystem has converted the unbanked customers to formal contributors to their nations' GDP growth.

Mobile phone subscribers can open e-wallet accounts on their devices to save money, obtain micro-loan, conduct remittances, POS services, purchase airtime, cash-in-cash-out, C2B and B2B services. Moreover, insurance services across business sectors in the region including medical, agriculture and healthcare particularly, in SMEs are untapped opportunities for those that can be leveraged through the mobile money ecosystem to provide affordable healthcare premiums and enhance insurance distributions and create differentiated pricings based on customer data. SMEs are extremely underserved in SSA markets in terms of insurance services (Hsu et al. 2006; Fang et al. 2014; Kola-Oyeneyin et al. 2020). Hence, mobile money will enable mobile-based products and services to be delivered in the agricultural sector including market pricing for crops, weather forecasts and micro insurance for farming products using mobile devices.

Trading cash for electronic values can solve many problems for SSA families, from cash handling to transportation. The risk associated with thefts and accounting problems that often being encountered by African families would be taken care of, because mobile money operators will be able to track every transaction electronically (Alhassan & Kouadio, 2019; Tankha, 2016; Fang et al. 2014).

Consumers can shop 'anytime' and 'anywhere' due to uninterrupted connectivity by means of a mobile device. A consumer doesn't require to have a physical presence in the store. This serves time and money and improves the quality of life. Also, the customer shopping flow will be reinforced from the initial phase of logging-ins, searching, comparing prices, ordering, and making payments for aftersales services. Furthermore, in view of the seamless shopping transactions across multiple channels, consumers will receive optimal shopping experiences. Similarly, retailers would be able to send customised information of their services to their customers' handsets, thus, resulting in the fulfillment of the previously unmet needs of multi-channel shoppers and better revenues for retailers in the long run (Iheanachor & Ozegbe, 2020; Singh & Srivastava, 2014; Fang et al. 2014; Wong et al. 2012).

On the contrary, a model of mobile money adoption that will be relevant for SSA markets should consider other adverse factors such as socioeconomic, political, and religious practices inherent to SSA other than the positive factors earlier mentioned, considering the fragile state of the economies and lifestyle forces. Therefore, for the most part, other factors that may combine to contribute to the inadequacy of technological infrastructures for mobile money must be addressed. Primary among these factors include intermittent electricity supply, poor road systems, poor telecommunication networks, graft, lack of visions and objectives, money laundry and terrorism financing, political thuggery, religious practices, illiteracy, poor government policies, poor health system, poverty, advance fee fraud, lack of transparency, identity theft, cybercrime, regulatory oversight, power self-centredness, youth unemployment, and fragmented ecosystem of mobile money operators (Tankha, 2016, Gencer, 2011, Musa et al. 2003).

As was noted, "no study that concerns itself on how to develop a successful IS and how to avoid failure can reach a meaningful conclusion unless it addresses the issue of culture and context" (McBride (1997, p. 277). Therefore, it will be irrational to utilise the TAM model in its originality to investigate the use of mobile money for SSA markets, because the model suggests that there are no barriers that will prevent the users from using the technology if they want to use it. However, the adoption and/or use of technology such as mobile money is non-volitional for the vast majority of SSA Africans. Whilst there may be a few privileged adults in the population that may have the needed resources for use of mobile money, this number is limited to urban area. But for the most eligible adults in the population, this is not applicable due to negative impact factors of the national economic factors including limited education, ability, skills, and experience and technological tools (Ouma et al. 2017; Musa et al. 2003).

In summary, SSA falls behind the rest of the world in terms of modern-day technological infrastructure, telecommunications networks, and big data for mobile money. On this note, we recognised that the primary investment for socioeconomic and technological developments for SSA should begin with the investment in education, youth employment, road system, healthcare systems, electricity supply, telecommunications networks, good governments, and a balanced regulation system. Furthermore, a partnership between the relevance stakeholders for mobile money such as, government agencies, central banks, NGOs, donor organisations and private investors will go a long way to promote the uptake of the mobile money ecosystem. Even so, it should be noted that socioeconomic developments for the citizens and youth employment can impact many lives in the continent prior to the intentions to adopt and/or not to adopt the mobile money and platforms for goods and services.

Thus, given this problem, this study recommends, a "Modified TAM," (see Figure 2, Section 8) for the study of the adoption and diffusion of mobile money in the context of SSA. The model incorporates both positive factors and negation factors of the national economic factors and actual mobile money infrastructure available with the aim of addressing the factors inherent to SSA that influence the adoption and diffusion of mobile money. Until this problem is addressed fundamental socioeconomic factors and technological infrastructures will continue to challenge many SSA nations.

8. THE MODIFIED TAM FOR ACTUAL MOBILE MONEY INFRASTRUCTURE AVAILABLE

Having assessed the implications of the interplay between mobile money infrastructures with socioeconomic and political forces in Section 7, this section examines the modified TAM (refer to Figure 2) for actual mobile money infrastructure available for SSA. As would be expected, the model shows some factors that tend to hinder the exposure of SSA residents to mobile money, which may lead to the limited adoption and diffusion of the technology. As shown, the new model reflects the actual mobile money infrastructures available as well as, positive and negative economic factors of the NEF.

As earlier noted, the theorical basis of NEF is drawn from the Triandis' (1979) facilitating conditions (FC) model. Triandis defines facilitating conditions as "objective factors, 'out there' in the environment that several judges will agree make an act easy to do". Thompson et al. (1991), Bergeron, 1995 and Ikart, (2006) measured the FC in terms of organisation environment of IS and IS management processes influencing PC use in an IS environment. In the context of SSA, the FC may be measured in terms of the NEF of the region e.g., employment, education, wages and education and training, laws and policies influencing economic situations of SSA. As noted in Table 5, NEF below are subdivided into positive and negative economic factors.

As shown in Figure 2 below, the modified TAM model incorporates variables namely, Facilitating Conditions (reflecting National Economic Factors), Social Factors, Perceived Behaviour Control, and Actual Mobile Money Infrastructure Available. The major statement of this model is that the utilisation of mobile money in the context of SSA would be influenced by the NEF, (i.e., facilitating conditions) of the region, actual mobile money infrastructure available for mobile money use, the social factors of the environment concerning the mobile money use and perceived behaviour control conducive to and/or hindering the adoption of mobile money. As was noted, two types of factors namely, Positive economic factors and Negative economic factors, respectively influence the NEF of the region. Whilst the positive economic factors reflect factors such as, democracy, good health care systems, economic productivity, governance, power supply, social well-beings, education, desire to integrate into global economy and good road networks; the negative economic factors reflect factors such as, power self-centredness, advance fee fraud, intermittent power supply, bribery and corruption, religious and tribal strife, regulatory hurdles, infrastructure incompatibilities, youth unemployment, cybercrime, identity theft, political thuggery, lack of transparency and poor education and health care systems (Tankha, 2016; Gencer, 2011, Musa et al. 2003).

From the preceding discussions, one will agree that most potential users of mobile money in SSA do not have the ability, experience and resources needed to facilitate the adoption of the technology in question either for now or for the foreseeable future. Also, both positive and negation impact forces such as economic productivity, governance, inadequate infrastructure, and youth unemployment do in fact influence the adoption and diffusion of mobile money.

The actual mobile money infrastructure available from the new model reflects the technological infrastructures available and installed for use. However, considering the fragile state of economies regarding SSA Africa, the actual mobile money infrastructures available constitutes technological infrastructures such as, fragmented ecosystem of mobile money providers, basic telecommunications and networks, GSM/EDGE 2G-enabled handsets accompanied with small data of about 2.4GB per handsets amongst others. It should be noted that poor technological infrastructures along with adverse socioeconomic factors combine to hinder the continent economic development and mobile money adoption rather than advancing the take up (Tankha, 2016; Ericsson Mobile, 2015).

As shown in Figure 2 below, the model reveals a two-way interaction between the actual mobile money infrastructure available and the national economic factors for the adoption of mobile money. This means that: (i), one or more main effects

are qualified by the interaction, or (ii), one or more main effects exist overall, but the effect of one independent variable depends (or differs) based on the level of the other independent variables (i.e., referring to interaction effects between the national economic factors and the actual mobile money infrastructure available discussed in Section 7).

The broken paths in the model shown between i) actual mobile infrastructure available and PBC, and ii) PBC and Behaviour suggests that in actuality, it may be difficult or impossible for users to ascertain the level of control over the behaviours to adopt or not to adopt the technology in question considering constraining resources such as experience, skill, and ability impacting the level of the control. For example, in his seminal work, Traindis (1979) acknowledged that even when the intentions are high, behaviour may not occur if the "geography" of the situation (i.e., facilitating conditions) makes the behaviour impossible. This means that if a SSA resident intends to use a mobile money, but s/he does not have an easy access to one, usage is less likely to occur. Furthermore, the role of social pressures on potential adopters of the mobile money influences the behaviour intentions concerning the usage of the technology because social pressures formed the attitude of the influential norms surrounding individuals. Social influences may be context specific in terms of an IS usage (Davies et al. 1989; Hsu et al. 2006).
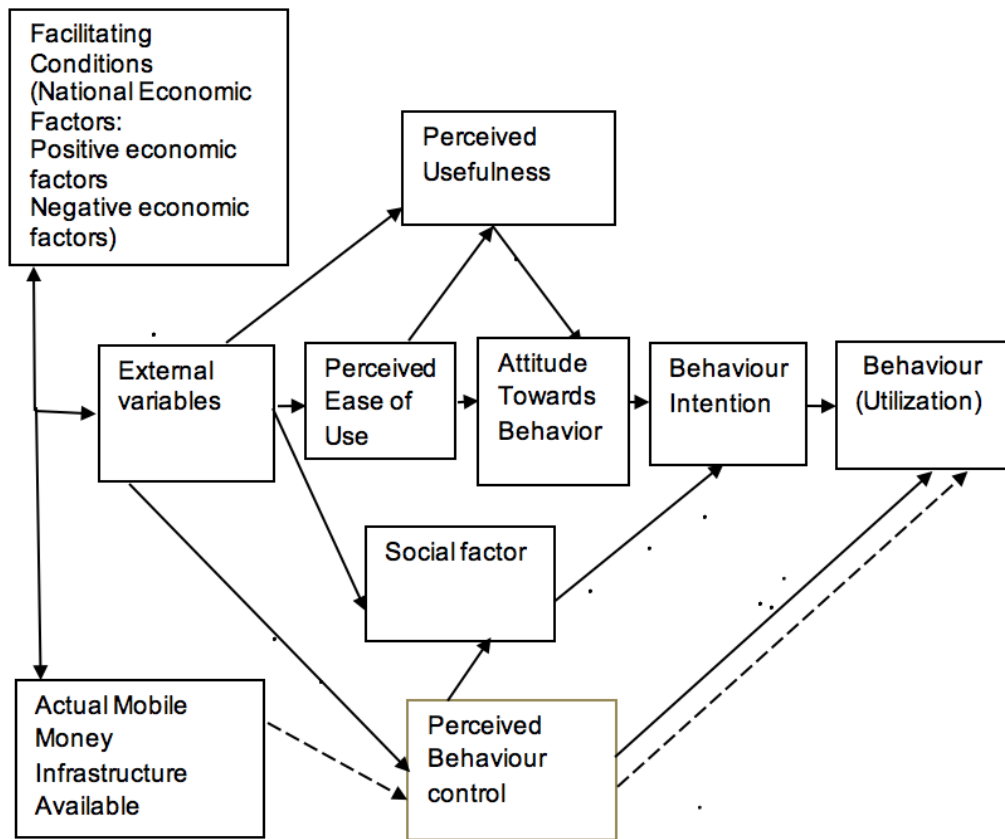

Fig. 2. A Modified TAM Model for Actual Mobile Money Infrastructure Available.

Source: Adapted from Musa et al. 2003; Traindis' 1979; Davis et al. 1989; Ajzen & Fishbein, 1975

To summarise, it is noted that initial investment in technological infrastructures for SSA could lead to improvement in national economic factors, which in turn could lead to improvement in socioeconomic developments for mobile money use. As suggested in the model, the positive economic cycle in the feedback loop could then help to minimise the effects of small disturbances (i.e., referring to a reduction in the region's negative economic factors due to primary investment in technological infrastructures discussed in of Section 7) in the ecosystem. As earlier noted, the initial investment in technological infrastructures for mobile money for SSA should begin with the investment in education, youth employment, road systems, good healthcare systems, electricity supply, telecommunication networks, good governments, social goods for citizens and a balanced regulatory system.

A theoretical perspective of the components in the modified TAM is summarised in Table 5. Four components including FC, PBC, SF and actual mobile infrastructure available respectively influence the adoption and diffusion of MM in the context of SSA. Though the study focuses on resources issues to allow policymakers, investors, and researchers to map-out those factors that managers will have control over from the outcome, it also aims to keep the modified TAM distinct from previously extended TAM that deal with resources and IS adoption studies.

Table 5: Theoretical Perspective in Modified TAM for Mobile Money for SSA

Variables	Measured of Components
Facilitating Conditions - Objective factors, 'out there' in the environment that several judges will agree make an act easy to do (Triandis,1979)	Measured in terms of national economic factors (i.e., socioeconomic factors) impacting economic situations of SSA. NEF is classified into positive and negative economic factors: ***Positive economic factors*** *– reflect factors such as* government activity, productivity, health systems, power supply, labour market, laws and regulations, wages, education and training, and road and transport system and technological infrastructures. ***Negative economic factors –*** reflect factors such as bribery and corruption, power self-centredness, advance fee fraud, religion and tribal strife, regulatory hurdles, infrastructure incompatibilities, identity theft, cybercrime, political thuggery, youth unemployment and intermittent power supply.
Perceived Behaviour Control - refers to the individual perceptions of how easy or difficult it would be to carry out the behaviour (Taylor & Todd, 1995a; Ajzen, 1991)	Reflect the presence of the users' factors or resources (or lack thereof) with respect to facilitate or impede the performance of the behaviour (i.e., the adoption of MM). PBC factors may be measured based on users' experience, training, ability, education and training, and support services
Social factors - Triandis suggests, the reference group's subjective culture (norms, roles, values, and social situations) of the SF influences the individual notion of desirable behaviour	In SSA, SF are rooted in traditional hierarchies, ranks, religions, lineage, and institutional deities. SF may be measured based on the influence by peer group, family, superior, belief system and traditions.
Actual Mobile Money Infrastructure Available Davies, 1986; Triandis 19*79*	Measured based on technological infrastructures available and installed for use in SSA for MM (e.g., small data networks, GSM/EDGE 2G enabled handsets and basic telecommunication infrastructure.

9. DISCUSSION AND CONCLUSION

This study has advanced our knowledge and understanding of the precursors inherent to SSA relating to a successful (or lack thereof) of mobile money adoption and diffusion in the context of SSA, as well as the effects of the interplay between mobile money infrastructure available with socioeconomic and political factors. As earlier noted, SSA falls behind the rest of the world in terms of modern-day technological infrastructures and socioeconomic developments. On this note, we posited that the application of the TAM model in its originality to investigate the adoption of mobile money in the context of SSA will be practically ineffective. Because for the most part, the model was based on studies in developed nations where the technology has been well established. Nonetheless, SSA has some factors such as socia-cultural, economic, religion and political factors which are absent in the original TAM. Consequently, by extending the TAM model with the influence of perceived behaviour control and social factors variables and with innovative ideas on socioeconomic (FC) and technological factors about SSA regions, we developed a modified TAM which reflect the actual mobile money infrastructure available as well as the positive and negative factors of the national economic factors of SSA, facilitating conditions of the economic situations of SSA.

The new model enhances our understanding of the factors that could influence the adoption and diffusion of mobile money in the context of SSA. The new model could be applied for empirical study of the adoption of mobile money in the context of SSA and to other developing economies of the world.

The methodology employed in the study to address the research problems as a behaviour using a modified TAM of social factors and perceived behaviour control and facilitating conditions as a theoretical foundation is highly robust. This methodology is important for empirical study into the mobile money adoption and diffusion in the context of SSA and other developing economies of the world. Also, the hypotheses derived from the model provide research opportunities into IS and mobile money adoption and diffusion in the context of SSA. The hypotheses could also be used into IS research and mobile adoption and diffusion in other developing economies of the world.

Specifically, this study makes important contributions to the literature and managerial practice on mobile money for SSA including:

- Demonstrated adequate knowledge and understanding of the forces e.g., socioeconomic, cultural, and political forces inherent to SSA contributing to poor technology including mobile money adoption.

- Built a modified TAM model of social factors and perceived behaviour control and facilitating conditions for understanding the mobile money adoption behaviour which show some factors that may hinder the exposure of SSA regions to mobile money which as a result may lead to the limited adoption of the technology in question.

- Provided adequate knowledge and understanding of factors regarding mobile money to policymakers, SSA regional governments, private investors, and NGOs, donor organisations and consultants to map-out

those forces that managers could have some control over for investment in mobile money projects.

9.1 Implications of Study

An adoption of mobile money in development programming is relatively new in the context of SSA. Up till now, there was no clear sense of what works or what doesn't work and why. Consequently, donor organisations, governments and NGOs should get involved in funding pilot studies that integrate the use of mobile money across business sector programs for the uptake. Governments and donor organisations could increase the uptake of, and use of mobile money by way of payments of salaries, social benefits, conditional cash transfers, pensions, and other disbursements by means of a digital money payment ecosystem. In doing so, they improved transparency, reduced costs and leakages in the financial system and promoted the financial inclusion of non-bank account holders in the mobile money ecosystem (Kola-Oyeneyin et al. 2020; Fang et al. 2014; USAID-Citibank, 2012).

The mobile money stakeholders including stakeholders in the government sectors, banking institutions, telecommunication regulators, central banks, and social security-related entities have important role to play for the success of a mobile money ecosystem in SSA (USAID-Citibank, 2012). For example, there is a need to establish an inter-agency government process to coordinate and strike the right regulatory balance to identify ways through which the governments can actively participate in improving the adoption of mobile money by consumers, SMBs and other small retailers. Stakeholders could ensure that appropriate laws, policies, and practices are designed to administer the ecosystem and to provide equitable opportunities and outcomes for all participants. Because without such coordination and a balanced regulatory system addressing security issues associated with mobile money, private investors will have little confidence to invest in mobile money projects (Hsu et al. 2006; Ondiege, 2010; Kola-Oyeneyin et al. 2020).

The fast-moving consumer goods (FMCG) industries also have a role to play particularly, in encouraging their clienteles to enrol in mobile money services through incentivising their adoptions. The FMCG can make it compulsory for food and household products retailers to adopt the new technology if they are to remain in business. Some insights on how mobile money services enhanced accessibility to purchase products, service customers and reduce service complexities within FMCG marketing activities demonstrate the need for effective policy and implementation for strategic an inclusive electronic platform using a mobile money. Eventually, this improves the cash collection, safety, cost, efficiency, anti-fraud, and working capital liquidity management (USAID-Citibank, 2012).

As the mobile money markets become more competitive as new operators enter the markets, over time, it will become increasingly vital for the stakeholders and practitioners to discuss, regulate, and incentivise the adoption of the infrastructure backbone essential to facilitate interoperability and maintain a functional open mobile money ecosystem for both domestic and international transfers (Ondiege, 2010; USAID-Citibank, 2012; Tankha, 2016). The mobile money ecosystem requires a degree of monopoly, duopoly or even cooperation by stakeholders to facilitate interoperability and to promote the uptake. For instance, the Kenya

Safaricon's near monopoly of the Kenyan telecommunication sector has been due to its sizeable national market share and the enabling regulatory environment. This has been the biggest contributor to the M-Pesa's impressive adoption rate (Gencer, 2011; Diniz et al. 2011).

Traditionally, the unbanked customers do not have the basic financial education and understanding of the financial protections they are afforded due to the mobile money. Thus, any financial education to the unbanked customers should include a broad array of financial services such as credit and savings capability, insurance, payments, stored value, and collections. Also, the government agencies of the regions, NGOs and donor organisations could play leading roles in providing basic financial education needs for understanding how the mobile money wallet works and why mobile money adoption and diffusion make sense for them from financial, economic, social, shopping, and lifestyle perspectives (Kola-oyeneyin et al. 2020; Alhassan & Kouadio, 2019; Gencer, 2011). Moreover, a user-friendly interface designed smartphones and other devices for various market segments including householders, food retailers, SMBs, retailers and religious organisations will go a long way to promote the adoption and diffusion of mobile money among African families, institutions, and religious organisations (Kotler et al. 1998; Tankha, 2016).

Finally, financial investment in key technological infrastructures and primary capital projects including education, youth employment, road system, healthcare systems, telecommunications networks, electricity supplies, and social services for socioeconomic and technological developments for SSA regional markets may go a long way to encourage the uptake of the new technology by many African families and SSA citizenries (Tankha, 2016; Gencer, 2011).

10. LIMITATION OF THE STUDY

There are fewer limitations associated with this study. First, while the methodology and theoretical foundation associated with this study to address the research problem as a behaviour using TAM, perceived behaviour control and social factors are highly robust, future research is needed to test the strengths of the hypotheses associated with the study. Second, there is an ever-present dependent variable issue. Mobile money adoption per se is not necessarily successful use, and it is one of the ecosystem success categories. Future research may therefore include other success measure that refer not only to use, but also e.g., the quality and individual impacts of mobile money in relation to SSA context. Finally, the study is region specific, which is SSA. A future study on mobile money adoption and diffusion might adopt a panel approach with selected at least two regions e.g., Asian markets where mobile money operate on a large scale with SSA.

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