Mobile Payment Applications in Countries with Low Financial Inclusion: A Multi-stakeholder Perspective Review

ABSTRACT

Aims: Mobile payment apps have become the most used mobile payment system,especiallyinunderbankedregions.Ithascomebethemostviablewayofpromotingaccesstoanduseofqualityfinancialservices,ataffordable cost. As far as review works on use/adoption of mobile payment apps in low financial inclusion countries go, presentation has beenfrom users' perspective. Thus, under-emphasizing the challenges of othermembersofthem-paymentappecosystem.Theworkaims at describing such general challengesfrom the lenses of users, regulators and merchants of mobile paymentapps. Also, prosand cons of some specific mobile payment apps in these regions are alsoprovidedinthework.

Place and Duration of Study: The review covered literature covering m-payment adoption in low financial inclusion countries i.e. Asian and African countries, spanning 2015 to 2023.

Methodology: In selecting the literature, we considered only journal publications considering specifically m-payment apps, and written in English. To achieve a measure of spread, major regions in the two continents were considered, and journal articles focusing on a particular country were limited to two.

Conclusion: We observe that the challenges of m-payment apps from users' perspective are mostly denser than other perspectives.Users' and regulators' concerns converge only so thinly.Onlyregulators'taskofenlightenmentofusers/customer of about demonetization policies mirrors one of users' concerns,perceivedtrust.Users and merchants are both concerned withperceivedriskandperceivedeaseofuseconcerns.Thechallengesofregulatorsas regards m-payment apps are quite dissimilar to those of merchants. Inall,the observeddisparate(orthin similarity of)concernsofthe different m-payment app stakeholders strengthens the need for such an inclusive review done in this work.

*Keywords: [*m-paymentappecosystem,financialinclusion,mobilepaymentapp*}*

1. INTRODUCTION

Mobile payment is a payment means that uses smart phone devices that areenabled by media technologies such as quick response (QR) code, near fieldcommunication (NFC), one-time password (OTP) code, SMS, web API, mobile application or USSD, for financialtransactions. Mobile Payments can also be carried out over cell phones withlimited internet access [1]. This makes it a tool for giving financial serviceaccess to

the low-income groups in underdeveloped and developing regions ofthe world [2],[3]. In recent times, the use of applications as technology (i.e. mobile payment applications or m-payment apps) has risen in popularity beyond SMS or USSDin India[4], and in Thailand [5], in terms of volume of transactions, user base and market share. Popularity of some have been because they offer payment support, cashback and rewards [6]. The reasons for this popularity is that a carefully crafted profitable business model has been adopted, driving interest of both users' and merchants', both stakeholders [6]. Implication is that for such competitive advantage secured so far by m-payment apps to be maintained, feedback from stakeholders must be routinely secured.

1.1JustificationfortheReview

China is reported to lead globally in proximity of adoption of mobile paymenthaving 81 percent of their smartphone users make payments using mobile payment appsinthepastsixmonths,whileDenmarkrankssecondwithusagerateof41 percent [7],[8],[9],[10]. To buttress this trend, mobile banking, also known as phonebanking,andfundstransferhaverisingimpactone-commerceactivitiesindevelopingcountrieswhileothermodesofm-paymentlikeATManddebitcardshavedwindlingimpactonine-commerceactivities[11].Thismeansthatalargeportionofmobilepaymenthasbeenviamobilepayment applications(m-paymentapps).Thisiswhythisworkfocusesonwhatthelimitationsandchallengeshasbeenform-paymentapps.Furthermore,thisworkiscenteredoncountriesoflowfinancialinclusion(mostlydeveloping and underdeveloped countries) as they have highest figures of unbanked population, which representsthefinanciallyexcluded[12],[13].Developedcountries/economiesontheother hand are facing saturated markets in terms of financial inclusion [14].According to the 2017 Global Findex Survey, 26 percent of unbanked personsinterviewed stated cost as deterrent to ownership of account, and some otherfraction held distrust in the financial system [15]. This is why financial inclusion is presented multidimensionally to include having access to financialservices, making use of same as well as cost and quality of financial services[16]. Mobile money services are highest in nations with dismal access to formal banking services [17],[18]. In fact, Alipay, an m-payment app in China isused by a greater fraction of the unbanked and underbanked population thanthe banked [19]. In [14], countries identified with highest need for financialinclusion were held as best potential for digital financial services and Fintechgrowth. This is why we review mobile payments applications in low financialinclusioncountries.Operation and development of mobile money, implications, costs and benefitsof mobile money in Africa are presented in [20]. It was established in [21] thatcustomerspreferm-paymentappsoverweb-basedpaymentapps.Also,peopleofyoungerdemographicembracem-paymentappsmorereadilythantheolderagegroups.

Insummary,althoughtherehasbeenquiteanumberofliteraturethathavereviewedchallenges withadoptionofm-paymentapplicationsinlowfinancial inclusion or developing and underdeveloped countries, current situation ofthings has evolved a bit past their discussion emphases. A lot of developingcountriesarenowinthegrowthphase,havinggonepasttheintroductionphasei.e. intention to use, one of the key usage adoption triggers, now means intention to use in the future, continuance intention and intention to recommendmobilepaymentservices[22],[23].Itmeansthatfactorscontrollingintentiontouse , which have previously been discussed mainly as user-centric, now represent the challenges with m-payment apps in such regions only partially. Otherperspectives of these challenges are needed to complete the situation. Thisideaagreeswithrecommendationin[24]thatthereispaucityofliteraturethat capture the factors directing the decision to use m-payment apps fromother viewpoints other than that of users/customers, e.g. that of

government/regulatorsandbusinessesprovidingthisservice.Foremphasis,Patetal [25] proved how pivotal contextual factors (like demonetization policy, crashing cost of internet) can be in promoting adoption of m-payment technology. Such contextual factors are user-centred.Thisiswhythekeycontributionofthisworkisthediscussionoftheoutlookof m-payment apps in regions of low financial inclusion from users', regulators'andmerchants'perspectives, particularly challenges.

1.2 Review Methodology

Reviewed was a total of 30 works on adoption of m-payment apps in areas of low financial inclusion, which were mainly countries in Asia and Africa. The period under review was 2015 to 2023. As shown in Table 1, breakdown of the 30 works include 17 works studying challenges with adoption in Asia; and 13 works for Africa. In searching for literature, varied combination of the following keywords/phrases were used: "adoption", "intention to use", "m-payment apps", "mobile payment applications", "users", "merchants", "government", "regulators" and country names in Asia and Africa. In selecting the literature, we considered only journal publications, excluding conference papers and book chapters. As further inclusion criteria,only literature considering specifically m-payment apps were part of the study; publications that focused just on the more generic theme of m-payment systems were excluded. Also excluded were publications not written in English. To achieve a measure of spread, major regions in the two continents were considered, and journal articlesfocusing on a particular country were limited to two.

Thewriteupisorganizedasfollows:theoverviewofexistingm-paymentappsandlimitationsofexistingm-paymentinsection 3; and their general challenges from the lenses of stakeholders or members ofthem-paymentappecosysteminsection4. A summarized look of the challenges is presented in section 5, followed by conclusion in section 6.

Table 1. Reviewed Literature

Citation	Continent	Specific region/country
[1]	Asia	Indonesia
[2]	Asia	China
[5]	Asia	Thailand
[11]	Asia	Pakistan
[17]	Asia	China
[20]	Asia	Indonesia
[25]	Asia	India
[26]	Asia	India
[43]	Asia	Japan
[45]	Asia	North Korea
[47]	Asia	Malaysia
[61]	Asia	South Korea
[64]	Asia	Taiwan
[83]	Asia	Thailand
[89]	Asia	Pakistan
[96]	Asia	Malaysia
[74]	Africa	Cameroon
[118]	Africa	Not specified
[119]	Africa	Mozambique
[120]	Africa	Sub-Saharan Africa
[121]	Africa	Ghana, Kenya, Lesotho, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania and Uganda

[122]	Africa	Not specified
[123]	Africa	South Africa
[124]	Africa	South Africa
[128]	Africa	Nigeria
[129]	Africa	Ghana
[130]	Africa	Ethiopia
[131]	Africa	Morocco
[132]	Africa	Egypt

3. OVERVIEW OF MOBILE PAYMENT APPLICATIONS IN REGIONS OF LOW FINANCIAL INCLUSION

Discussion on existingmobile payment applications (m-payment apps) will be presented as they concern regions of low financial inclusion. M-payment apps selected for discussionwereonespredominantlyusedintheidentifiedregions/countriesbasedondomina nce and volume of transactions. Financial inclusion or financial inclusivenessis the mechanism/process that facilitates easy access or reach, availability, andutilization of a range of appropriate financial services, such as credit, savings,payment/payment platforms, and products for risk management, for all members of an economy [26], [27]. The utilization here is widely known as adoptionin the area of m-payment systems. In the course of retrieval of publishedmaterials for this work, it was observed that most works tilt toward adoptionconcerns. These concerns were predominantly about same set of countries/regions - Asia, Africa and very little on South America (which is why we excluded South America from our study).What is common to these regions is lack of financial inclusion. Financialinclusionper [26] and [27], are based on access to a number of financial services. This workfocuses on m-payment apps because in recent times it has been a major tool inachieving financial inclusion. Access to all forms of financial services have beenmade easier with use of m-payment apps. With them, users open and operatebank accounts without ever needing to visit the bank offering the service. InNigeria, for instance, a country of low financial inclusion, with your Bank VerificationNumber(BVN),youcanopenandoperateabankaccountwithoutanyface-to-faceinteractionwiththebank.Inreviewingtheapps,attentionwas on identifying generic and peculiar issues users of m-payment applicationsarecurrentlyfacedwithintheseregions.Theseissueswereextractedfromuserrev iews got from verified websites like www.capterra.com, google play storeandjournals.Them-paymentappreviewsaresummarizedinTable2.

Table2.SummaryofReviewofExistingM-paymentApps

Country	M-payment App	Pros	Cons
China	Alipay	Alipay has the QR code feature which works without NFC. Allows top up and and phone plans.	Non convenient for non-Chinese nationals [39]
China	WePay	It offers smart retailing technology [40]	
India	Paytm	Multifunctional payment app, used by majority to pay for products and services.	Layout of the app is not really convenient to some customers.
Indonesia	OVO Wallet	Most used in the Indonesian market. OVO e-wallet is easy to use, has a simple design and	Not many users find it easy to use.

		many features that can be used to upgrade the app [41].	
Japan	PayPay	Most popular in Japan [42]. Quick, easy and very operational in sending and receiving money [43].	It has limited number of locations [42].
South Korea	Kakaopay	Most used mobile payment app in South Korea. Kakaopay is easy to use payment operations is because of its ease of use and simplicity 44],[38]. Kakaopay provides joint services support with Alipay to service 450 million Chinese and Korean m-payment consumers [45].	Generation of receipts for QR payment operations is problematic and takes a long time to complete [44].
Taiwan	LINEpay	Most used m-payment app in Taiwan (58%). [46]. LINEPay is a multifunctional application.	It is used only in Taiwan.
Malaysia	GrabPay	Most used in Malaysia with 13.3 million users	Foreign nationals in Malaysia still have issues accessing features in the app [47].
Thailand	TrueMoney	Most used m-payment app in Thailand. It has multiple layers of advance security and has 24/7 real-time monitoring [48].	It has limits on daily transactions and tourist have issues with the demands of certain documents not owned by non-citizens [49].
Vietnam	VTC Pay	VTC Pay's e-wallet has more than 3 million consumers and a million transactions recorded daily [50].	VTC Pay is limited by language versions [51].
Philippines	DragonPay	Most used in the Philippines [52]. Dragonpay platform is secured. It is Compatible with Mastercard and VISA cards; and digital banks in the Philippines. Can readily be integrated to e-commerce websites.	Slow performance of the app. Slow Customer service. Less than desirable user interface [53].
Zimbabwe	EcoCash	With Ecocash, users can deposit, withdraw and transfer money, pay various bills [54]. Controls 99.8% of the mobile money market in Zimbabwe [55].	Users are restricted to sending a maximum of ZW $10,000 per transaction. Users can not also exceed ZW $280,000 per month [56].
Liberia	VeriCash	Seeking to empower financial inclusion in emerging markets.	Mobile payment in Liberia is largely limited by lack of basic infrastructure, (including VeriCash [57].
Nigeria	FairMoney	Smooth sign up process. Illustrative user interface [58]. No transactional charges. Easy access to loans.	Rigorous login procedure. Privacy concerns where user is required to grant Fairmoney access to his contact list [58].
Columbia	DaviPlata, Movii	DaviPlata and Movii is currently used in Columbia with a record of about 33% us-age and 3 million user respectively.	Poor user support system. App tends to crash often. Users complain of repeated failed registration and login attempts.

3.1 China

AlloverAsiancountries,thereisstronggrowthindigitalpaymentadoption.China has emerged as the true mobile nation and a strong contender for largestcontributortotheprojectedfigure[28].Accordingtothereport,in2015,more purchases were made through mobile phones than computers by Chineseconsumers. In 2016, 66 percent of digital purchases that equates to 450.3 billiondollarsinmobile-basedpurchaseswereexecutedthroughmobiledevices.M-paymentusersinChinaseemmoresubjecttosocialinfluencethanU.S.A.,for instance. WeChat pay and Alipay have become the primary and influentialmethodofpaymentinChina,eveninruralareas[29]-avastmajority(92percent)ofChinesemobileinternetusers(92percent)choosingm-paymentapplications[28], [30].Alipaylauncheditsfirstmobilewalletin2008while WeChat came on board in 2013 and these two platforms have built two-thirdsof a million formidable merchant networks [31],[32]. Of a market of over 1240million active users in 2022. Wechat records 1305 million users [33]. Other m-payment apps like Union Mobile Pay, JD Bank Mobile Wallet and 1qianbaodivideonly7percentofthemarketshare[34].75.8percentofrespondentsinstudyin[35]useAlipayforhotelreservations.Wechatisamultipurposeapp with currently about 1 million active users monthly [36]. It has certainfunctionsincluding:messagingservices, sharingofphotos/videosandoffersfreevideo and voice call. Wechat is a good application with technical support andefficientfeedbackmechanism.However,someoftheissuesexistswithWechatapp which can be summarized as follows: large storage capacity, cumbersomeauthentication, verification and security, compatibility with various operatingsystemsandProblemswithupgradingingeneral.

3.2 India and South East Asia

Indiaishomeofthehighestecommerceconsumerrategrowthintheworld[37]. The big appetite of Indians for cross border shopping has largely influencedtheir use of mobile payment with over 82 percent in-app transactions equatingto about $16.8 billion mobile commerce market value. The mobile paymentapplicationlargelyusedinIndiaincludePaytm,GooglePay,AmazonPay,MobiKwik, etc.

Indonesiahadthemobilecommercemarketshareof$7.1billionasof2020,OVO wallet and Go-Pay wallet are the leading mobile payment platforms with69percentand62percentusagerespectively[37].Debitcardsisstillthesecondmost used payment method in Indonesia, however, Mobile payment is steadilytakingthelead.

In Malaysia, The use of Touch N Go, PayPal, and GrabPay are all emerging.Similarly in Singapore, mobile payment platforms like FavePay, Google Pay,ApplePay,SamsungPayandPayPalarealsoemerging.

In Thailand, TrueMoney is the leading payment method, other mobile payment platforms like PromptPay and Rabbit LINE Pay are emerging and themobilecommercemarketsizeasof2020is$13.6billion.

3.3 Other regions in Asia

InJapan,asof2020,creditcardwasstilltheleadingpaymentmethodinJapan, they had 70.6 percent mobile wallet penetration that same year and anexpectedmobilewalletpenetrationof98.6in2025.Themostpopularpaymentewallets in Japan are PayPay and Rakuten Pay [37][28]. However, they haveabout$36.6billionmobilecommercemarketsize.

In South Korea KakaoPay and SamsungPay, are now the preferred paymentmethod with 35 percent of their population currently using the platforms andmobile commerce market size of 2.8 billion dollars. However, credit card is stillthe most preferred method of payment in Taiwan, seconded by pay-on-pickup,only10.4percentengagetheuseofLINEPayforpayment.

3.4 Africa

Mobile payment is also being embraced in African countries; 84percent of mobile payment users in Kenya, 60 percent in Nigeria, 21 percent inSouthAfricaand9percentinMorrocco.InNigeria,themostpopulousnationin Africa, the race has been between bank apps and fintech apps. Nigerians areembracing the fintech apps in numbers, evident by the number of downloads.No bank app in Nigeria has grossed the number of downloads as either ofFairmoney and Opay fintech apps. Fairmoney stands out primarily for easyaccesstoloanthatitoffersusers.

4. CHALLENGES

As shown in the previous section, concerns with m-payment apps may seempurelyusercentric.However,toreallyachievefinancialinclusionwithm-payment as a tool, we may need to look at the broader picture. Which is, thatthere are other players involved, not just the users. Stakeholders of mobilepayment platforms include user, commercial banks, payment gateway, developer,regulators(thegovernmentinsomecasesandregulatorybanks)[58],[59]and intermediaries [60]. It is presented in [61] as a triadic ecosystem involvingconsumers,onlinevendorsandregulators.Capturedinsimilarwords,usageor customer loyalty in mobile telecommunications as a whole has long beendeemed an outcome of triadic interactions of users, companies/vendors andgovernment [62][63]. There are interdependent activities carried out amongstakeholders in the mobile payment ecosystem; stakeholders like the government,communicationtechnology andbanking[64].DennehyandSammon [65] put the stakeholders to be financial institutions, mobile network operators (MNO's), integration partners, merchants, consumers and regulators. Thestakeholders can also be visualized from three platforms [66]: Sponsor level(Mobile device makers, payment terminal makers, software company, MNOs,credit card companies and banks); Platform level (Mobile payment platform);and User level (Consumers and merchants). In aggregating all these positionsonthestakeholdersinvolvedinm-paymentapps,weconsider users/customers,regulators/ government and merchants in our discussionof challenges withm-paymentapps.

4.1 Challenges from Users' perspective

Adoption of payments using mobile devices often demand the user/customer'swillingnesstolearn[67].Thispositivelyandsignificantlyaffectsperceivedsecurityandperceivedtrust[59].Thisperceivedsecurityandperceivedtrustinturn influence

users' perceived usefulness (PU) which has highest significanceonbehaviourintentionorintentiontouse[29].Ubiquityisaddedtothatlistby[68]asa statisticallysignificantpositivecontributortoperceptionofease. of use, perception of usefulness and the intention to perennial usage of mobilepayment service like electronic wallets. Issues with m-payment from users'viewpoint can be either ones impacting directly or indirectly user adoption.In [69] most influential direct effect on m-payment adoption is consumer innovativeness, perceived convenience and perceived behavior. On the other end,perceivedpleasurewithsubjectivenormswasfoundtopossesanindirecteffecton the adoption of m-payment with convenience as mediation [128]. The survival ofm-payment systems is majorly influenced by user satisfaction, effort and performance expectancy [70], and how compatible the technical features are withtask demands [71]. Quite a number of literature exist that have evaluated useradoption of m-payment according to some theories: unified theory of acceptance and use of technology (UTUAT) model, the information systems success(ISS)andtask-technologyfit(TTF)model.ISScapturessystemquality,informationquality,thequalityofs erviceandusersatisfaction.Twitteranalytics of popular hashtags and @ occurrence of 'digital payments' establishedfactors which propel user satisfaction to include: usefulness, responsiveness,responsiveness,informationprivacy,credibilityandtangibility[72].TTFc on-siders task characteristics, technology characteristics and task-technology fit.UTAUT involves social influence, intention to use, performance expectancy,effort expectancy and facilitating conditions. Consequently, we discuss usercentricchallengesasfollows:

4.1.1 Internet Experience (IE)

Mobilepaymenthasbecomeaneasywaytocarryoutfinancialtransactions because of widening popularity of mobile devices and the coming-of-ageof associated technologies [73],[130]. Users' familiarity with use of computers andthe internet for financial activities greatly impacts their intention to use m-payment apps. Technology Acceptance Model and Innovation Diffusion Theorywerecombinedin[73]todiscoveringthatinternetexperienceandtheadoptionof mobile payment apps have a relationship, but with perceived usefulness,privacy concern, compatibility, risk, and perceived ease of use as mediatingeffect.

4.1.2 Socio-economic Factors (SF)

In Cameroon, for instance, a developing country in West Africa, socio-economicfactors like standard of living, level of education, age and mobile phone owner-shipcontrastinglyaffectboththeadoptionanduseofmobilemoneyservicesinCameroon[74].Expa ndingvarietyoffinancialservicesandfinancialeducationwereproposedaswayforward.Peoplemo readvancedinagetendtoapproachm-paymentappwithcaution,whilepeopleofyoungerdemographictendtoreadilyembraceitastheydot echnologygenerally.

4.1.3 Perceived Trust (PT)

Thediscussionofchallengeswithmobilepaymentplatformsisprincipallycouched in the concept of trust. In fact, the definition of trust in the domain ofmobilepaymentpresentedin[29]completelycapturesthemainperspectivesofsecurity viz confidentiality, authentication, integrity and non-repudiation. Thisexplains why trust is

dubbed an essential matter in m-payment and that cultivatingtrustinthethird-partyplatformhasbecomecriticalinthecontinuityofm-paymentservices[75].

Perceived trust is the user's willingness to be vulnerable [76]. People in thiscategory may have no prior experience with the Internet and only a rudimentary understanding of how it operates. Therefore, m-payment app are a bigstep into the unknown, mainly when no one can guide them or explain thedetails [77]. In [78], trust is one of the four user-centered constructs observedto have significant positive impact on m-payment adoption intention in India,but its impact is indirect [79]. Related but not specific to mobile, trust weighedamong top four factors driving adoption of cashless payment in Malaysia [80].A survey done in Australia found perceived information quality, perceived system quality [81], and perceived service quality to be instigators of initial trust[82].

Connection between intention to use and actual adoption of m-payment appcan be aided by brand equity, quality of service, public policy, service innovativeness and switching costs [64],[121]. This shows two things: that intention touse is not necessarily same as actual usage, and that it is the business ecosystem that impacts the transition of intention to behaviour. Though it is theusers/customers that actually make the demand for m-payment apps, it isactuallythevalue-addedservicesavailableonm-paymentplatformsthatdrive userdemandform-paymentplatforms.Thisiswhym-paymentappadoptionincreaseswheneverthereisimprovementineffectivenessandefficiencyofservicesonm-paymentapps[1].

InaBangkokstudy,results showed that perceived risk impacts negativelyon intention of millennials to use m-payment for mobile shopping [83]. Asmediation test reveals, attitude mediates the connection between perceivedtime risk and intention to use m-payment. To put this in context, perceived risknegatively affects perceived trust by millennials in online marketing platforms[84]. Perceived ease of use is another mediation between perceived time riskand intention to use m-payment [68]. It is therefore pertinent that businesspractitioners design simpler systems under the most bearable transaction timetoengenderproductiveattitudetowardsm-payment[83],[131].

4.1.4 Perceived Risk (PR)

Perceived risk can be divided into perceived financial risk and perceivedinformation risk [85], as well as perceived performance risk [43]. Perceivedfinancial risk is defined as users' beliefs, judgements, behaviors and feelings ofthe risk characteristics of an m-payment app [86]. Perceived performance riskisthedegreetowhichauserconsidersanm-paymentappperformingcontraryto what he needs. Perceived performance risk or performance expectancy, m-payment app implies the extent to which a user believes that available on themobile payment system will facilitate their performance of financial tasks andenhance their overall performance [87]. The online survey of 295 respondentsin [85] revealed that perceived risk as a whole has a positive impact on bothuse intention and perceived usefulness. Perceived risk is also a concern forsome specific uses of mobile payment. Also, findings in [67] indicate that wideradoption of mobile in-store payments is hampered by perceived security andprivacyrisks,aswellasperceivedrisksofrelianceonamobilephoneand lackofperceivedrelativeadvantagetootherpaymentoptions.Thefindings in [43] indicated performance risks imply safe, secured, reliable, and fast mobilepayment environment to low, medium and high intention users, valued aheadoffinancialrisk[43].

4.1.5 Intention to Use (IU)

Results of the study in [23] indicated that ease of use, relative advantage,visibilityandperceivedsecuritypositivelyinfluencetheindividual'sintentionto use m-payment services. Intention to use in the future, intention to recommend mobile payment services or continuance intention, can be viewed aspost-adoptionmetamorphosisofintentiontouse.Thelatercanbeseenasthe mirror perspective of continuance intention. Using the push-pull-mooringframework, critical antecedents of switching intention of m-payment platformusers in Taiwan were investigated in [88]. The most pivotal push effect makingm-payment platform users to switch is user regret brought on by dissatisfactionwithsystemquality(mainlysystemstability and visual attractiveness)and information quality. While inertia related to uncertainty cost had mostnegativeassociationwithuserswitchingintention.

4.1.6 Technology and Innovativeness (TI)

Since performance expectancy have significant impact on value, it follows thatfunctionalityoftechnologysignificantlypredictsperceivedvalue[89].Toalarge extent, the experience of users with (and interest in) computers and theinternet influences their propensity to use mobile payment apps [73]. Non-familiarity with technology can dissuade prospective users, however beneficialthe platform may be. To the demographic already used to technology gadgets,innovativenessbecomesafactorinretainingintentiontouse[90].Usersusuallyassociate innovativeness of a mobile payment app with added performance.Innovativeness in the form of promotional activities were found to a strongdriverofuseofm-paymentappsbyyounggeneration[91].

4.1.7 Perceived Ease of Use (PEOU)

Ease of use as the extent to which customer' use of m-payment system (ser-vices) is perceived as easy or effortless [92]. PEOU has been observed to havepositiveandweightyimpactonconsumers'desiretousemobilepayment[85].

4.1.8 Age and Income (A&I)

Age and income affect intention to use m-payment apps with perceived expectation,perceivedcostandperceivedrisk[93],[94];allexceptthelaterpositivelymoderate intention to use. Also, younger adults in better earning homes, withbetter exposure to education and mobile devices more probable to adopt andusemobilepayment[95].Goodincomerepresentsbeingabletoaffordamobiledevice [132]. Age mostly represents interest in technology, and adaptability to it,whichishighlyinfluencedbyperceivedcompatibility.

4.1.9 Perceived Compatibility (PC)

Perceived Compatibility is extent to which a new technology converges withthe lifestyle, principles and needs of the prospective adopter. Perceived compatibilityisoneofthemobile-basedpredictorsofusingm-paymenttechnology,especially in budding digital economy. In a in Malaysia, perceived compatibility was observed to have a strong connection with intention to use themobile payment for mobile network operators' services, with perceived useful-nessandperceivedeaseofuseasmediation[96].Tosupportthismediation,in a Tanzanian

study [97], compatibility was deemed to determine perceivedusefulness of m-payment apps [85]. Following what perceived compatibility isdefined as, adoption of an m-payment app can be fostered if the it addressesan adopter's needs (perceived usefulness or value e.g. quick access and rewardfor loyalty [98]) and/or his ease (perceived ease of use). Both put together rep-resent effort expectancy, which is is the degree of comfort and usability thatusersexperiencewhenusinganm-paymentapp[99],[100],[77].

4.1.10 Social Influence (SI)

Asm-paymentsteadiesinitsgrowthphase,havingprogressedfromtheintroduction phase, consideration of factors influencing adoption other thantechnology becomes pertinent - social, for example [64]. Social influence isdefinedasperformingcertainactionswiththeviewsofothersinmind[101].A significant impact of social influence on behavioral intention was observedin[89],[70]tomakeconsumersmorewillingtoadoptm-paymentiffriendsand family are using this payment method. Same in Bangladesh [102], and inThailand [103]. Awareness of neighbors' use of cashless money transaction hasa substantial positive effect adoption [95]. However, behavioural intention ofMillennials in Indonesia were found to be affected minimally by social influence, as they were more enamored by infrastructure that can help their dailyneeds[70].InBangladesh,socialinfluencewasalsofoundtoaffectintentiontoadopt mobile banking, but with gender as mediation [104]. As further contrast,respondents in sultanate of Oman (in the Middle East) indicated that publicizing review ratings of service providers ease users' reluctance to use mobilepaymentapplication.

4.2 Challenges from Regulator's Perspective

Thisistheviewpointthatcapturespolicy,regulationandstandardization.Financial inclusion or any tool that fosters it requires control, supervision andenforcement of some sort, with legal or judicial backing [105], [106]. Government regulations is one of the contextual variables that affect mobile paymentadoption [25]. Many central banks and other policymakers want to review andpossiblystrengthenregulatoryframeworksformobilemoney,forinstance.Theorthodox method of regulating m-payment apps does not offer sufficient guidance for these policymakers. Reason being that normally payment systemsoperate through banks, which work under tested prudent regulation [107]. Sowhen a payment protocol can thrive without banks, for instance the fintechm-payment apps, as presented in [108], they pose challenges to such existingregulatory frameworks. In some cases, the existing regulatory frameworks areill-equippedtohandlesuchchallenges,especiallysecuritychallenges[108].

WiththeexpansionofFintechmobilepaymentplatformhascomerisks.Xiaet al [109] posit that the impact of those risks can be reduced by helping mobilepaymentappsunderstandregulatorypoliciesandreduceplatforms'operationalrisks,withoutimpedingusersfromunderstandingtherisksofmobilepayments. From global experience so far, regulators should adopt a functionalapproachtoregulatingm-paymentsinsteadofanestablishedorinstitutionalapproach[110], [118].Thereisneedforgovernmentstoscaleuptheirreformandupgrade the regulatory framework to make room for development of paymentsystems[111].Apartfromaforementionedrolesofregulators,wehaveothers:

4.2.1 Enlightenment on Demonetization Policy (EDP)

Users need to be informed not just of the roll out of demonetization policiesbut also of the all-encompassing benefits. Otherwise, users of financial servicesare likely to swing with whatever conspiracy theories they can mutter, extending the distrust they have in some aspect of the system to demonetizationpolicies which m-payment apps are to service. Even when such sentiments arenot an issue, people still need to have government say on m-payment for suchto earn their trust. The study in [112] investigated user's behavior toward m-payment apps in India, pivoted on motivational model and consciousness ofdemonetization policy in place. What was observed was a correlation betweenthe motivation model adopted in the work and consciousness about demonetization policy in m-payment app usage. Specifically, a positive correlationexistsbetweenextrinsicmotivationandpropensitytousem-paymentapps [124];andbetween awareness about cashless policies and behavioral likelihood to use m-paymentapp.ThissupportsthefindingsinaTanzanianstudythatm-payment knowledgepredictsPEOU[97],andPEOUdeterminesm-paymentuseintention[96].Whatisprovenhereisthesignificanceofheighteningconsciousnessofthe no-cashorcashlesspolicyasastimulatingfactorofusers'tendencytouseM-paymentservices.

4.2.2 Managing Effect on the Financial Ecosystem (EFE)

As noted in [113], mobile payments are constantly metamorphosing becausethey can step up access to monetary services, particularly in countries of lowfinancial inclusion. Such transformations can disturb the monetary servicesecosphere, prompting varied response by regulators. These regulatory reactionsmanyatimesimpactmarkedlyonthefortuneofsuchinnovativeservices,inawaythattruncatessuchinnovativeservices.

4.2.3 Interest Groups Effect (IGE)

Pressure groups, public opinions or the media always seek to have a say onpolicies, ranging from lobbying to less ethical methods like blackmail. Policiesregarding m-payment is no exception. Conflicts between interest groups andtheregulatorymeasures/policiesingovernmentcanbetriggeredbyrapidtechnological innovations witnessed over technological innovation. Using Koreanregulatorysandbox,LeeandSeo[114]explainedwhythemechanismofinterestgroups influence inter-ministerial control/regulatory policy negotiations withingovernments. Way out can be approached from some configurations viz: mutualcooperation between government and interest groups, active acceptance fornewpoliciesandpassiveacceptancefornewpolicies.

4.3 Challenges from Merchants' Perspective

The business ecosystem set up determine merchants' adoption decision [115].Although merchants play a important role in the m-payment ecosystem, thereisashortageofcognizanceintomerchantbehavior,andhowtheyinteractwithotherstakeholders/actorsinthem-paymentecosystem[115].Itisnecessarytounderstanddeterminantsofmerchants'choicetousemobilepaymentsinorderto guide the provider companies in modulating their own marketing strategiesto avoid things that may dissuade merchants from the mobile payment market[116].Thestudyin[116]putperceivedriskandperceivedeaseofuseashavingno significant positive impact on merchants' decision to offer mobile

paymentmethod.Ontheotherhand,compatibilitywithcustomers'needsandperceiveduseful ness have positive impact on merchants' acceptance of mobile paymentsystems[129]. When merchant adoption is not triggered, mass use of m-paymentapps or e-wallets remains out of reach [111]. A further look into m-paymentapps from a merchant's point of view shows that decreasing payment process-ing time and fees, enhanced payment security features and convenience aresome of the drivers of merchants' intention to adopt m-payment apps, whilecost of investment, complexity and technological incompatibility are some ofthereasonsdissuadingmerchantsfromdoingso[117].

5. SUMMARY OF THE CHALLENGES

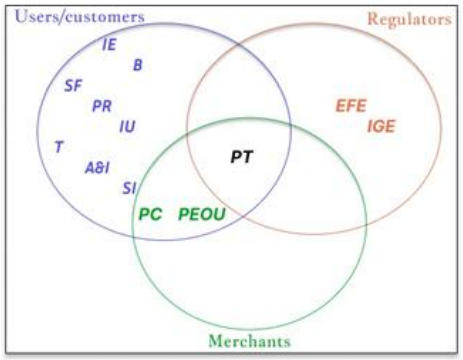

Fig. 1. SummaryofMultipleperspectivechallengeswithm-paymentapps

As shown in Fig. 1, the issues affecting adoption for the different stakeholdersofm-paymentappsareverysimilarforsomestakeholders(e.g.betweenusersandmerchants)and mostlydivergent(orverythinlysimilar)forothers(e.g. between users and regulators; and between merchants and regulators).Adoption concerns for users and merchants are related in the areas of perceived trust (PT), perceived compatibility (PC) and perceived ease of use(PEOU). Other than that, user centric concerns are predominantly different fromthose of merchants. Also observed in the course of our study is that perceivedtrust is the only overlapping concern between the three stakeholders (or members of m-payment app ecosystem) considered. Enlightenment on demonetization policy (EDP) directly maps into perceived trust (PT), because its main objective is to ease users' apprehension, thus promoting perception of trust in m-payment apps.

6. CONCLUSION

The work presents understanding of m-payment app adoption concerns frommultipleperspectivesofusers/customers,regulators/governmentandmerchants. The discoveries in the work have underline this need to consider theperspectives of members of the m-payment apps ecosystem, asides users orcustomers. Interestingly, the challenges of m-payment apps from users' perspective, as myriad as they are, were found to only very marginally overlapwiththoseofregulators.Onlyregulators'taskofenlightenmentofusers/customer of about demonetization policies mirrors one of users' concerns,perceivedtrust.Ontheotherhand,usercentricchallengesareslightlysimilar to what motivates adoption by merchants, except in concerns bothering onperceivedriskandperceivedeaseofuseconcerns.Thechallengesofregulatorsas regards

m-payment apps are quite divergent from those of merchants. It isonlywiththeintroductionofusersasmediationaretheirconcernsconnected. Inall,theimplicationofthisdivergenceorquasi-divergenceofconcernsofthe different m-payment app stakeholders, is that a great deal of actionableinformation for harnessing the potentials of m-payment apps is gained by thismulti-perspectivereview.

Furtherreviewcanbedoneonothermembersofthem-paymentecosystemlike integration partners. Integration partners are seen as technology providersthatactasatrustedintermediarybetweenbanksandMNO'sandmobiledeviceproducers.

CONSENT (WHERE EVER APPLICABLE)

Not applicable

ETHICAL APPROVAL (WHERE EVER APPLICABLE)

Not applicable

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