Digital Financial Inclusion and Market Development in East African Community (EAC) Economies

AERC CREA

Edited by : Dianah Ngui, Abebe Shimeles, Njuguna Ndung'u, David Cracknell and Jonathan Greenacre

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Acknowledgements

Foreword

This volume draws together several papers addressing current issues in financial inclusion and market development in East African Community economies. The papers were written as part of a collaborative research project led by the African Economic Research Consortium through the generous support of the Bill & Melinda Gates Foundation. This collaborative volume is not only of policy relevance, but also timely as the papers study and detail financial inclusion and market development in the East African region that can be used to advance knowledge base and policy drive for sub–Saharan Africa (SSA) economies. The papers also explore how digitization fundamentally changed the nature of how financial services are delivered, with new financial sector actors, the development of digital ecosystems and how they interoperate.

In line with its mandate of strengthening local capacity for conducting independent and rigorous inquiry into problems facing the management of economies in sub-Saharan Africa, AERC, therefore, utilizes its collaborative research model to bring together important research contributions bearing on the question of financial inclusion and market development in East African Community (EAC) economies. These contributions shed light on the rapid evolution and the changing nature of financial services, that has raised significant issues for policy makers to address related to innovation, regulation, competition, privacy, taxation, exclusion, and monetary policy.

The chapters in this volume, written by economic experts in the discipline of financial inclusion and market development, characterize financial market developments as well as electronic payments interoperability for lessons that can guide policy drive. This volume is highly recommended to policy analysts and policy makers, those working in development finance, students, and scholars from all disciplines interested in understanding financial inclusion and market development.

AERC prides itself in undertaking high quality and policy-relevant research on contemporary policy issues affecting Africa's development to better inform policy makers in the continent. Other impactful AERC collaborative projects are *Re-Examining the Growth, Poverty, Inequality and Redistribution Relationships in Africa; Climate change and Economic Development in Africa; Financial Inclusion in Fragile and Post Conflict States*; and *Work and Income for Young Men and Women in Africa: A Political Economy and Social Equity Approach to the Employment Potential of Specific Sectors and Subsectors in African Economies.*

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Prof. Théophile Azomahou
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Abbreviations and Acronyms

AFI	**Alliance for Financial Inclusion**
AFR	**Access to Finance Rwanda**
AMFI-K	**Microfinance Institutions in Kenya**
AML	**Anti-Money Laundering**
API	**Application Programming Interface**
ATM	**Automated Teller Machine**
ATMs	**Automated Teller Machines**
B2C	**Business-to-Customer**
B2G	**Business-to-Government**
BFA	**Bankable Frontiers Associates**
BOP	**Bottom of the Pyramid**
BOT	**Bank of Tanzania**
BoT	**Bank of Tanzania**
BOU	**Bank of Uganda**
BB	**Broadband Backbone**
CAK	**Competition Authority of Kenya**
CBK	**Central Bank of Kenya**
CBR	**Credit Reference Bureau**
CDR	**Call Detail Records**
CDR	**Call Detail Records**
CFT	**Combatting the Finance of Terrorism**
CGAP	**Consultative Group to Assist the Poor**
CGFS	**Committee on the Global Financial System**
CMSA	**Capital Markets and Securities Authority**
COSTEC	**Tanzania Science and Technology Commission**
COVID	**Coronavirus**
COVID-19	**Coronavirus**
CPSS	**Committee on Payment and Settlement Systems**
CRBs	**Credit Reference Bureaus**
DCP	**Digital Credit Providers**
DFS	**Digital Financial Services**
DMA	**Digital Mobile Africa**
DNA	**Deoxyribonucleic acid**
DSE	**Dar es Salaam Stock Exchange**
DSIK	**German Sparkassenstiftung Eastern Africa**
EAC	**East African Community**
EAPS	**East African Payment System**
EFT	**Electronic Fund Transfer**
eGA	**e-Government Agency**
EMV	**Eurocard, MasterCard, Visa**
ESRF	**Economic and Social Research Foundation**
FE	**Financial Education**
FSB	**Financial Stability Board**
FSD	**Financial Sector Deepening**
FSD	**Financial Sector Deepening**

FSDK	**Financial Sector Deepening Kenya**
FSDT	**Financial Sector Deepening Technology**
FSDT	**Financial Sector Deepening Trust**
FSDU	**Financial Sector Deepening Uganda**
G2P	**Government-to-Person**
GDP	**Gross Domestic Product**
GE	**Gender Equality**
GEPF	**Government Employees Provident Fund**
GePG	**Government e-Payment Gateway**
GII	**Gender Inequality Index**
GSMA	**Global System for Mobile Communications Association**
IAD	**Institutional Analysis and Development**
ICT	**Information and Communication Technology**
ID	**Identification**
IMF	**International Monetary Fund**
IPO	**Initial Public Offer**
IPSL	**Integrated Payment Services Limited**
IVR	**Interactive Voice Response**
KBA	**Kenya Banker's Association**
KCB	**Kenya Commercial Bank**
Ksh	**Kenyan Shilling**
KYC	**Know Your Customer**
KYC	**Know Your Customer**
LAPF	**Local Authority Pension Fund**
MFIs	**Microfinance Institutions**
MMO	**Mobile Money Operator**
MMU	**Mobile Money of the Unbanked**
MNO	**Mobile Network Operator**
MSC	**MicroSave Consulting**
MSMEs	**Micro, Small and Medium Enterprises**
MTN	**Mobile Telephone Networks**
MVNO	**Mobile Virtual Network Operator**
NBR	**National Bank of Rwanda**
NFC	**Near Field Communication**
NFIF	**National Financial Inclusion Framework**
NICTBB	**National Information and Communication Technology**
NICTP	**National Information and Communication Technology Policy**
NIDA	**National Identification Authority**
NMB	**National Microfinance Bank**
NSSF	**National Social Security Fund**
OECD	**Organization for Economic Cooperation and Development**
OTC	**Over the Counter**
P2G	**Person-to-Government**
P2P	**Person-to-Person**
PO-RALG	**President's Office Regional Administration and Local Government**

POS	**Point of Sale**
PPF	**Parastal Pension Fund**
PSD	**Payment Services Directive**
PSP	**Payment Service Provider**
PSPF	**Public Service Pension Fund**
PWC	**Price Waterhouse Coopers**
QR	**Quick Response**
RCT	**Random Control Trials**
RTGS	**Real Time Gross Settlement**
RURA	**Rwanda Utilities Regulatory Authority**
Rwf	**Rwandan Franc**
SACCOS	**Savings and Credit Cooperative Societies**
SIM	**Subscriber Identification Module**
SMS	**Short Message Service**
SSA	**Sub-Saharan Africa**
SWIFT	**Society for Worldwide Interbank Financial Telecommunications**
T&C	**Terms and Conditions**
TCB	**Tanzania Commercial Bank**
TCDC	**Tanzania Cooperative Development Commission**
TCRA	**Tanzania Communication Regulatory Authority**
TIPS	**Tanzania Instant Payments System**
TIRA	**Tanzania Insurance Regulatory Authority**
TTCL	**Tanzania Telecommunication Company Ltd**
TZS	**Tanzanian Shilling**
UGsh	**Uganda Shilling**
UNCDF	**United Nations Capital Development Fund**
US	**United States**
US$	**United States Dollar**
Ush	**Uganda Shilling**
USSD	**Unstructured Supplementary Service Data**
VAS	**Value Added Services**
VICOBA	**Village Community Bank**
VSLAs	**Village Savings and Lending Associations**
WEE	**Women Economic Empowerment**

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Digitization and Delivery of Financial Services: New Financial Sector Actors, Digital Ecosystems and Interoperability

David Cracknell, Jonathan Greenacre, Dianah Ngui, Abebe Shimeles and Njuguna Ndung'u

1. Introduction

Beyond Access to Finance

For decades, the principal measure of financial inclusion was access to finance, which over time was reduced to a single, simplistic measure – the number of accounts in formal or semi formal financial institutions — whether banks, credit unions, or microfinance institutions. This simplistic approach, however, measured numbers of accounts, not the usage of those accounts, nor the quality of the services being provided. Nevertheless, whilst there was very limited access to accounts, this shorthand was accepted, with the occasional acknowledgement that some accounts may be dormant, or that some individuals could have multiple accounts, or that borrowers could borrow once and not borrow again.

The Finscope Surveys of African Financial Sector Deepening Programmes recorded the notable progress of 'financial inclusion' throughout the sampled countries from 2006 onwards – driven in part by innovative banks, such as Equity Bank in Kenya, and an expansion in regulated microfinance institutions – which now had access to funding and capital.

From 2007, financial inclusion has been gradually redefined, with the launch and expansion of Safaricom's M-Pesa in Kenya, and mobile money's expansion across East Africa, and beyond. Safaricom's M-Pesa was launched around a strong local value proposition – "Send Money Home" based around person-to-person payments. However, it quickly became clear that many mobile money users were using their mobile money wallets as basic savings accounts.

In financial inclusion circles, it quickly became evident that access itself was multi-dimensional. Access included an easy to open account or mobile wallet that was convenient to operate and affordable. In M-Pesa's case, usability had been carefully assessed during an 18-month pilot test, and the number of agents and customers grew rapidly offering convenience and access. Access to money was no longer tied to a branch or an ATM, but included hundreds of thousands of agents. By 2020, millions of customers were served by agents across East Africa, as shown in the table (**Active mobile money subscribers and agents (mostly 2020)**).

Active mobile money subscribers and agents (mostly 2020)

	Kenya	Uganda	Tanzania	Rwanda
Active subscribers	32.46m	22.52m	23.96m	4.68m
MM agents	264,390	235,790	560,063	131,173
Transactions per active subscriber per month (tpm)	13 tpm	15 tpm	10 tpm	12 tpm

Cracknell (2022), multiple sources

Retail financial institutions in East Africa responded to the launch of mobile money, through offering agent banking services in Kenya from 2010, Rwanda (2012), Tanzania (2013) and in Uganda from 2017. By 2020, financial inclusion measured through banked and other formal non banked, had increased throughout much of Africa, as shown in the following figure (Financial Inclusion Across Africa through Finscope Surveys).

Financial Inclusion Across Africa through Finscope Surveys
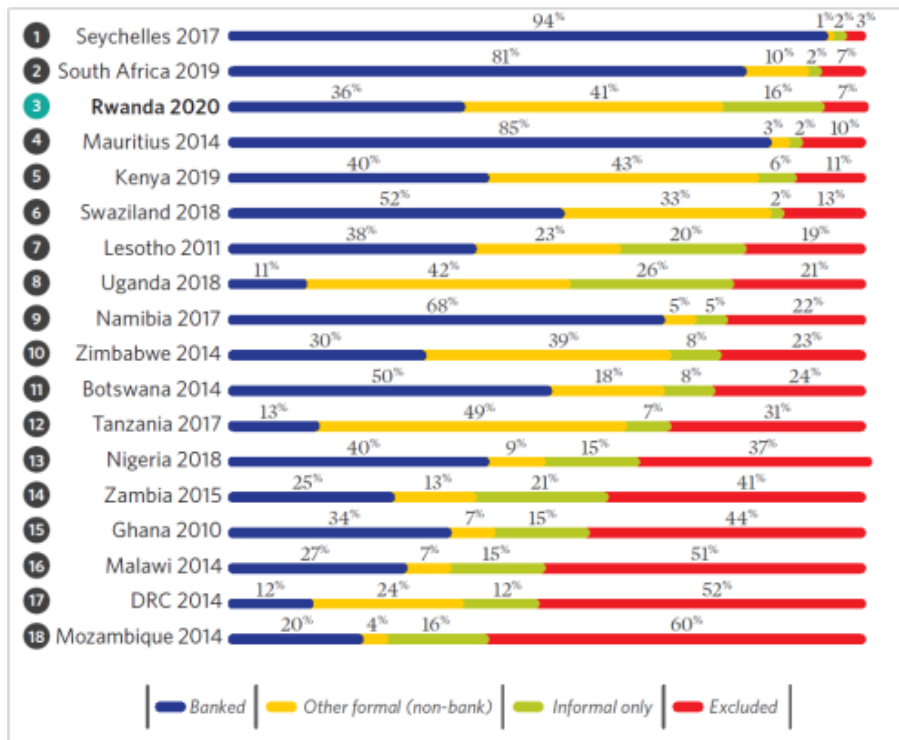
Source: AFR (2021)

As the number of bank and mobile money accounts increased, financial inclusion experts focused beyond the challenge of accessibility and considered the use of financial services; typically dividing financial services into savings, credit, payments, and insurance. FCDOs Finscope Surveys grew in complexity.

The papers in this volume explore how digitization fundamentally changed the nature of delivery of financial services with new financial sector actors, the development of digital ecosystems and how they interoperate. However, rapid evolution and the changing nature of financial services has raised significant issues related to innovation, regulation, competition, privacy, taxation, exclusion, and monetary policy for policy makers to address. Digital finance improved financial access for women, nevertheless, gender gaps in financial access persist. Rural financial access has improved, though it relies upon increasingly informal mechanisms and relationships to deliver financial services in remoter areas.

From channels to use cases

As the number of customers increased — served by a large numbers of agents — attention focused on extending the range of services being offered through the mobile money platforms. Initial launch offerings typically focused on facilitating cash in, and cash out, person-to-person transfers and a small number of key payments, for example to utility providers or to purchase airtime.

The nature of services provided on mobile money, and through bank apps, grew in nature and range, and no longer were always easily or completely captured by traditional categories of savings, credit, insurance, and payments. In some cases, financial services were bundled with other services. Hence the growth of the term "use cases."

Typical early use cases included:

1. *Nano credit:* Small instant loans provided for short periods, typically one to two months, based on data analytics and algorithms, even if heavily weighted towards repayment performance and a positive credit reference. Early providers included Juma, Branch and Tala.

2. *Merchant services:* Payments to retailers through till numbers which were easily accessible, with costs paid by the merchant. Merchant services in turn facilitated a range of additional use cases including, taxi services such as Uber, and e-commerce, such as Jumia.

3. *Foreign exchange:* Receiving and sending funds internationally, for example, Wise.

4. *Betting platforms:* Betting platforms were quickly developed making use of merchant services and apps that enabled customers to place bets on sporting events, for example Betway.

Digital finance ecosystem development is changing how financial services are delivered

This book combines five framework papers and two country case studies under the Bill & Melinda Gates Foundation (BMGF) *Delivering Digital Financial Services for the Poor in the East African Community (DFSP-EAC)* collaborative research project. The five framework papers are "Old verses New Financial Inclusion", by Peter Knaack; "Digital Financial Inclusion, Interoperability and Market Development in East African Countries" by David Cracknell; "Expanding Digital Financial Services in the East African Community with a Gender Lens" by Flora Myamba; "Bridge Contracts in Africa" by Jonathan Greenacre; and "The Monetary Economics of E-Money in East Africa" by David Weil and Isaac Mbiti. The two country case studies are "Financial Technology in Tanzania: Assessment of Growth Drivers" by Deogratius P. Macha and Nangi Massawe; and "Digital Financial Services and Implications of Financial Literacy on Gender and Over-Indebtedness: The Case of Kenya" by Anne Kamau, Roseline Misati, Kethi Ngoka, Maureen Odongo and Maureen Were.

Framework papers

The paper on "The Old and the New Economics of Financial Inclusion" by Peter Knaack considers how digital finance, and the consequent financial technology revolution are changing how financial services are delivered as indicated in the following Figure (**Old versus new financial inclusion**).

Old versus new financial inclusion

Old Financial Inclusion	New Financial Inclusion
Banks and MFI as key actors	BigTech and MNOs as key actors
Labor-intensive	Data-intensive
Financial inclusion vs profits	Financial inclusion as source of profits
Interventionism: use nudges, regulation, subsidies to push banks to reach BOP	Laissez-faire: provide regulatory enablers to allow newcomers to start with BOP
Main concerns: financial literacy, stability	Main concerns: competition, privacy, data governance

Source: Peter Knaack (2022)

Under the old model, interventions required regulation and subsidies to reach the bottom of the pyramid, services were labour intensive, and provided through banks and microfinance programmes. In new financial inclusion, low-cost digital finance offers financial services to as many people as possible, making profits from the volume and nature of the services provided. This brave new world requires a laissez-faire approach from regulators and policy makers to facilitate innovation. This did not mean the absence of regulation, but rather a "test and learn" approach, where appropriate regulation would follow innovation.

The new economics of financial inclusion is supported by a continuously evolving ecosystem. This includes financial institutions, mobile money operators, agents and merchants, financial technology companies, regulators, policy makers, legislators, payment service providers, and technology service providers.

The second paper on "Financial Inclusion, Interoperability and Market Development in East African Countries" by David Cracknell studies interoperability across Kenya, Rwanda, Uganda, and Tanzania. Cracknell takes a broad view of interoperability, noting different levels and states of interoperability in each country. In Kenya, interoperability is mostly provided at platform level through Safaricom's M-Pesa platform, which links into most

financial service providers, merchants, retailers, and fintechs. The paper shows that interoperability is provided at peer group or scheme level, between the MNOs, and between the banks for agent banking in Uganda while in Tanzania, interoperability will be extended through the Bank of Tanzania-led Tanzania Instant Payments System (TIPs). In Rwanda, despite positive policies since 2014, interoperability is only beginning to be introduced. Cracknell shows that interoperability in East Africa has lagged despite strong mobile money development in all markets attributed to multiple factors, including competitive positioning and compliance with the letter of regulations rather than the intention of policy makers. The paper observes that whilst the laissez faire, market-led approach favoured by Peter Knaack (2022) is important to stimulate the development of the mobile money ecosystem, it has not been able to deliver full interoperability in most of East Africa. This means that regulators are increasingly taking a more interventionist approach, led by the Bank of Tanzania with TIPs, and the Central Bank of Kenya which is gradually mandating competitive access to the M-Pesa platform. Cracknell notes key challenges in introducing interoperability which include frequent failure of interoperability by simple mandate, difficulty in moving from scheme to national interoperability, competing revenue models of mobile money operators and financial institutions, and critical unavailability of data for policy makers to evaluate the impact of policies.

The third paper on "Expanding Digital Financial Services in the East African Community with a Gender Lens" by Flora Myamba explores lower levels of access for women and presents recommendations on how access can be increased. Myamba highlights the gender inequality index, noting that gender inequality has many contributing factors including, illiteracy among women, rural poverty, women's ownership of assets, the level of participation in labour markets, a high unpaid care burden, and discriminatory social norms. In considering access to mobile money, inequality in mobile phone access is highlighted with ownership gaps of between 7% in Kenya to 9% in Tanzania, as well as lower rates of internet usage. However, Myamba notes gender gaps in mobile money usage are decreasing.

The paper summaries the constraints to women's digital finance access and presents a series of potential interventions which are targeted at designing solutions for illiteracy, innumeracy, increasing the use cases for low-income account holders, increasing access to mobile phones, financial education, appropriate fees, and gender responsive policies and laws. Myamba notes areas for intervention that could further improve women's access to digital finance include expanding agricultural finance and agri-tech given women's extensive role in agriculture, expanding government-to-person payment programmes through digital finance, and in digitizing savings groups which are predominantly accessed by women. As a caution, the paper observes that investment in consumer protection is required to ensure that vulnerable individuals can safely utilize digital financial services.

The fourth paper on "Bridge Contracts in Africa" by Jonathan Greenacre considers how property rights influence the nature of agency relationships in the delivery of mobile money and applies concepts from engineering economics to agency relationships. Engineering economics involves helping people develop better organizational

arrangements, such as contracts, firms, families, non-governmental organizations, and other types of collective action. The paper claims that peoples' surrounding property rights system impact which tools wealth-maximizing people will use to solve moral hazard problems. The paper analyses organizational adaptation to surroundings by examining which tool(s) from mechanism design people will use to solve moral hazard problems. The paper posits that as property rights are strong, for example in urban areas then less authority is provided to a mobile money agent, but in frontier areas where there are weak property rights then more authority is delegated to agents in terms of how they operate. Greenacre explores this concept by examining the case of mobile money in Mali. The paper identifies "bridge contracts" which Orange Mali, a mobile money firm, uses to respond to weak property rights between urban and frontier communities in Mali. These contracts appear designed to encourage agents in frontier areas to operate as largely self-sufficient networks with little oversight from Orange Mali.

The paper on "The Monetary Economics of E-Money in East Africa" by David Weil and Isaac Mbiti focuses on establishing a range of macroeconomic indicators around e-money. These include establishing the transactions velocity of e-money (the number of times per month that average unit of e-money is transferred among customers); the length of the "e-money loop" (the number of transfer transactions that the average unit of e-money goes through between creation and being extinguished); average customer balances held in e-money accounts; and the outstanding balance of e-float; and the total value of customer-to-customer transfers. The paper notes that velocity in Kenya is established as 2.5-3 transactions per account per month, and the loop length is estimated to be 0.85-0.90, though with a fall during the Covid-19 pandemic. However, velocity of e-money in Tanzania is 1.4, roughly half that of Kenya, declines in the loop length over time from 1.36 in 2013 to 0.75 in 2020, which requires further investigation. The significantly greater penetration of e-money in the Kenyan economy than in Tanzania possibly reflects the level of development of digital financial services in the economy as seen in the following table (E-money macroeconomic indicators).

E-money macroeconomic indicators

	GDP in local currency units (trillions)	E-float held on customer phones (billions)	E-float as a percentage of GDP	Monthly customer-to-customer transactions (billions)	Transactions as percentage of GDP
Kenya	2.76	135.9	4.9	374.1	13.6
Tanzania	155	918.4	0.59	1,118	0.72
Uganda	129	546	0.42		
Rwanda	10.4	67.2	0.64		

Source: Weil and Mbiti (2022)

3. Country case studies

The country case study paper by Deogratius P. Macha and Nangi Massawe titled "Digital Financial Technology in Tanzania: Assessment of Growth Drivers" highlights the importance of the interoperability of transactions, particularly as the ecosystem develops. The authors provide an in-depth overview of the fintech environment in Tanzania, focusing on factors driving and retarding growth. They explore how the growth of financial technology is changing the nature of financial services across markets, how they are accessed and consumed noting that whilst the trends are identifiable, the growth drivers in each market differ. Macha and Massawe identify gaps in the legal framework governing digital instant loans and a need for the protection of nascent fintech innovations. They further note the 'test and learn' institutional set-up is missing, making it challenging to nurture and/or support fintech innovations from the initial stages. Greater coordination is required between stakeholders which could be facilitated through establishing national networks and stakeholder forums. Macha and Massawe indicate taxation policy as a challenge noting the negative impact of the taxation of mobile money transactions on the financial technology sector. Findings show that most fintech innovations in Tanzania are in payments and lending—driven by mobile money providers of which most have integrated with banks and financial institutions to facilitate delivery of banking services. Their study highlights opportunities for scaling up fintech solutions to a broad range of the population.

The study on "Digital Financial Services and Implications of Financial Literacy on Gender and Over-Indebtedness: The Case of Kenya" by Anne Kamau, Roseline Misati, Kethi Ngoka, Maureen Odongo and Maureen Were deepens the focus on gender in digital financial services. Kamau et al examine the relationship between financial literacy and over-indebtedness from a gender perspective, considering the increased usage of digital financial services. The study uses both primary and secondary data sourced from the FinAccess Survey 2021. The results show that although gender gaps in terms of access and usage have declined over time, disparities still exist in terms of utilization of different components of financial products, in financial literacy, and indebtedness. Specifically, the results show that women prefer informal channels of credit services such as chamas (informal investment groups) compared to men whose preference is formal channels. The results further show that both formal education and financial literacy lower the probability of over-indebtedness. The study shows that women are less financially literate than men and for that reason have higher chances of being overindebted than men. Kamau et al note a huge need for financial education.

4. Concluding remarks

The five framework papers and the two country case studies under the Bill & Melinda Gates Foundation (BMGF) *Delivering Digital Financial Services for the Poor in the East African Community (DFSP-EAC)* collaborative research project have tackled several issues relating to the theme of financial inclusion and market development. Collectively the authors in this volume provide a range of conclusions and advice to regulators and policy makers. Whilst the recommendations can be generalized across geographies, the application of recommendations is always specific to the situation in each country.

Drawing lessons from from both the Kenyan and Chinese cases, Knaack notes that financial inclusion requires both careful policy sequencing and a focus on cross-agency cooperation and recommends a two-step policy for a successful financial inclusion, laissez-faire first and rectification later. So, initially removing regulatory obstacles, do not wait for banks to deliver digital self-disruption but lower barriers to entry for digital newcomers. Allow private sector companies to benefit from initial limited competition to stimulate investment. Once a well-functioning digital retail network is established then rectify, introduce interoperability, agent non-exclusivity agreements, and prohibit anti-competitive practices.

From studying the development of financial technology in Tanzania, Macha and Massawe provide policy recommendations, which though specific to Tanzania, have differing levels of relevance throughout the East African region. The growth of financial technology is changing the nature of financial services, how they are accessed and consumed. However, whilst the trends are identifiable, the growth drivers in each market differ. From Cracknell's study of interoperability, the author notes the need to reconcile the agendas of multiple stakeholders to implement interoperability. In achieving greater alignment, the role of regulators and policy makers must change as ecosystems mature. Approaches include establishing national platforms like TIPS in Tanzania, and setting standards and policies for the financial sector, as in the case of the Central Bank of Kenya.

In studying bridge contracts in Africa, Greenacre recommends that regulatory and management mechanisms should be designed to fit around the contextual variables of delivering mobile money in urban and frontier areas, rather than applying a uniform approach, which might otherwise discourage the development of rural ecosystems. Mobile money operators can further develop and design products to support rural communities and agents. Government policies, and transfers can further stimulate the development of rural ecosystems.

Beyond the headline numbers of financial access, attention is increasingly focused on the nature of access and who continues to be excluded. Common reasons for exclusion provided by Finscope Surveys include insufficient income, affordability, lack of identification, with reasons related to poverty increasing in the latest surveys (FSD Kenya 2021). Dimensions of access include gender, and financial access in remote communities. Even as mobile money has reformed how financial services are received, use cases have developed, and digital ecosystems have evolved, access to digital finance is not equal. Myamba concludes her gender framework paper with critical questions aimed at enhancing discussion and policy around gender and digital finance. These critical questions include: 1. What strategies can facilitate affordability and accessibility, including reducing transaction fees and device prices? 2. How can we enhance women's productive livelihoods through digital financial technology? 3. What innovative strategies can improve women's access to, ownership, and control over productive assets and resources. 4. How can we address both country-specific and East African shared barriers, including women's mobile phone use and ownership, and ensure government and other money payments, particularly social cash transfers, are delivered digitally and directly into an account owned and operated by a woman?

Kamau et al provide three recommendations. First, development of customized financial initiatives targeting different customer segments, including women, would be beneficial in minimizing financial literacy gaps and over-indebtedness. Second, the terms and conditions of loans that form an important financial decision-making tool need to be reviewed at industry and regulatory level with an objective of making them simple, readable, concise and user friendly. Thirdly, enhancement of access, usage, and awareness of credit reference bureaus can be an important policy tool for minimizing over-indebtedness.

References

Cracknell, D. 2022. "**Financial Inclusion, Interoperability and Market Development in EAC.**"

2

Financial Inclusion, Interoperability and Market Development in the East African Community

David Cracknell

Abstract

The digital finance revolution in East Africa contributed to a rapid evolution in financial services, and especially in mobile money-based services. Today, the ability of a customer to make end-to-end transactions from one provider to any other is assumed to be critical for continued rapid financial sector development. Interoperability is believed to promote financial inclusion by promoting greater and cheaper access to a wide range of financial services. This paper contributes to questions on the benefits of interoperability from an industry perspective, the anticipated value proposition for customers, and pricing structures. It establishes how interoperability has worked in practice across East Africa. From this perspective, it determines the factors that have influenced the success or lack thereof in interoperability and considers the impact of interoperability on financial inclusion. The paper looks to the future in assessing how financial technology can enhance interoperability. It presents lessons for Sub-Saharan Africa from East African financial inclusion, market development and interoperability. The paper closes with a discussion of what the research findings mean for future interoperability. In the absence of comprehensive data, the paper has relied upon extensive secondary research followed by discussions with 30 primary respondents. Regional and international respondents were drawn from regulators, policy makers, payment specialists, donors, and financial sector specialists. The study notes the impressive results in the value and volume of payments that can be derived from an interoperable platform, citing the evolution of Safaricom's M-Pesa and Equity Bank's digital banking platforms in Kenya. However, the findings question the assumed benefits of scheme interoperability, noting the limited interoperability achieved to date across East Africa, partly resulting from the commercial and competitive positions taken by industry participants. The position of regulators and policy makers is evolving as pressure to implement nationally

interoperable platforms increases and the definition of interoperability evolves to include data and payment interoperability. Financial technology, in particular shared platforms, banking as a service, and cloud-based solutions can enhance interoperability, but policy needs to evolve to support these advances.

Keywords: *Payment interoperability, digital interoperability, fintech ecosystem, digital finance ecosystem, payment regulation, financial inclusion, financial sector development, East African financial system.*

1. Financial inclusion in East Africa[1]

A generally-accepted definition of financial inclusion is that "individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way" (World Bank, 2018).

Until recently, a greater focus has been on the volume and type of financial access. This has been expressed in financial access surveys as the operation of an account in either a regulated financial institution ("banked"), through mobile money, or a non-regulated institution ("informal non-banked"), or through informal mechanisms (typically savings groups, or table banking). The data in the figure below is from the Finscope Rwanda survey in 2020 (AFR, 2020; 2021).

Financial inclusion in selected African countries
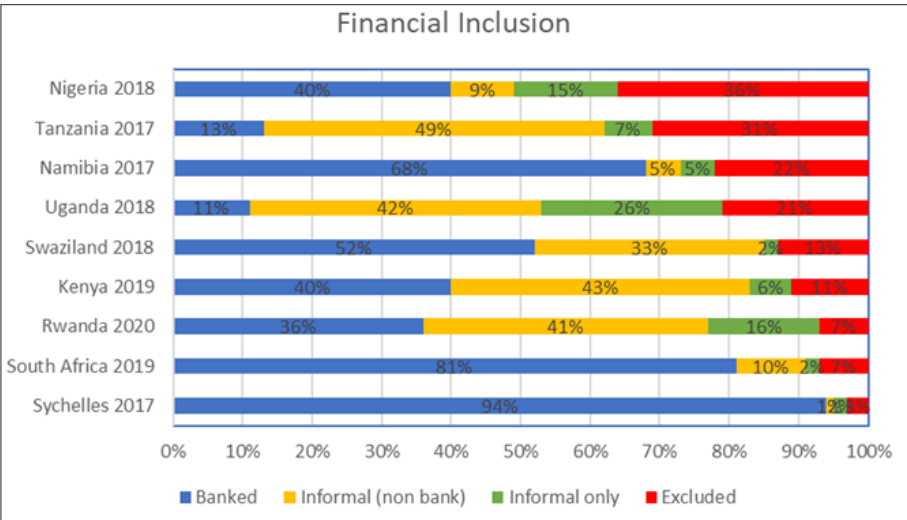
Source: Finscope data

The data shows high levels of financial access through formal channels: Kenya 83% in 2019, Rwanda 77% in 2020, Tanzania 62% in 2017, and Uganda 53% in 2018. Each of the financial inclusion studies notes the rapid growth of financial inclusion and the contribution of

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1   In most cases, opinions have been expressed by more than one respondent.

mobile money to financial access. As rates of financial access have increased, there is an increasing focus beyond access to financial services to defining and measuring financial inclusion. For example, the Global Partnership for Financial Inclusion states that "financial inclusion is measured in three dimensions: (i) access to financial services; (ii) usage of financial services; and (iii) the quality of the products and the service delivery", (G20, undated). Therefore, in considering the mobile money and digital finance revolution, there must be greater understanding of how consumers are benefiting and how the ecosystem is evolving to provide the quality services that people want to use.

The ability to move funds, from one account in the financial system to any other, whether in a wallet (a virtual account) or a bank account, is seen as a critical component in the evolution to cash-lite economies. The goal is to facilitate real time micro-transfers that are secure, conform to Know Your Customer / Anti Money Laundering / Combatting the Financing of Terrorism (KYC/AML/CFT)[2] norms, and are performed at a low cost. This is interoperability.

What is interoperability?

Interoperability is defined by the global payment standard-setting body, the Committee on Payment and Settlement Systems (CPSS), as "a set of arrangements, procedures and standards that allow participants in different payment schemes to conduct and settle payments across systems while continuing to operate also in their own respective systems" (National Bank of Rwanda, 2014).

Digital interoperability
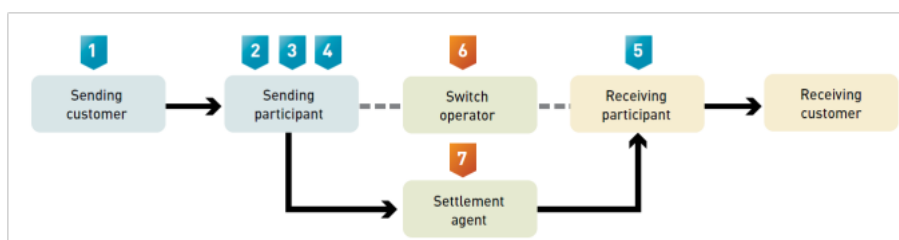
Source: Cook et al (2021)

NB: Describing the process of digital interoperability pictured above: 1: A sending customer initiates a transaction; 2: The transaction is authorized when the customer confirms his/her identity; 3: The customer and account issuer authorize the transfer of funds; 4: The funds are debited from the customer; 5: The funds are credited to the recipient; 6: Payment information is transmitted by the switch; and 7: Settlement agent transfers funds between participants.

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2   "KYC/AML/CFT" refers to Know Your Customer, Anti Money Laundering and Combatting the Financing of Terrorism rules that underpin the worldwide financial system.

Therefore, in the interoperable transaction, we have the customer, the customer's institution, the agent or third party accepting the transaction, a process of clearing funds, a process of settling funds, a third-party institution, and the recipient.

Consumers, however, have many ways to perform transactions across payment platforms. For consumers, how a transaction is completed matters less than cost, convenience, speed, and the security of the transaction being completed. This duality is recognized by Bankable Frontiers Associates (BFA) in their research on the success of Tanzania's mobile money interoperability, (BFA and CGAP, 2018) and by the Central Bank of Kenya in their "Payment Systems Vision and Strategy 2021-25", (CBK, 2021). It is a duality that also runs through this paper.

Why so much focus on interoperability?

As early as 2012, CGAP were focused on the projected benefits of interoperability. This organization stated "[a] robust environment of interoperability in payments systems benefits all participants in the payments ecosystem. End-users, including consumers, merchants, governments, and other types of enterprises, find it easier to make and accept payments" (CGAP, 2012).

The mantra has only become stronger with the digital finance revolution, though the messaging has become more nuanced with a greater focus on how interoperability is designed and implemented, guided no doubt by increased experience in implementing payment platforms (Nègre and Cook, 2021). A newer rationale has emerged for interoperability. This relates to the importance of interoperability for the developing digital ecosystems. This is the basis for open banking enshrined in the Open Banking Initiative in the UK, and the European Union's Payment Service Directive - PSD2 (European Commission, undated). It is increasingly reflected in regional policy (CBK, 2021). This paper will examine the perceived versus realized benefits of interoperability in East Africa.

Options for interoperability

There are many ways that individuals can perform interoperable transactions. Nautiyal et al (2020) defines seven options for interoperability, with increasing levels of formality. These are cash indirect (sending cash through a relative or driver), cash direct, multi sim, voucher, over the counter, bank transfer or directly through a mobile money platform. The study notes that for the consumer, factors that matter in deciding how to make a transaction include affordability, convenience, speed, avoidance of physical contact and security of funds. Each of these is said to have advantages and disadvantages, with the ideal solution said to be direct interoperability between the platforms of mobile money providers and other financial institutions. At the level of providers, interoperability also differs depending on how the solution is structured. The connections can be bilateral or hub, settlement can be prefunded or clearing based, governance can be full control or reduced control, the business model can be either based around processing fees, interchange fees or client surcharge, and dispute resolution can be consensus or arbitration (Nautiyal et al, 2020).

Each of these options for consumers and providers has implications for the consumers, for providers, for the ecosystem, and for regulators and for policy makers. These implications will be explored in this paper.

Research questions

This paper will examine research questions through primary and secondary research. The research questions being addressed include:

1. What are the benefits that industry experts anticipate from the best-case interoperability?

2. What are the expected customer value propositions for interoperability?

3. What are the price structures to the consumer and costs to the participating institution – how does this compare with alternatives?

4. How has interoperability worked in practice across East Africa? Have industry benefits and customer value propositions been realized?

5. What are the factors that have influenced the success or lack of, of interoperability in East Africa?

6. What is the potential impact of interoperability on financial inclusion?

7. Can financial technology address some of the issues identified?

8. What can SSA economies learn from the East African Community (EAC) financial inclusion, market development and interoperability?

9. What do the research findings mean for future interoperability?

Primary research has been through individual interviews with industry respondents based mainly in the EAC region, drawn from digital finance, financial technology and payment industries, regulators, and policy makers. In most cases, respondents are identified by position, not name. This was done to encourage frank responses from the respondents. However, most opinions expressed in this paper have been provided by multiple respondents.

2. The evolution of payment services in East Africa

While there is a renewed focus on interoperability to facilitate digital financial services and financial technology, interoperable payment services have a long history. At the level of the financial system, this includes a wide range of services and supporting infrastructure; for example, Automated Teller Machines (ATMs), debit cards and credit cards, electronic funds transfers, Swift[3] and Real Time Gross Settlement (RTGS) systems. The advent of mobile money and financial technology has added the ability to settle real time micro payments, and to provide additional interoperable use cases based around international and regional money transfers, merchant services, and shared agent initiatives.

Of particular interest from the perspective of ecosystem development is interoperability designed to facilitate transfers between mobile money providers (wallet-to-wallet), and between mobile money providers and financial institutions, the so called bank-to-wallet, and wallet-to-bank.

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3   Transactions through the Society for Worldwide Interbank Financial Telecommunications.

Data from East African central banks and communications authorities show the impact of mobile money, with millions of active mobile money subscribers each conducting between 10 and 15 transactions per month.

Mobile money statistics (December 2020 unless otherwise specified)

	Kenya	Uganda	Tanzania[6]	Rwanda
Active subscribers (millions)	32.46	22.52	23.96	4.68
MM agents	264,390	235,790	560,063	131,173
Transactions per active subscriber per month (tpm)	13 tpm (Safaricom, 2021)	15 tpm (Uganda Communications Commission (2021)	10 tpm (Bank of Tanzania (2019)	12 tpm (National Bank of Rwanda (2021)

Sources: Communications Authority of Kenya, Uganda Communications Commission,

Traditional payment systems: The payment landscape across East Africa includes network of ATMs that are interoperable at country level. Not every ATM is on the national network. International interoperability is offered on some bank ATMs, those offering EuroCard, MasterCard and Visa (EMV)[5] interconnectivity. Regional banks offer ATM transactions through their regional networks. National clearing houses facilitate bank-to-bank electronic fund transfers and real time gross settlement. Merchant services are provided based around cards, and Point of Sale (POS) devices.

Mobile Money Operator interoperability: is often mandated by regulators in East Africa. Interoperability between Mobile Money Operators (MMOs) and banks, both push and pull transactions[6] is currently based on bilateral agreements and connections.

Systemwide interoperability: The intention of policy makers across the region is for systemwide interoperability, which facilitates end-to-end micro transactions. In Tanzania, this is the Tanzania Instant Payments System (TIPS), and in Rwanda through the Rwanda Digital Payment System. Kenya has implemented a new RTGS payment system that will handle up to one million transactions per day.

Payment landscape across East Africa

Prior to the advent of mobile money in East Africa, starting with the launch of M-Pesa in 2007, payment systems evolved gradually, and mirrored those operating in Western countries with ATMs and EMV-based card solutions. International transfers were handled

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4   Calculated from Bank of Tanzania statistics November 2019, available on https://bit. ly/3m9wWGB, accessed on 28th September 2021.

5   "EMV" is an industry shorthand for connectivity to the card associations – specifically, EuroCard, MasterCard, Visa.

6   A push transaction is where the payer initiates the transaction, a pull transaction is where the payee initiates the transaction.

through established international settlement mechanisms such as Swift. With the advent of mobile money and the digital banking revolution, the financial system is in a state of perpetual change. Change includes the diversification of the ecosystem to include mobile money operators, an array of third-party aggregators, and financial technology providers. Payment solutions, once the preserve of national clearing houses, are now being provided on a bilateral basis through payment service providers. The following table describes the payment landscape in East Africa.

The payment landscape across East Africa

	Kenya	**Uganda**	**Tanzania**	**Rwanda**
Interoperable ATMs	Kenswitch, SACCO-link	Interswitch	Umoja	R Switch
Interopera-bility	Mandated (USSD)	Mandated	Mandated	Mandated (2014)
Wallet-Bank-Wallet	Bi-lateral	Bi-lateral	Bi-lateral	Bi-lateral
Bank-Bank	PesaLink, EFT, RTGS, SACCO Link	EFT, RTGS	EFT, RTGS	EFT, RTGS
Merchants	Bank and MMO	Bank and MMO	Bank and MMO	Bank and MMO
APIs[9]	M-Pesa, Airtel 5 Banks	MTN, Airtel 0 Banks	Vodacom, Airtel 0 Banks	MTN, Airtel 0 Banks
Cross border mobile money	Bank, Money Transfer, Bi-lateral MMO and fintech solutions	Bank, Money Transfer, Bi-lateral MMO and fintech solutions	Bank, Money Transfer, Bi-lateral MNO and fintech solutions	Bank, Money Transfer, Bi-lateral MMO and fintech solutions
Cross border ATM	EMV, regional bank	EMV, regional bank	EMV, regional bank	EMV, regional bank
Shared Agents	Small schemes, non-exclusivity	BAU shared agents Non-exclusivity	Non-exclusivity	Non-exclusivity

Sources: Author's observations
API: Application Programming Interface. EMV: EuroCard, MasterCard, Visa. EFT: Electronic funds transfer. MMO: Mobile Money Operator. RTGS: Real Time Gross Settlement. USSD: Unstructured Supplementary Service Data

Interoperable channel usage

Most customers access services through their own financial institution or their mobile money provider's infrastructure. The following table provides an indication of the extent to which interoperable channels are used.

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7   Based on available literature and website reviews.

Usage of interoperable channels

	Kenya	Uganda	Tanzania	Rwanda
Interoperable ATM	Used moderately	Used infrequently	Used infrequently	Used infrequently
Wallet-Wallet	Poor take up	Poor take up	Extensively used 30% of transactions	No interoperability
Wallet-Bank	Extensive M-Pesa and partial Airtel	Relatively extensive MTN, partial Airtel.	Bi-lateral	Bi-lateral
Bank-Bank	PesaLink operating but at relatively low volume	EFT, RTGS	EFT, RTGS	EFT, RTGS
Platform	M-Pesa ecosystem. Eazzy24/7 BaaS (SACCOs)[10]	n/a	n/a	AMIR/AFR BaaS MFI platform (AFR, 2020)
# Debit Cards	10,844,565 (12/20)	n/a	9,145,240 (8/18)	471,898 (12/20)
POS devices	48,012 (12/20)	n/a	24,147 (12/18)	4,335
Merchant services	Higher usage	n/a	Growing usage	Limited use
Cross border mobile money	Bank, Money Transfer, Bi-lateral MNO and fintech solutions	Bank, money transfer, bi-lateral MNO and fintech solutions	Bank, Money Transfer, Bi-lateral MNO and fintech solutions	Bank, Money Transfer, Bi-lateral MNO and fintech solutions
Cross border ATM	EMV, regional bank	EMV, regional bank	EMV, regional bank	EMV, regional bank
Shared agents	Non-exclusivity not working at Safaricom agents	Some MNO agents operate for multiple providers Moderate use, but 'on us' systems primarily used	n/a	n/a

Source: Author's observations, and central bank websites

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8   As at the time of writing, SASRA is planning to introduce banking as a service platform for Kenyan SACCOs.

The GSMA on Mobile Money Interoperability

The GSMA State of the Industry Report 2020 (GSMA, 2021) provides an overview of the development of the global mobile money industry. Fund flows through mobile money providers are explored by GMSA. The GSMA graphic below shows incoming value of US$ 25 billion, outgoing transactions of US$ 22 billion, and a growing ecosystem with US$ 23 billion circulating in the system through Person to Person (P2P) transactions, and a growing base of merchant payments.

Worldwide mobile money flows, December 2020
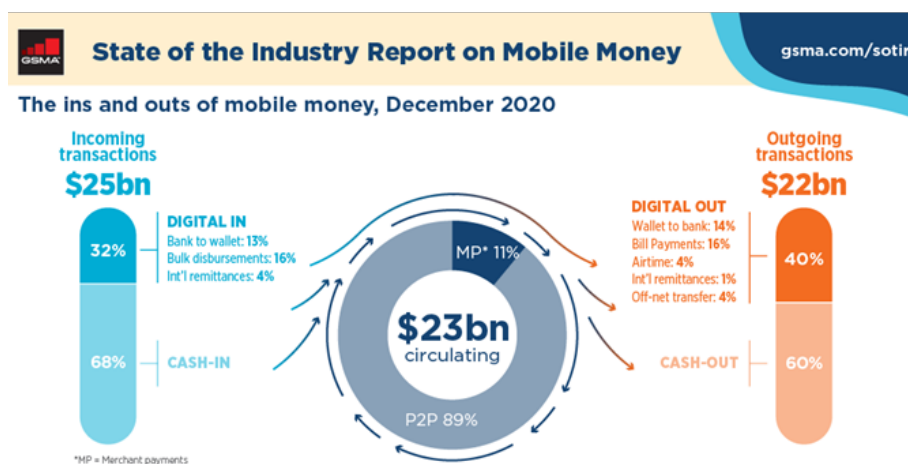
Source GMSA (2021), State of the Industry Report 2021 (graphic used with permission)

The ecosystem is of particular interest, given circulating digital value drives interoperable transactions. Transactions between mobile money and bank accounts represent 13% of value in and 14% of value out. Interoperability between mobile money and banks has increased from US$ 15 billion to US$ 68 billion from 2015 to 2020. Given that over US$ 2 billion is transacted through Mobile Money Operators (MMOs) worldwide daily, a considerable value remains within the ecosystem circulating between persons and merchant payments.

Interoperability between mobile money and banks
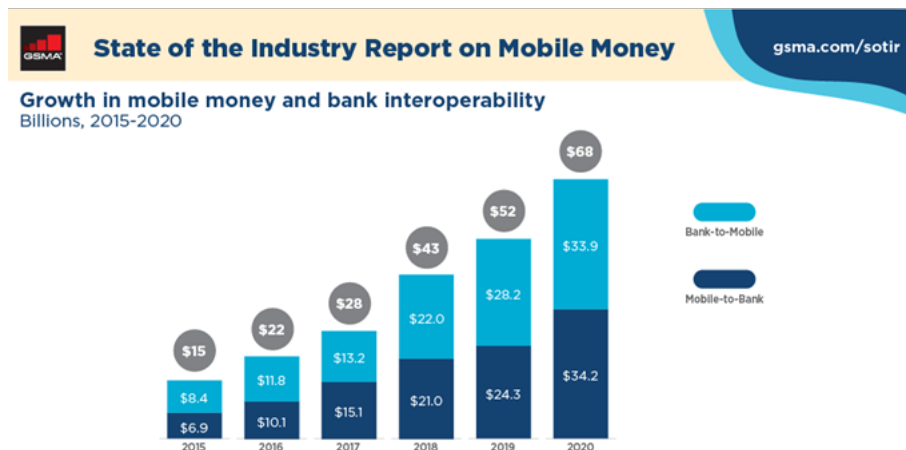
Source GMSA (2021), State of the Industry Report 2021 (graphic used with permission)

Intra-mobile money transactions are not separately identified in the GSMA report; these will be significant but are captured under person-to-person transactions.

Data on interoperability in East Africa

Data on interoperability is limited. GSMA provided some data directly from mobile money operators in East Africa. The data is aggregated at regional level and is provided quarterly from 2015 to 2020. The following two figures consider the value and volume of mobile money to bank transactions (P2P-M2B), bank to mobile money transactions (P2P-B2M), and mobile money to mobile money transactions (P2P offnet)[9] in East Africa.

Given the level of aggregation, only high-level interpretation is possible. However, the following can be surmised. There is a growing importance of bank to mobile transactions as banked customers refill their mobile wallets from their bank accounts. Transactions in the first half of 2020 are different, particularly in the value of wallet to bank transactions. The reason for this trend is unclear, but it is likely to reflect mobile money usage for retail transactions during the early stages of the COVID-19 pandemic. In this case, retailers accept mobile money payments, which are accumulated and sent to the bank periodically. This accounts for a spike in the value of wallet-bank transactions and a more modest increase

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9   "Off-net" refers to the mobile money network, not the Global System of Mobile Communications (GSM) network. An "off-net" recipient may be on the provider's GSM network but is either not formally registered on the mobile money network or may be a customer of a different mobile money scheme (GSMA – 2013 Global Mobile Money Adoption Survey).

in the number of wallet-bank transactions. There is limited mobile money interoperability in Uganda, Kenya, and Rwanda (as discussed in the country profiles), which implies the off-net transactions are largely reflective of mobile-mobile transfers in Tanzania.

MMO interoperable transactions in East Africa in US$ millions
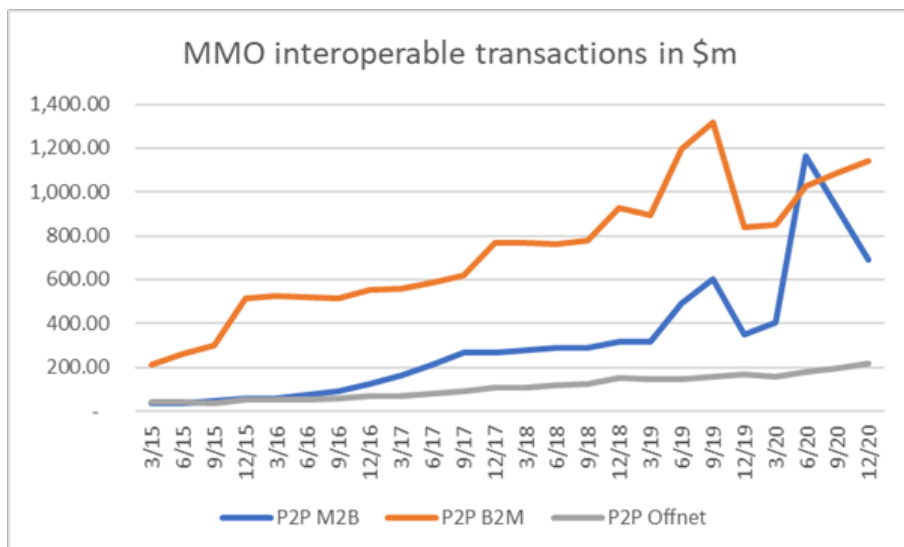
Source: GSMA

MMO interoperable transactions in East Africa (volume)
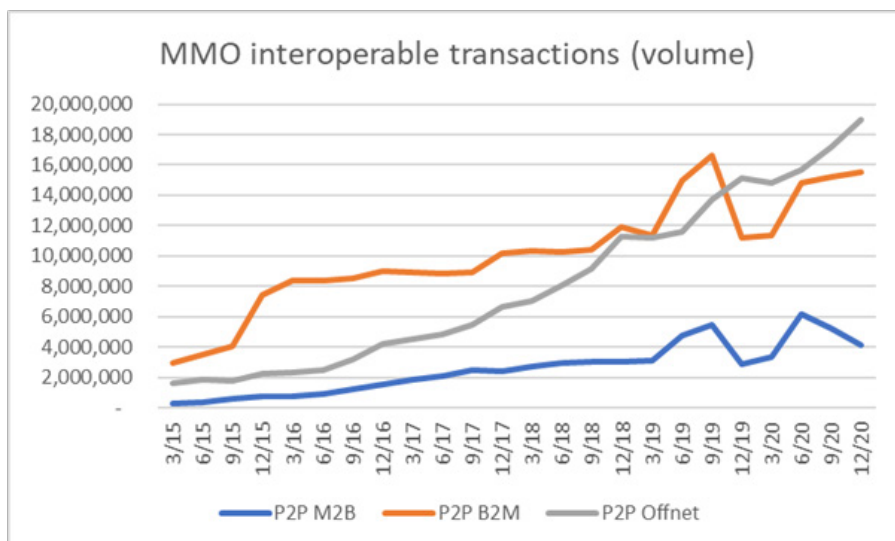
Source: GSMA (2020)

According to GSMA, there were an average of 27 banks connected to MNOs during the period 2015-2020. Safaricom, which connects to most Kenyan banks, will account for majority of these inter-connections, though the actual data was not provided.

Q1. What are the benefits that industry experts anticipate from best-case interoperability?

The conventional view is that for customers, interoperable digital payments offer customers' funds, in real time, on systems that are continuously available, which are channel agnostic, which support transactions, which are often low value and high volume (Benson and Loftesness, 2013) state:

> "A robust environment of interoperability in payments systems benefits all participants in the payments ecosystem. End users, including consumers, merchants, governments, and other types of enterprises, find it easier to make and accept payments" (CGAP, 2013).

The Bank of Tanzania (BoT) reinforces this perspective. It regards the "potential benefits offered by interoperability of financial services including ease of payment, fast, cost effective and secure means of payments" (BoT, 2021).[10]

Similarly, a lack of interoperability is seen as a problem. The Kenya's National Payment Vision and Strategy states the "lack of interoperability between different stores of value means that businesses require multiple devices for multiple channels" and "[a]s with businesses, the government is affected by the lack of interoperability between stores of value," and "closed loop payment systems and bilateral agreements between PSPs creates a lack of transparency (CBK, 2021).

Advocates of interoperability in East Africa point to the increased volumes of transactions resulting from interoperable platforms, usually quoting the example of Tanzania's mobile money interoperability, where over 30% of transactions take place between different mobile money operators. However, interoperability supports an increasing range of transactions which includes:

a) Person -to-person transfers across networks (wallet-to-wallet transfers);

b) Remittances between financial service providers, fintech firms and MMOs;

c) Bank-to-wallet and wallet-to-mobile transactions, which in turn fund merchant transactions; and

d) Electronic commercial transactions requiring payments across platforms.

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10   Bank of Tanzania - BoT (2021) webpage - https://www.bot.go.tz/PaymentSystem/ Initiatives, accessed on 24th September 2021.

Interoperability is often considered in terms of payments. However, interoperability of data is becoming increasingly important. This underpins the value addition of the India Stack (India Stack, 2021) and the working of interfaces between institutions through switches and Application Programming Interfaces (APIs).

However, the case studies to follow demonstrate how interoperability is achieved is important in stimulating competition, developing new products and services, or "use cases", and supporting equitable access to the payment system. The case studies and respondent comments highlight that "best case" interoperability is extremely difficult to achieve in practice.

Q2. Projected value propositions from interoperability

Value propositions focus on customers. In 2017, William Cook put forward three hypotheses for the value of interoperability for consumers (Cook, 2017). These were:

Hypothesis 1: Interoperability encourages existing customers to transact more

In best case examples, this appears to be the case. BFA and CGAP (2018) carried out research on mobile money interoperability in Tanzania. From a survey of 1,024 telephone interviews, they found that over 838 customers had used mobile money interoperability during the last year. They noted that where interoperability works well, users find it fast, convenient, cheap, private and that it avoids problems with agents related to the availability of float.

They noted that scheme interoperability does not eliminate alternative forms of interoperability. They found that over-the-counter transactions through agents were still common, 327 surveyed customers had used alternative forms of interoperability in the past 12 months. In aggregate, BFA found that interoperable P2P transactions had grown from 5% of volume and value of transactions since Vodacom joined in 2016 to 28% of all transactions by volume and 26% of all transactions by value.

Hypothesis 2: Interoperability promotes new ways for users to transact

This appears to be the case. Interoperability is at the heart of certain products and services. In particular, the ability of customers to top up e-float from bank accounts greatly facilitates merchant services and encourages e-commerce more generally. Agent interoperability has enabled agents to efficiently manage their float. The promotion of digital finance during COVID-19 has seen a significant increase in small businesses signing up to receive payments through mobile money merchant platforms.

Hypothesis 3: Interoperability expands access to digital financial services

It is easy to see that "Absent interoperability, customers create workarounds to transact that often are difficult and costly. Examples are maintaining accounts with several providers, using an agent to intermediate, and reverting to cash" (Cook et al, 2021). However, it is more difficult to see how much interoperability drives access (BFA, 2021).

Q3. What are the price structures to the consumer and costs to the participating institution – how does this compare with alternatives?

Pricing of financial services is both an art and a science (Cracknell and Messan, 2006), representing the requirement to balance the interests of different stakeholders, cover costs, and generate profits. Customers want lower fees and instant transfer of funds. Mobile money operators and fintechs achieve profits by maximizing transaction income and maintaining low costs. Scheme managers and switch operators need revenue to cover their costs and provide profits.

Payment participants are keen to reinforce the perception that prices are fairly determined:

> *"The prices, according to banks interviewed, are set individually largely based on costs incurred in the transactions, third party costs, recovering investments made in setting up the systems while others will factor in convenience fees. Convenience fees factor in what one would have otherwise paid to physically walk into a bank to make a withdrawal or use an Automated Teller Machine".* MobileMoney Africa (2021)

Fees to scheme participants include switch fees (typically support fees, connectivity fees, onboarding fees and transaction fees) and scheme fees (typically legal fees and transaction fees). In addition, interparty fees can be set which seek to compensate parties for their existing or future investments in infrastructure.

However, the pricing picture is usually complex. The CBK (2021) highlights a lack of transparency in market-based payment systems:

> *"The benefits of digitisation of payments are yet to be fully passed on to customers. Prices and tariffs of some payment services are high in relative terms, while others are too complex to be understood by the average consumer. Further, where institutions utilise payments rails, services are availed to end-consumers with multiple charges. The inability to put in place effective and easy-to-access mechanisms to address price related complaints, particularly on digital channels, has undermined trust".*

There are multiple motivations for pricing financial services. Cook et al (2021) note that participants may be motivated to cover costs, recover lost revenue, or to strategically protect their network. Llewellyn and Drake (2000) note how pricing financial services influences consumer behaviour.

Pricing is used strategically. In 2014 "Equity Bank doubled service charges for over-the-counter withdrawals in a bid to decongest banking halls and direct customers to alternative channels such as ATMs and mobile banking" (Business Daily, 2014). In Uganda, MTN and Airtel appeared to set premium prices for cashing out across networks, perhaps to encourage customer loyalty. However, off-net transactions were valued by customers,

and pricing of cash out across MMO providers in Uganda was perceived by customers as very expensive (Friends Consult, 2017), a factor that directly contributed to the use of agent-assisted transactions, bypassing direct interoperability.

In a similar vein, Richard Mutabazi, posted on Twitter:

> *"@MTNRwanda, and Banks you are not helping the @RwandaGov agenda of cashless economy by charging clients push and pull fees that are way higher than withdrawing from ATM or Momo Agents. This needs to be resolved"* MobileMoneyAfrica (2021).

Pricing is made more complex through taxation. Uganda in July 2018 and more recently Tanzania in September 2021 implemented mobile money taxes. In Uganda 0.5% tax was charged on amounts withdrawn and in Tanzania taxes between Tsh 7 and Tsh 7,000 are charged depending on the amount transferred or withdrawn. Depending on how the taxes are applied, they have been shown through qualitative studies to influence consumer behaviour. For example, in Uganda, the tax encouraged a shift in transactions towards agent banking (UNCDF, 2021). In particular, the study noted that taxation was regressive, having a disproportionate impact on customers who did not have a choice in their transaction mechanism.

At the same time, as pricing is being used as a strategic tool to influence customer behaviour, it is also culturally and market-specific. Arguably, the transition of Equity Bank in 2002 from monthly fees to transaction-based fees (Wright and Cracknell, 2007), helped to acclimatize the Kenyan market to fee-based payment services. Similarly in Rwanda, many accounts are offering free services, making it more challenging to introduce fee for service products.

The market-based, strategic reality of pricing, and the challenges it represents, is recognized by regulators:

> *"The CBK is determined, working with the industry, to change this reality and ensure that benefits of digitization translate to affordable, transparent, and customer-centric payment services. The main initiative will be the gradual rollout of pricing principles that were introduced by the CBK in December 2020 across the payment's ecosystem."* (CBK, 2021)

A further factor in pricing may be the nature of the institutions themselves. The GMSA notes in its State of the Industry Report (GSMA, 2021), that MMOs over-rely on customer fees.

> *"In the medium to long term, revenue models must diversify to become more resilient. As the mobile money industry matures, revenue sources should also evolve and expand. In June 2020, respondents to the Global Adoption Survey reported that, on average 87 per cent of their revenues were generated by customer fees. A downside of heavy reliance on customer fees is greater exposure to future short-term shocks."*

Commercial banks, however, generate income from investments, in their loan portfolio and on their transactions. Their strategic reality, and therefore their pricing motivations, are different from those of MMOs, which are highly sensitive to changes in transaction pricing.

A final factor in pricing is the need to encourage remote access and financial inclusion, specifically in the provision of rural financial services. Rural financial services are considered much more expensive to provide and generate fewer returns than urban financial services, and there are significant challenges in liquidity management (Cracknell, 2021). Agent interoperability, both at the transaction and float level, are part of the solution, as offered in Uganda through the shared agents initiative of the Agent Banking Company (ABC).[11] However, an element of cross-subsidy may be required.

Q4. *How has interoperability worked in practice across East Africa ? Have industry benefits and customer value propositions been realized?*

Interoperability in East Africa has a varied history, influenced by the attitude of policy makers and regulators and the nature of competitive markets in each country. In a 2015 study, Anderson et al (2015) considered the attitudes of policy makers and regulators to interoperability and the supporting infrastructure for interoperability across the sampled countries. This analysis has been updated for East Africa.

The following table shows the regulatory attitude towards interoperability. Policy makers generally encourage, interoperability. All regional regulators have objectives in their national payment strategies to promote interoperability. Uganda's policy mandates that mobile money operators must be able to interoperate. In Rwanda, a draft 2021 law proposes a new provision that allows the Central Bank to impose interoperability — a set of arrangements, procedures and standards that allow participants in different payment schemes to conduct and settle payments across systems.[12]

Regulatory attitude towards interoperability

Country	Interopera- bility is mandated	Technical capacity for interoperability is mandated or MNOs must have a plan to interoperate	Interopera- bility is encouraged or permitted	Interopera- bility is not regulated
Kenya			X	
Rwanda			X	
Tanzania			X	X
Uganda		X	X	

Source: Author's observations

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11   See Agent Banking Company's website (2021) "About Us" available on https://bit. ly/3FhG9W3, accessed on 4th October 2021.

12   All Africa Blog Rwanda: "New Law Seeks to Enable Payment Interoperability", available on https://bit.ly/2YfErDs, accessed on 5th October 2021.

The next table shows infrastructure for interoperability. There is mobile money account to account interoperability in all markets except Rwanda. There are government-led switches pending in Rwanda and Tanzania.

Infrastructure for interoperability

Country	MM Account to Account (A2A) interoperability	Government led National Switch or RTGS connect to process mobile money	Non-Government Third Party Providers (platforms or agents that provide interoperable mobile money services)	Other
Kenya	X			PesaLink
Rwanda		Pending		
Tanzania	X	Pending	X	
Uganda	X			

Source: Author's observations

The following country case studies contain lessons for interoperability in Sub-Saharan Africa. Each has a covering theme which highlights potential lessons, but as will be seen, both failure and success are highly contextual.

a)   Tanzania: A model for MMO interoperability

b)   Kenya: Institution-led platform level interoperability

c)   Rwanda: An active state role for interoperability

d)   Uganda: Unintended consequences of MMO interoperability, and shared agents' successes.

The country case studies follow a similar format, taking information which is available from secondary sources, and then discussions with key respondents. To encourage participation, frank discussion and objectivity, respondents are normally not named directly, but are identified by type of respondent.

Tanzania – a model for MMO interoperability?

The Tanzanian case illustrates how interoperability between mobile network operators can have benefits for consumers and for providers. However, it notes the specific circumstances that made this 'model' case possible.

In 2014, Tanzania became the first country to launch mobile money interoperability. It is often given as the most successful example of interoperability in East Africa (Cook, 2018), with many advantages accruing to customers (BFA and CGAP, 2018).

MMO interoperability in Tanzania
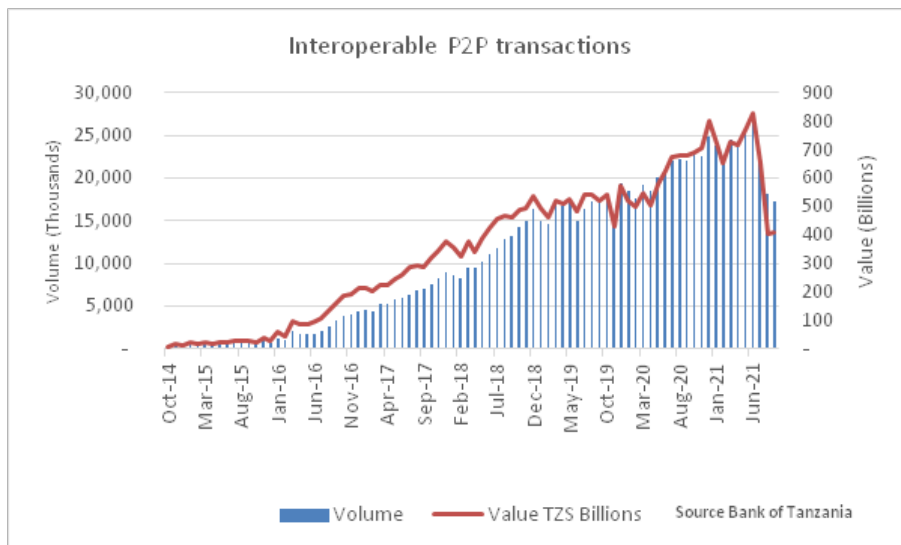
Cook and the BFA note that interoperable transactions account for approximately 30% of all P2P mobile money transactions. In addition, 60% of customers transact across networks. However, in an Alliance for Financial Inclusion (AFI) blog, Komba (Komba, 2016) notes that "Tanzania was well-suited to a market-based approach to interoperability, with its supportive central bank, conducive regulatory framework, and a sufficient level of market competition and maturity." Specifically, Komba noted consideration of the value proposition of the private sector, and the public policy imperative of financial stability and financial inclusion in building the solution.

Komba's comments need to be understood in the competitive context of mobile network operators in Tanzania, and from the perspective of Tanzanian demographics. First, is market share; unlike in Kenya where Safaricom has a dominant market share of around 70% of voice traffic (Communications Authority, 2022). Voice market share is much more evenly distributed in Tanzania, with the three largest providers relatively evenly matched: Airtel with 26.8%, Vodacom 30%, and Tigo 25.6% (Tanzania Communications Regulatory Authority, 2021). Secondly, multi-sim usage is common. Historically, this was encouraged by patchy network coverage across Tanzania. A more recent study by Walwa (2019) notes significant multi-sim holding in Tanzania, encouraged by multi-sim handsets. He notes that multi-sim holding provides an incentive for MNOs to "improve network quality, promotional activity and customer care in order to win the customers' share of spend."

It is important to acknowledge the process of establishing interoperability. It involved the mediation of the Bank of Tanzania (BoT), facilitated by the IFC in an industry-led interoperability project with financial support from the Bill & Melinda Gates Foundation

and FSD-Tanzania (IFC, 2018).[13] The exercise began in September 2013 through meetings to create an understanding of the regulatory framework, market demand, payment systems and rule development. Wallet-to-wallet operating rules were developed, with interoperability commencing from February 2016.

The IFC study produced a lengthy list of learning points, which included: allow the industry to define the rules, have an industry champion, have a neutral broker, ensure everyone is speaking the same language, have a strong in-country manager, have a plan, and do not expect to achieve everything at once.

What next for interoperability in Tanzania?

The BoT is developing the Tanzania Instant Payments System (TIPS) (BoT, 2021). The BoT envisages the system will enable the Government, individuals, and businesses to transact with each other regardless of provider.

> *"TIPS will facilitate instant payments, easy connections by multiple participating institutions and low-cost payments. It will also provide a single national switch that will facilitate BoT oversight supervision of payment systems, improve financial inclusion through usage of electronic payments platforms and promote cash-lite economy." (BoT, 2020)"*

Golder Kamuzora from PWC Tanzania (Kamuzora, 2021) writes, "If successful, [TIPS] might be a gamechanger within the Tanzanian financial services industry, reducing transaction costs for consumers and potentially connecting millions of new customers with the banking system... Moreover, any instant payment or money transfer solution introduced to replace legacy solutions should be robust, adaptable, scalable, and extensible to keep up with upcoming technologies... In addition to being compliant to existing payment standards, these new solutions should also introduce new, open standards that will allow developers to innovate on top of the solution… the underlying infrastructure should include monitoring and logging features that can be used to detect and mitigate fraud, money laundering and other liquidity risks."

While Kamuzora (2021) is generally positive about TIPS, respondents from the industry and from the BoT note design issues that still need to be resolved:

Governance: During the pilot test, TIPS is being managed by the BoT. However, some participants would prefer to have TIPS run by an independent body. There are concerns that if TIPS remains housed within the BoT, it will lack the flexibility to provide wide ranging solutions through the platform.

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13   IFC, "Achieving Interoperability in Mobile Financial Services", Tanzania Case Study, IFC available on https://bit.ly/3CX0Pke, accessed on 28th September 2021.

Regulatory participation: Views on regulatory participation differ significantly, reflecting the complexity of interoperability in practice. Respondents from the BoT suggested that an assertive regulator had been important in bringing the industry together to participate in TIPS, and that banks and MMOs must be able to accept incoming transfers. Prior to an assertive regulator, there was a preference for peer-to-peer connections. Other respondents feel equally strongly that the market should determine how participants interoperate and not the regulator, for example:

> *"There are gaps in the market, and transfers can be challenging, but the regulator should be pushing the industry to reorganise itself; in the current plan, bringing innovation will be difficult. If the industry cannot come to agreement, then the Central Bank should provide guidance rather than intervene directly."*

Sustainability: In peer, or association-developed platforms, funding for development is often an issue. Respondents from the BoT were confident that resources would be allocated as required for platform development. They noted that it is intended to further develop the system to facilitate government payments and to link into the national identity database. Against this assertion of readily available funding is a history of extensive donor investment in Tanzanian interoperability.

Participation: The platform as currently envisaged is intended to only onboard regulated financial institutions and the MMOs. There is no provision for direct connection to TIPS for either financial technology companies or MFIs. They will need to be onboarded through a participant in the platform.

Innovation: One respondent noted that the role of different actors was often unclear in centralized platforms. The roles noted included leadership, driving product development and innovation and ensuring effective competition. This required more than a technology solution; it needed to carefully consider the business case and how it was likely to evolve, the challenge of "getting it right without going back."

Pricing: Proponents of TIPS mention that being a public enterprise can have positive impact on the pricing of interoperability as the state is "not seeking to price for profit, but for sustainability." However, the pricing structures of TIPS are yet to be published, so it is difficult to judge at this point.

Operating difficulties: It will take time for all participants to connect to the platform, connections will be API led, and while technical specifications have been shared, most participants require their own funding and development to take place.

System constraints: According to a respondent from the BoT, it was noted that while many financial institutions initially preferred peer-to-peer connections, it was recognized that a network of peer-to-peer connections could become very expensive on their current platforms. Connecting to a central platform should create cost savings.

Kenya: Institution–led platform level interoperability

Kenya's mobile money revolution has been extensively documented by Ndung'u (2021) and others. The Kenya Banker's Association led PesaLink[14] platform by Integrated Payment Services Limited (IPSL) is a further step in this revolution. An aspect less fully documented is the part that institution-led interoperability has played in this revolution. Notably, is how Safaricom has embedded an interoperable ecosystem through its M-Pesa platform, and how Equity Bank facilitated fintech interoperability through its Eazzy 24-7 platform.

The M-Pesa timeline (Safaricom, 2017) provides an indicative, though incomplete, timeline devoted to the development of the M-Pesa platform over its first ten years. The timeline shows:

*   An initial focus on expanding agents and signing up customers;

*   From 2008, a series of bilateral connections with financial institutions. This has evolved to wallet-bank-wallet relationships with 29 banks and five deposit-taking microfinance institutions; [15]

*   Cash-out through institutional relationships and through ATMs via vouchers;

*   An expansion of bill-payment relationships;

*   The launch of MShwari loans in 2012;

*   The launch of Lipa na M-Pesa merchant services in 2012;

*   The launch of the M-Pesa Application Programming Interface in 2015; and

*   The launch of an upgraded developer Application Programming Interface in 2017.

The initial wallet-bank-wallet connections were made through direct bilateral connections. Through the launch of successive APIs, Safaricom has underlined its intention to facilitate connections to its ecosystem and its customer base. This commitment to interoperability predated the commitment made by the CBK in its 2021-2025 National Payments Vision and Strategy (CBK, 2021) to introduce open APIs in the banking system.

Through its own platform, Safaricom has created platform-level interoperability. Safaricom's 98.9% mobile money market share (Communication Authority, 2021) and its developer API ensures that M-Pesa's Lipa na M-Pesa is integrated into government payments, e-commerce, and almost all fintech-based services.

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14 IPSL (2021) "Home page" available on https://bit.ly/3AbiN0e accessed on 4th October 2021.

15 See Safaricom's website for updates https://bit.ly/2XQuPPs, accessed on 27th September 2021.

When PesaLink was launched in 2017, it was billed as a collective banking sector response to M-Pesa (East African, 2017). PesaLink by IPSL is an initiative of the Kenya Bankers' Association (KBA). It is a real time payment gateway for over six million banked customers, offering immediate value transfer for customers, and same day settlement for participating institutions. From launch to end 2020, KBA reports over Ksh 360 billion in value transferred since commencement, doubling from Ksh 180 billion reported to end 2019.[16] As of 2021, IPSL intends to launch PesaLink 2.0 and intends to make PesaLink interoperable across banks, telcos and fintechs, to offer additional non-switching services, and engage with fintechs to facilitate the bank transformation agenda (Kenya Bankers' Association, 2021).

From the banking sector, Equity Bank has been leading the digital banking revolution, closely followed by Kenya Commercial Bank. In its year end 2020 investor brief, Equity Group Holding, 2020) counted 874 million transactions through its digital and payment channels, compared to 38.5 million transactions through its branches and ATMs.

Equity developed its range of digital services through its fintech subsidiary, Finserve, in 2018 (FinServe Africa, 2021), facilitated by its Mobile Virtual Network Operator (MVNO) Equitel,[17] and its award-winning app, Eazzy247.[18] Finserve developed the Jenge gateway, which accepts payments from 180 countries, including EMV, mobile money and international digital wallets such as PayPal, Alipay and WeiChat. The Jenge API allows fintech's to incorporate Jenge payments into their products and services (Techweez, 2018).

In 2021, the Harvard Business Review recognized that Kenya is becoming a global hub of fintech innovation (Chitavi et al, 2021). It specifically acknowledged two institutions, namely, Safaricom and Equity Bank. However, while Kenya is becoming a global hub of fintech innovation, as KBA acknowledges in its report on PesaLink, there is no end-to-end interoperability across the financial system. The Central Bank of Kenya (CBK) Draft National Payments System Vision and Strategy (CBK, 2021), stated that the CBK intends to enhance interoperability, in several ways:

1. *"CBK will facilitate interoperability across various payment systems, anchored on the vision, its principles, and its strategic objectives. This will enable users to affordably access their stores of value from different channels and providers to seamlessly pay for goods and services and to facilitate economic activities. CBK will work with industry*

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16   For 2019 data on PesaLink see Kenya Bankers' Association (2020) "Turning Points – Annual Report and Financial Statements 2019", available on https://bit.ly/3tPKXN5, accessed on 17th September 2021.

17   Equitel.com (2021), "Homepage", (webpage) available on https://equitel.com/my-money/ accessed on 8th October 2021.

18   Equity Banks Eazzy247 has won multiple banking awards, including those from Think Business. It won Best Bank in Mobile Banking in 2021.

stakeholders in order to outline the framework required to develop and implement the appropriate model, governance and infrastructure integration for efficient interoperability". (Section 5.3.1)

2. *"CBK will develop, and where necessary review and adopt, common standards that can be used to enhance usefulness. The adoption of common user experience standards will make the use of various payment instruments easier to use. This will include standards and procedures on payments such as QR code payments. NFC payments, mobile push payments, domestic card payments and cashless withdrawals… this will include adopting the ISO20022 messaging standard for financial transactions". (Section 5.3.3)*

3. *"CBK will facilitate the emergence of effective interchange frameworks where it is required to enable or promote interoperability. For each payment stream and channel, an interchange framework may be needed to enable the continued financing of the acceptance infrastructure and the issuance of the instrument. Various models will be considered defining interchange fees and a strategic interchange fee model. Stakeholders' views will be incorporated to ensure that the outcome is not dominated by the interests of any one group or lead to anti-competitive practices." (Section 5.3.4).*

The CBKs stance is an indication that it intends to create an enabling environment for interoperability for a wide range of stakeholders, and that it is willing to become more interventionalist to do so. It is an implicit recognition that markets may not interoperate fully without intervention, and that the current status quo of interoperability through stakeholder-based platforms is not sufficient. It acknowledges the challenges inherent in defining interchange fees, and that there is the potential for anti-competitive practices.

Battle of the platforms

Competition between the platforms looks set to increase (Business Today, 2022). In January 2022, Equity Bank announced One Equity. This offers businesses a single till number that allows customers to make payments via M-Pesa, Airtel Money, PesaLink, Equitel and the Eazzybanking app. It integrates QR code functionality, M-Visa, Masterpass, and Union-Pay. The One Equity solution enables businesses to collect payments directly into their bank accounts, and thereby avoid making multiple transfers from mobile wallet to bank accounts.

There are additional media reports (Business Daily, 2021) that the CBK intends to launch a national payment system, which will force Safaricom to accept cash from rivals through to the Lipa na M-Pesa merchant platform. The CBK reports that merchant payments were constrained through lack of interoperability, with growth expected to "continue increasing once initiatives such as interoperability are fully rolled out, allowing customers to seamlessly transact across the ecosystem irrespective of their provider".

Respondent views

Respondents commenting on the Kenyan experience noted the impressive ecosystem built by Safaricom. However, some industry respondents reported a *"deliberate compliance with the letter of the regulatory guidance given rather than the spirit,"* the

view was *"how to protect your market position whilst complying with the regulator"*. As an example, the respondent noted that MMO interoperability was possible, but it was hidden in multiple menus. The nature of regulatory compliance may be a factor in the CBK becoming more assertive.

Other respondents noted the existence of vested interests, particularly among institutions that dominate the payment sector, which made progress very slow. *"In an ideal world PesaLink would be providing a wider range of services and would be providing equitable access to financial service providers and fintechs, with robust risk management in place".*

A further concern from a service provider, which was said to limit interoperability, was the extent of older (so called legacy systems) used in the banking sector. This suggests that the current infrastructure could not support significant modernization, with specific weaknesses in terms of cybersecurity and data centres.

Rwanda – An active state role for interoperability?

Pathways to interoperability differ, as indicated by Nautiyal et al (2020). The Kenyan, Ugandan, and Tanzanian cases demonstrate interoperability through the evolution of markets as distinct from creating a national architecture for interoperability, which could be called interoperability by design, the best case of which is the so-called India Stack (India Stack, 2021). The India Stack visioned by Nandan Nilekani, the co-founder of Infosys, comprises four interoperable layers: an identity layer built on the Aadhaar biometric identity,[19] a payments layer, a consent layer, and a documentation layer. It connects over 1 billion Indians, and 339 million bank accounts.

In 2014, the National Bank of Rwanda mandated interoperability, publishing an interoperability policy (National Bank of Rwanda, 2014). The policy defined settlement through the RTGS, settlement through settlement banks, with irrevocable transactions, and with justified clearing models.

The vision for a cash lite Rwanda was reaffirmed in the "Rwanda Payment System Strategy – Towards a Cashless Rwanda 2018-2024" (National Bank of Rwanda, 2018). The payment strategy acknowledges that the legal framework needs to be updated, sandboxes need to be introduced, and enhanced consumer protection, data protection and cyber security are required. The strategy identifies significant shortfalls in point-of-sale infrastructure, the need for government digitization and financial education for consumers. To facilitate the transformation to cashless payments, the need for interoperability is restated, which includes APIs, data portability and labs, and accelerators for financial technology. Other institutions are to be onboarded to the national switch, and the real time payments system is to be upgraded. The cash lite vision is clear.

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19   Unique Identity Authority of India (webpage), "Home Page" available on https://bit.ly/3iwN7wp, accessed on 4th October 2021.

The interoperability blueprint for Rwanda was established in a "Business Plan for the Rwanda National Digital Payment System (R-NDPS)" (National Bank of Rwanda and Access to Finance Rwanda, 2018). The R-NDPS was envisaged as a platform to facilitate the processing and settlement of P2P transactions, send money, requests to pay, government collections, merchant payments, bulk disbursements and at a later stage to facilitate business-to-business and intra-agent transactions. The R-NDPS is further intended to facilitate access to the payment system to "non-traditional players" such as fintechs.

While the R-NDPS proposed architecture, operations and governance are set out in the business plan, initial discussions with industry participants were unable to establish the processing and interchange fees with different ecosystem participants backing different models. The plan noted that "further discussions with industry participants are required".

Despite strong policies and blueprints, practical interoperability has remained elusive in Rwanda, despite Parliament requesting the Rwanda Utilities Regulatory Authority (RURA) to enforce interoperability between MTN Rwanda and Airtel/Tigo (The New Times, 2021). The Governor of the NBR noted:

> *"Currently, if you are a subscriber to MTN mobile money you are not able to pay a subscriber to Airtel money. When you have a digital payment channel in a given bank you can use it only for transactions in that bank," he added. "But, after we have linked those channels, you can have a product in a given bank and use it for payment through MTN, or Airtel network, Equity, BK among others".* Central Bank Governor, John Rwangombwa

Respondent views

Respondents on interoperability in Rwanda noted the central position of RSwitch in providing interoperability. It is Rwanda's only national payment provider. Respondents suggested that the limited progress on interoperability was, therefore, at least in part an outcome of a "payment bureaucracy". Nevertheless, other respondents noted that central pressure from policy makers and regulators could be effective in Rwanda, and that there is current market engagement on the go live process for interoperability.

Uganda: Unintended consequences of mobile money interoperability, and shared agents' successes?

The Uganda case study looks at the initial implementation of mobile money interoperability, the ABC Shared Agents Initiative and it introduces a new mobile money platform player – Wave Money.

Mobile money launched in Uganda in 2009, through Airtel, MTN, and Warid, and was quickly being used across the country. In 2013, the Bank of Uganda (BoU) produced mobile money guidelines (BoU, 2013), in which they mandated that "[m]obile money service providers shall utilize systems capable of becoming interoperable with other payment systems in the country and internationally, to facilitate full interoperability"(BoU (2013).

Mobile money interoperability

All providers enabled money to be sent across networks. This was described as sending money from a registered user to an unregistered user. However, instead of transacting across networks, many Ugandans preferred to conduct an Over the Counter (OTC) or agent assisted transactions.

The International Telecommunication Union (ITU) defined an OTC transaction as "a transaction that the agent conducts on behalf of a sender/recipient or both from either the sender's or agent's mobile money account" (Wright and Singh, 2016). The study found that OTC increases anti-money laundering and combatting the financing of terrorism risks, limits product evolution, locks providers into an indirect delivery model, reduces providers profitability and creates volatility in market share.

In 2017, FSD Uganda commissioned a study of mobile money operator interoperability in Uganda. The Friends Consult study (Friends Consult, 2017) was to ascertain the demand for interoperability from the perspectives of consumers and agents, the hinderances from a lack of interoperability, and ascertain willingness to pay for interoperability.

The study was of 2,000 Ugandans and 500 agents. It found that 48.6% of respondents were multi-sim, 57% had an awareness of interoperability, but only 18% had used network to network interoperability. A total of 98% of respondents said off net transfers were important. However, 90% of participants felt that sending across networks was more expensive than agent assisted transactions. Despite this, 69% were willing to pay a small premium for transferring across networks.

Most agents in Uganda were independently agents of MTN and Airtel: 96% of respondents were agents of MTN, 82% of respondents were agents of Airtel. Agents wanted to be able to top up e-float between networks but were unwilling to pay a premium for doing this, despite the significant costs already involved in rebalancing float. The most common need for interoperability was for P2P transfers. A voucher system was developed to enhance interoperability through agents.

In the Ugandan case, providers effectively discouraged interoperability through their pricing strategies; creating a customer value proposition that encouraged OTC transactions. This is despite the mandate to interoperate.

The GSMA, (Naji, 2020) then reported:

> *"In 2017, the BoU acted swiftly on regulation announced four years earlier—the 2013 Mobile Money Guidelines—to mandate immediate interoperability between Mobile Money Providers (MMPs) over a period of a few months. This short timeline led two of the country's major MMPs to initially use an aggregator before connecting bilaterally in 2019. However, they continue to use third parties for interconnection with smaller MMPs."*

The study failed to acknowledge earlier interoperable practices.

An industry respondent opined that while the MMOs are connected and money can be pushed from one provider to another, few customers do so. This is in part because the service is not promoted, and that moving money through USSD is not user friendly.

Shared agents

Uganda is unique in East Africa for launching a service to interoperate bank agents. The following information draws on a study for FSD Uganda by MSC "Making Elephants Dance" (MSC, 2021). Uganda passed amendments to the Banking Act in 2016, which led to the launch of agent banking. Initially, agent banking was launched by Centenary Bank, Stanbic Bank, DFCU Bank, KCB, and Equity Bank on closed loop systems. The Uganda Banker's Association (UBA), alongside a technology service provider, Eclectics International, formed a joint venture to facilitate shared agents, titled 'The Agent Banking Company'. The premise for founding shared agents was to increase access through financial institutions, and to efficiently compete with mobile money operators, avoiding cost duplication.

As of the end of 2020, there were 10,600 shared agents (62% active), serving 19 banks, with a cumulative 4.6 million transactions, UGX 5.14 trillion (US$ 145 billion), serving 533,562 unique customers.

The benefits to the banks were said to be increased distribution network, scalability, interoperability of agents, and collective efficiency. It is anticipated that the platform may be used in future to connect financial technology companies and a range of competitive services through and to agents.

ABC has been supported by FSD Uganda. It established the business model, common pricing principles, customer services standards, and agent training. The study noted the high costs in establishing and training the agent network and integrating with diverse banking platforms.

The MSC study noted the following as the forces promoting competition and collaboration:

(i)   Remuneration, technology management, float management, branding and training for agents.

(ii) The threats from new entrants - access to market, shrinking margins, new services and multi-banked.

(iii) The threat from substitution, including shrinking margins, customer attrition, technology superiority, and product cannibalization.

(iv) The `bargaining power of customers in terms of product pricing, customer service, high availability of services and deposit mobilization.

The achievements listed in the report include better service of underserved populations; reduced overall investment in infrastructure; enhancement of the agent banking model; enhanced operational efficiency; mobilization of deposits; and socio-economic benefits.

Industry respondents noted that ABC in practice has had more challenges than suggested by the FSD Uganda study. Paul Mbugua, the Managing Director of Eclectics the architects of ABC, noted the following challenges:

(i)   **Integration and onboarding:** Integration forced banks to pay vendors, and there were specific challenges for banks that were customers of certain vendors, which meant that they were restricted in their operation of ABC. Onboarding new banks could be difficult because banks usually have their own procedures for onboarding third parties.

(ii) **Tariffs:** It was difficult to negotiate intra-bank tariffs, given that there were multiple charges to agree.

(iii) **Regulatory requirements:** A range of regulatory requirements had cost implications, for example the requirement for printed receipts (not required under mobile money) and the application of full KYC. Furthermore, flexibility will be required from the regulator to facilitate onboarding new services to the ABC platform.

(iv) **Challenges with go to market:** Take up on the ABC platform was not uniform. Some banks were acquiring, other banks were acquiring and issuing. Agents can be active for multiple solutions (for ABC and "on net" transactions) with several POS devices. Every bank with its own agent network prioritizes marketing its own agents. MFIs cannot integrate directly and had to participate through a sponsoring bank.

Industry respondents noted a range of additional challenges:

Competition with on net solutions: Other respondents noted that banks have implemented ABC differently and have been influenced by the business case for bank. In particular, the banks with large customer bases had already implemented their own "On net" agent networks, which they encourage their customers to use.

Interchange fees: A respondent from a major bank, which provided many agents to ABC, felt the nature and amount of the interchange fee provided through ABC did not compensate for the significant investment the bank made in maintaining its agents.

Functionality: One respondent noted that there was always likely to be a patchwork of inconsistent implementation, given the competing commercial positions of the major banks, and that there needs to be a win-win for all the institutions that are using the platform. One way that this might be achieved is by adding 'use cases' that can be accessed by fully participating banks through the platform. As an industry participant opined, "the only way to disrupt the status quo is to create more services".

Paul Mbugua would agree with the desire to add more functionality to the ABC platform, and to extend use cases beyond "cash in" and "cash out". However, this exposes a major challenge in peer-to-peer platforms; the ability of owners to invest in their platform.

Another respondent opined that given the number of agents that were now in Uganda - 180,000 mobile money agents and 26,000 bank agents (of which 16,000 are ABC agents), there would be limited extension in new agents, so there needed to be a greater drive for all services to be provided through all agents. To do this may require new initiatives such as rolling out common float management and extending the range of banking transactions that agents could perform.

Operations: It was noted that ongoing investments were required in the back office, with several respondents noting that at the time of writing this paper, several institutions were choosing not to connect to the ABC platform due to potential financial exposure.

Investment: The ABC platform requires periodic investment to accommodate increasing transaction volumes in systems and staffing and increased functionality. But where are funds to come from? The ABC platform is owned by the Uganda Bankers' Association and Eclectics. Major investments could require funding to come from the Uganda Bankers' Association members, which could be a significant challenge to organize. Mbugua sees a role for donors to invest in adding functionality to the platform, particularly where it could contribute to the goal of financial inclusion. Other respondents have opined that a third investor may be required, possibly the State, given that ABC is in part supplying a public good. A well-informed respondent noted the considerable value of ABC, but that there *"needed to be a long-term strategic vision for the platform."*

National Payments Act: Another respondent noted that, over time, greater alignment will be driven by the National Payment Act, opining *"however, we haven't got this far yet, everyone is fighting to protect their market share, telcos are now looking to expand their services into remittances."* He further noted that according to the National Payment Act that the technology would have to sit on servers operated by the BoU.

Regulatory attitude: Respondents, recognized the significant potential of the ABC initiative, but noted that to leverage the potential of ABC, the BoU would require more openness towards innovation, and that the BoU was currently focused on control rather than opportunity.

Wave Money – A Future Platform Player?

Wave Money[20] is a new entrant into Uganda, offering mobile money with a difference. Upon registration, users are issued with a QR code, which they can share to enable others to pay money into their account. Once verification is completed on signing up to the app, the QR code can be used to deposit funds into the account with no identification needed. Deposits are free if the user is depositing into their account, otherwise it is treated as a transfer from others, and a fee of 1% of the amount transferred is charged; withdrawals are free. At the time of writing, payment and remittance functionality is limited with only airtime purchase offered.

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20   For more details see the Wave Money website - www.wave.com

Ease of use, pricing, and that the app is agnostic of mobile network operator are attractive features. However, it will be the value-added services to be added to the app over time that will determine how disruptive Wave will be as a platform provider. Innovation is likely.

Q5. *What are the factors that have influenced the success of interoperability in East Africa or lack of?*

A study across 12 countries on instant payment schemes by BFA (BFA/DFI, 2022) ranked stakeholder views on outcomes judged three East African interoperability schemes[21] lower than many other schemes in the survey. The team from BFA judged scores against achieved off-net transactions, stakeholder assessments of whether the objectives of the scheme had been achieved and the actual and anticipated benefits to financial service providers and users. They judged the effectiveness for users in terms of accessibility, affordability, user experience, and use cases. This raises the question: what factors have influenced the success of interoperability in East Africa? The following appear relevant:

Willingness to invest: By far, the most successful interoperable platform in East Africa is Safaricom's M-Pesa, even if that interoperability is at a platform level only. Safaricom does not publish spending on interoperability. However, Safaricom has significant ability to invest - its annual capex, across voice, data and M-Pesa of approximately US\$ 35 million (Safaricom, 2021) - dwarfs investment levels in other interoperable platforms, which is reportedly typically around US\$ 10 million to operationalize the platforms.[22]

National interoperability is seen through the lens of competitive advantage at an institutional level: Initial implementation around interoperability has been heavily influenced by strategic and commercial considerations, with Equity Bank and Safaricom building their own interoperable platforms and ecosystems, and MTN and Airtel's pricing of mobile money cash out transactions in Uganda. Even the success of mobile money interoperability in Tanzania can be seen through this lens, where there was a strong collective interest in interoperability among the major mobile money issuers. In the case of Ugandan agent banking, each of the major financial institutions has its own on-net network of agents, which it encourages its customers to use over the shared agent platform.

Institutional responses to mandated interoperability have often frustrated policy makers' intended impact: Regulators have often mandated interoperability, but results have been underwhelming. In Rwanda NBR (2014), in Uganda the ability for MMOs to interoperate was mandated (BoU, 2013), in Kenya mobile money interoperability was mandated and was launched on Unstructured Supplementary Service Data (USSD) only (CBK, 2018). However, simply mandating interoperability has not been sufficient to achieve widespread interoperability.

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21   Specifically – mobile money interoperability Taifa Moja, Tanzania, Pesalink in Kenya, and mobile money interoperability in Kenya.

22   According to respondents.

Donor investments have underwritten interoperability: Nationally, interoperable systems in developing countries are often partly donor-funded. TIPPs is supported by the Bill & Melinda Gates Foundation and is implementing its interoperable platform based around Bill & Melinda Gates Mojaloop.[23] The WAEMU digital financial services interoperability platform[24] is supported by the Africa Digital Financial Inclusion Facility, a project of the African Development Bank.

Inevitable duplication of costs through failing to optimize interoperability: "Today retail banking in East Africa services half the value of mobile money using three times the infrastructure. Banking technology is often implemented at sub-scale levels for every use case and in every market, increasing cost and friction for payments. As scheme discussions progress across East Africa, shareholders should instead focus on driving economies of scale" (Cook et al, 2021).

So, what conclusion can we draw from this picture?

There is inertia and collective inaction, which is difficult to overcome: It is difficult to assess progress on interoperability without concluding that there is collective inaction whereby the financial sector and mobile money operators without encouragement fail to move forward. One respondent opined "there is a tendency to say – 'yes' in conferences and workshops, and then backpedal institutionally." The discussion then must explore how to overcome this inertia.

Industry lobbies: Proponents of interoperability are divided on how this should be achieved. Some argue for the continued role of the private sector and working with the private sector to negotiate between competing interests, to establish and promote areas of mutual advantage, and to offset potential losses through interchange fees. Therefore, out of this, there would be a protracted process of negotiation, and roles for a wide variety of stakeholders, including bankers' associations, GSMA, donors, policy makers, regulators, and regulators' forums. Emerging best practices, tools and guides are shared. This process can work, but it may be that it works easiest in less mature markets, where competitive interests are less entrenched, and where legacy investments are smaller.

Regulatory assertiveness: This then sets the scene for increased levels of regulatory assertiveness. It is not clear whether the level of regulatory assertiveness is a result of frustration with regulatory avoidance, or collective inaction, or whether all avenues of negotiated settlement have been exhausted. Regulatory assertiveness takes two forms:

(i) **Kenya:** Improving the ability to interoperate through the application of standards, APIs, and to control for misbehaviour.

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23   Level One Project, "Homepage", available on https://bit.ly/3DrjPYj (webpage) accessed on 8th October 2021

24   Africa Digital Financial Inclusion Facility, "WAEMU digital financial services interoperability platform" (webpage), available on https://bit.ly/3BnP3yI, accessed on 8th October 2021

(ii) **Tanzania, Rwanda:** Interoperability through a centralized, regulator promoted, platform.

Q6. *What is the potential impact of interoperability on financial inclusion?*

There are multiple assumptions relating to the impact of interoperability on financial inclusion from increased availability of services, lower prices, and enhanced evolution of the financial sector. However, it is difficult to assess the benefits of interoperability.

Are the assumptions of the benefits of interoperability realistic?

Assumptions are made in relation to interoperability and financial inclusion, which relate to the projected benefits of interoperability, namely that interoperability increases competition, increases choice, and reduces prices. However, the extent and nature of the benefits realized must be documented. The GSMA stated:

> *"Understanding how an interoperable market can enhance domestic payment landscapes and contribute to broader socioeconomic objectives for financial inclusion and cashless economies will be essential to strengthening the business case for integrations between MMPs, banks and other financial system players. Once in place, assessing the impact of interoperability—domestically, regionally, and internationally—will require a concerted effort to measure and track progress"* (Naji, 2020).

Where there is information, in a competitive market, such as mobile money in Tanzania, transactions across networks have increased following interoperability. In the case of Uganda's shared agents, the ability to interoperate has enabled 19 banks to benefit from a network of shared agents. At the same time, the banks with the largest customer numbers all have their own agent networks, including many of the same agents.

Donors are currently trying to understand how financial inclusion has been enhanced by interoperability. The Bill & Melinda Gates Foundation has funded an ongoing study by BFA to examine 12 payment schemes across Canada, EU, UK, Kenya, Tanzania, Ghana, South Africa, Jordan, India, the Philippines, and Thailand. The questions the study seeks to address are:

1. Why interoperability? Is interoperability necessary for full financial inclusion? We shall be evaluating outcomes from various journeys.

2. What policy design features are relevant for achieving interoperability success? Where success is registered, what interventions were deployed? (e.g. pricing caps, common standards, mandated participation).

3. When should policy makers advocate for interoperability? What defines the right time – is it at the beginning, or should the market be able to evolve over time before intervening?

In terms of the link between interoperability and financial access, BFA noted that "Interoperability can be helpful for financial access – but it does not drive it."

The BFA study attempted to measure the propensity for financial inclusion across six criteria, namely: (i) entities with business models suitable for low-end segment participation; (ii) entities with business models suitable for low-end segment that is involved in rule making; (iii) accessibility – USSD access for non-smartphone users; (iv) valued extension of use cases beyond P2P; (v) accessible user experience; and (vi) affordability.

On these scales, the schemes in East Africa[25] were found to be mid-ranking but were outperformed by schemes designed with financial inclusion in mind, notably the UPI in India and Financial Inclusion Triangle in Ghana.[26]

Wallet to bank to wallet interoperability

The GSMA (GSMA, 2021) notes that there has been a four-fold increase in transactions between banks and mobile money operators between 2015 and 2020. However, the values involved, while significant at US$ 68 billion in 2020, are a fraction of the values transferred on mobile money at US$ 2 billion per day. But they noted:

> *"This type of interoperability not only provides better access to the formal economy for the underserved and financially excluded, but also helps to prevent two-tier financial systems, or even parallel economies from becoming entrenched. It is, therefore, important that integrations between banks and mobile money providers continue to be encouraged and strengthened"* (GSMA, 2021)

Evolution of the financial system

Missing from discourse to date is seeing interoperability as a vital component in the evolution of financial systems and specifically fintech facilitated products and services. Cracknell and Wilkinson (2021) observe an evolution in digital finance in Africa, which flows through the following generic stages.

(i) **Channels:** The establishment of mobile money and agent banking. Agent-assisted onboarding of customers is assisted by digital/national identity systems. The launch menu of products and services is similar and focuses on Cash-in and Cash-out (CICO), P2P, bill payment, and airtime top-up. The core agent ecosystem is established, and there is an intensive focus on customer onboarding.

(ii) **Channel-based products:** In this phase, channel-based products drive not only the volume of transactions but increase the value of transactions. These products include nano-credit, betting, remittances, merchant services, and pay as you go solar

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25   Schemes considered were mobile money interoperability and Pesalink in Kenya, and mobile money interoperability in Tanzania.

26   Findings presented at a DFI/BFA Webinar on 20th April 2020.

power. The services are market-specific. Interoperability can help determine which products and services establish themselves. Safaricom's extensive, early bilateral interoperability boosted its merchant services.

(iii) **Fintech:** Micro-payment interoperability is important in the evolution of national financial technology industries. The ability of fintechs to connect efficiently to the financial sector through interoperability, third party aggregators, and open APIs facilitates the volume-based business case that drives financial technology. There is a rapid expansion in use cases at this stage.

(iv) **Platform-based services:** This stage sees the development of highly tailored technology facilitated financial, lifestyle and business services for groups, or businesses that are highly tailored. The clearest examples at the time of writing include those targeted at farmers, such as Safaricom's Digifarm (Safaricom, 2021c) and KCB's Mobigrow (KCB, 2021).

(v) **Fintech as a national asset:** Kalifa (2021) describes fintech as a national asset. In the Kalifa Review of UK Fintech, fintech represents the final observed evolutionary phase, where financial technology is driving policies towards investment, education, immigration, and skills development.

In this observed evolution, interoperability assists the development of channel-based products, and the emergence of strong local fintech industries, and supports the development of platform-based services.

Q7. *Can financial technology address some of the issues identified?*

Financial technology is already facilitating interoperability, and its role will grow as financial institutions in East Africa increasingly adopt digital finance. A range of technologies - open APIs, shared platforms, banking as a service, payments as a service, and cloud-based services are being and will be adopted by financial institutions across the region, particularly as technology results in reduced costs, and increased competition.

APIs: The CBK's National Payment Vision and Strategy 2021-2025 discusses the application of common standards for data exchange and the implementation of open APIs across the Kenyan banking sector. This implies that the cost of incremental interconnections between financial institutions and between financial institutions and financial technology providers should significantly reduce. Klienbaum (2020) expresses the potential benefits.

> *"In financial services, APIs are viewed as a potential means by which traditional financial institutions, especially small and midsize banks, could partner with upstart financial technology companies (fintechs) to offer innovat[ive] products, especially to low-income customers. These partnerships can create a symbiotic relationship: financial institutions have the regulatory approvals, infrastructure, and customer base that fintechs lack, while nimble, iterative, and product-oriented fintechs can develop products quickly, which has been a historical struggle for banks."*

Shared platforms: Shared platforms will enable many small to medium-sized financial institutions to access cloud-based, perpetually updated, core banking solutions. These solutions can connect to Payment as a Service (PaaS) providers.

> *"While outsourcing of the full payments stack is a possibility, a new generation of technology providers has emerged allowing banks to expand quickly and modernize their payments product portfolio without incurring high upfront investment. Payments-as-a-Service (PaaS) players operate cutting-edge cloud-based platforms to provide specialized services, such as card issuing, payments clearing, cross-border payments, disbursements, and e-commerce gateways."* (McKinsey Global Payments Report).

Cloud supported services: Shared platforms, Payments as a Service (PaaS), and Banking as a Service (BaaS), typically make extensive use of cloud-based services for storing data. This brings issues related to data residency, and potentially with data protection. Against this, cloud-based storage offers participating institutions access to benefits, including security, lower costs, flexibility and scalability, increased efficiency, faster product development, and consumer insights (The FinancialBrand.com (2021).

Digital ecosystems and interoperability: While the technology to support interoperability, APIs, shared platforms, payments as a service and cloud supported services is in place and continues to develop, there is an even greater driver towards interoperability, and that is the development of an interoperable digital ecosystem. The clearest example of this is the "India Stack".

Most of the discussion on interoperability to date has been around "payment interoperability." The India Stack is a collection of systems that support four interconnected layers. These are:

(i) **Presenceless layer:** Where a universal biometric digital identity allows people to participate in any service from anywhere in the country;

(ii) **Cashless layer:** A single interface to all the country's bank accounts and wallets to democratize payments;

(iii) **Paperless layer:** Where digital records move with an individual's digital identity, eliminating the need for massive amount of paper collection and storage; and

(iv) **Consent layer:** Which allows data to move freely and securely to democratize the market for data.

Regulatory attitudes: A gradual transition to open APIs, cloud-based services, shared platforms, PaaS, BaaS, will be key to leveraging the advantages of interoperability, and reduced infrastructure costs, beyond payments. For this to become a reality, several respondents noted that regulators should be more supportive of innovation. Regulatory constraints were said to relate to data residency, cryptography, and legal requirements.

Supporting ACFTA through interoperability

The Africa Continental Free Trade Agreement raises new issues in relation to interoperability, specifically in relation to data, both commercial and financial. This point was discussed with Sam Omukuko, the Managing Director of Metropol CRB.

Free trade across African countries requires the right data infrastructure, which can validate: a) the movement of goods and contains proxies for trust; b) provide for the movement of money; and c) the movement of data. For this to happen, platforms need to be synchronized. Three regional central banks have agreed in principle on cross border data sharing. To support international trade through technology will require standardization of data elements, the use of templates, and relatively few mandatory fields that can be expanded over time. Data will be required, which identifies the entities, people, documents which creates a "single point of truth." Payment systems will then need to be tied to the transaction, dispute and error mechanisms designed. The need for integrity, efficiency and accessibility of data will dictate the technology and policy issues.

Q8. **What can SSA economies learn from East African Community financial inclusion, market development and interoperability?**

Observations

From the literature review, the country studies and the respondent interviews, the following observations have been made:

Emerging best practice guidance – incorporates lessons from East Africa: Learning from the experience of interoperability in East Africa and other parts of the world presents an emerging body of best practice on how to interoperate, and where challenges can be expected. The Alliance for Financial Inclusion published a "Framework for Digital Financial Services Interoperability in Africa." AFI (AFI, 2018) and CGAP published "Building Faster Better – A Guide to Inclusive Instant Payment Systems" (Cook et al, 2021).

The need to reconcile multiple agendas: Implementing payment interoperability means reconciling multiple, sometimes competing agendas and interests. Institutional priorities frequently rank higher than commitments to collaboration and ecosystem development, with institutions most heavily invested in the status quo being late to join common initiatives. Respondents who had experience implementing initiatives alongside the Level One project team noted that the team spent a long time trying to bring the market together. However, this was likely much easier in markets where the financial sector was less developed and integrated, such as Myanmar, than in established financial sectors.

There is an evolving role for regulators and policy makers: Regulators and policy makers have a key role to play in moving from interoperable schemes to national interoperability. Even in developed markets such as Kenya where players have already invested in schemes and their own interoperable platforms, a more interventionist

approach can be seen. The CBK published its pricing principles in its National Payment System Strategy and Vision (CBK, 2021) and is moving to allow Airtel to interoperate merchant payments through the Safaricom M-Pesa platform. In Tanzania, the BoT was actively involved in promoting mobile money interoperability and in the ongoing promotion of the TIPS scheme.

Interoperability stimulates the emergence of financial technology: Financial technology benefits significantly through easy access to payment services and data interoperability. This can best be seen through the rapid development of financial technology in Kenya, built on the M-Pesa mobile money platform, supported by Kenya's national identity system, and established credit reference bureaus. Payment and some data interoperability have supported the extension of digital credit and e-commerce.

There are competing viewpoints on how to create change: There are strongly held but competing views on how change should be introduced. These can be characterized as "market-led" and "interventionist". The market-led respondents argue that private sector players, often MNOs, have created significant change in a very short period through heavy investment in their own systems and building a network of bilateral connections. These institutions need time to recoup returns to investment. "Interventionists" usually agree that private sector players are hugely important in stimulating innovation, but that the vested interests in a financial sector make coming to consensus a very lengthy and sometimes fruitless activity. Interventionists argue that there comes a time when policy makers and regulators need to cut through "vested interests."

Challenges

Implementing interoperability has many observable challenges. These include:

Interoperability by mandate: Taking long-term decisions influencing the financial system is difficult to make in a dynamic environment. East African regulators have taken different positions with respect to interoperability. However, imposing interoperability by mandate risks regulatory avoidance.

Interoperability and competition: In their study, "Review of the Interoperability and Regulations of Mobile Money," Anderson et al (2015) raise important caveats related to the evolution of interoperability. These are as follows:

1. Private sector interests can be opposed to interoperability. "Large MNOs with extensive infrastructure and upfront investment in mobile money networks have little incentive to interoperate with smaller MNOs if they have cornered the market".

2. Businesses do not want to interoperate without recouping the substantial investments they have made into developing services and related infrastructure.

3. Many MMOs have a catalogue of services on their platforms to encourage customer loyalty.

Scheme interoperability vs national interoperability: To date, interoperability in East Africa has operated at institutional or scheme level, not at a systemic level. Therefore, the MMOs interoperate in Tanzania, the banks in Kenya can interoperate on PesaLink, or in Uganda can share agents. Real time micro-settlement systems are in development for Tanzania (TIPS) and Rwanda. In both cases, the central bank and policy makers have been extensively involved, and the systems have been partly funded by international development partners. With well-established, competing ecosystems in Kenya at institutional level and at scheme level, it is not clear how systemic interoperability will be achieved in Kenya. However, CBK requirements for data standards and APIs suggest that future interoperability will be driven in part through promoting standards that facilitate interoperability. Recent actions by the CBK have suggested that the Central Bank will encourage Safaricom to open greater access to its platforms to competing institutions.

Competing revenue models: The revenue models for MMOs, fintechs, and commercial banks are different, which makes the commercial case around national interoperability difficult. The GSMA (2021) noted a need for MMOs to diversify their revenue models from fee income because "on average 87% of MMO revenues were generated from customer fees." By contrast, a commercial bank has a revenue model based on three significant sources of income: fees, investments, and interest, each of which is a significant revenue centre. Bank interoperability does not rely on transaction fees alone for its business case.

Lack of data: Searches for data and direct contact with central bank respondents and with GSMA showed that there is very limited publicly available data on interoperability. According to at least one industry respondent, there is "an unwillingness to share data which may be used by competitors". Even in cases where data is available, it is frequently highly aggregated. Furthermore, in many cases, the data is not collected by responsible authorities. This implies that policy is being made on a presumption of the benefits of interoperability, with limited ability to quantify the 'real world' benefits of interoperability.

The lack of data suggests that beyond centralized platforms, it is difficult for policy makers to assess how well interoperability is working in practice, to determine which institutions are promoting and/or restricting interoperability, and to take appropriate corrective action.

One respondent said that without objective data for policy, there was considerable "noise" around payment ecosystems, in part promoted by donors. Such noise made it difficult for regulators and policy makers to assess or question the conventional wisdom to determine national policy and appropriately include ecosystem participants.

Q9. What do the research findings mean for future interoperability?

This paper shows an evolution in interoperability across East Africa from bilateral connections to peer (or scheme) interoperability towards national interoperability with one outlier, Kenya, where *de facto* national interoperability through the Safaricom

platform is dominant. In fact, it is the Safaricom case which provides the best evidence of the benefits of interoperability in terms of the evolution of products and services, and the fintech ecosystem more generally.

The study highlights a very slow path towards payment interoperability, with multiple constraints related to ownership, governance, ability to invest, defending market position, competition, legacy platforms, and seemingly regulatory avoidance. There have been some attempts to push for consensus, particularly in Tanzania, through the introduction of TIPS, but consensus building is usually difficult, time consuming and often meets with limited success.

Systems such as ABC in Uganda are lauded for their actual and potential impact, but also show the challenges and limitations related to ability to invest and the competing realities of market participants which have their own on-net solutions. The potential for these platforms to evolve, develop their value proposition, and onboard services for the entire banking sector is clear, but how that potential is to be realized is not.

The findings show that national interoperable systems have involved interventions and mandates from policy makers and regulators, and that donors have part funded these systems. Historically, narrowly focused mandates on interoperability have had limited practical success, potentially contributing to more interventionist policy from central banks.

Participation so far in evolving national platforms focuses on regulated financial institutions and MMOs and not other financial institutions or financial technology providers, which are generally assumed to connect through banks or mobile money operators. While it may be difficult to onboard immature institutions or fintechs, thought should be given to integrating more payment service providers and aggregators in future phases.

Regulatory and policy responses are evolving too, with regulators moving towards more interventionist stances perhaps to respond to market failure. Central banks, led by the CBK, are beginning to look beyond payment systems, to the ability to interoperate, with a focus on data standards and APIs.

Future interoperability must consider an infrastructure that goes beyond payments, and can handle identity, payments, consent, and data as identified in the operation of the India Stack, and that will support cross-border, international trade facilitated by distributed ledgers and smart contracts. Regulators and policy makers will need to consider the ability to compete more than the interests of entrenched providers of services.

But future interoperability means facilitating the digital banking revolution, promoting shared platforms, APIs, cloud storage, and facilitating the data revolution.

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3

Bridge Contracts in Africa: A Case Study of Orange Mali

Jonathan Greenacre

Abstract

People incur transaction costs fitting their organizational arrangements into their surrounding property rights system. This paper analyses organizational adaptation to surroundings by examining which tool(s) from mechanism design people will use to solve moral hazard problems. Broadly, the weaker people's surrounding property rights system, the more a principal will use tools from mechanism design, which provides greater autonomy to the agent. The paper finds support for this hypothesis by identifying 'bridge contracts', which Orange Mali uses to respond to weak property rights between urban and frontier communities in Mali. The paper proposes to use these findings to stimulate a 'context specific' approach to engineering economics. This involves developing mechanisms to encourage people to work towards social goals but also fit within specific communities. The paper applies this approach to random control trials.

Keywords: *Mobile money, mobile money, agents, contracts, mechanism design, random control trials*

1. Introduction

A growing range of research focuses on the so-called 'engineering' side of economics (Maskin, 2019). This involves helping people develop better organizational arrangements (Menard and Shirley, 2022). Such arrangements are contracts, firms, families, non-governmental organizations, and other types of collective action with little, if any, reliance on the price mechanism. Relevant fields include mechanism design, market design, strands of contract theory, and random control trials (RCTs).

How can scholars adapt insights from engineering economics to help firms and governments in Africa and other developing and middle-income regions? Engineering economics has delivered a range of economic and social benefits in developed countries, particularly the

United States (USA).[1] Adapting engineering economics to international development could contribute to poverty alleviation (such as enabling governments and firms to develop new products to solve poverty problems such as lack of credit), greener societies (such as helping firms launch innovative green services such as micro-solar energy), and other goals.

Exploring how to apply engineering economics requires tailoring organizational arrangements to specific communities before designing solutions. Currently, engineering economics and international development programmes often behave like a doctor who prescribes medication without examining the patient.[2] This involves largely ignoring local contextual factors and proposes cookie cutter solutions that work effectively in economics textbooks or in developed countries, but often have a range of damaging consequences in Africa and other developing regions.[3] Making progress involves going the other way, studying the property rights system in local communities and then prescribing so-called solutions. This involves examining the patient to discover their symptoms and then prescribing medication. Such solutions could conceivably come from engineering economics, appropriately adapted.

The paper begins the process of linking engineering economics to specific communities by examining how a specific subset of this field – mechanism design tools used to solve moral hazard problems – applies in different surroundings across Mali. Doing so can enable scholars and policy makers to better understand the sources of transaction costs people face when designing organizational arrangements: they come from adapting to the surroundings and more standard sources, which focus on the nature of the good and the nature of the transaction.

The paper claims that peoples' surrounding property rights system ('surroundings') impact which tools from mechanism design wealth-maximizing people will use to solve moral hazard problems. This paper analyses organizational adaption to surroundings by examining which tool(s) from mechanism design people will use to solve moral hazard problems. The paper finds support for this hypothesis by identifying 'bridge contracts' which Orange Mali, a mobile money firm, uses to respond to weak property rights

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1   For example, auction theory contributed policies of the Federal Communications Commission which has generated an estimated over US$ 120 billion for American taxpayers. Popular information. NobelPrize.org., see 8 Feb 2022 <https://www.nobelprize.org/prizes/economic-sciences/2020/popular-information/>.

2   See the discussion in Section 4, below.

3   For example, the widely used contract theory textbook by Bolton and Dewinport (2005) which states: "We shall consider in this book one between two parties who operate in a market economy with a well-functioning legal system. Under such a system, any contract the parties decide to write will be enforced perfectly by a court, provided, of course, that it does not contravene any existing laws."

between urban and frontier communities in Mali. These contracts appear designed to encourage agents in frontier areas to operate as largely self-sufficient networks with little oversight from Orange Mali.

The paper uses these findings to stimulate a 'context specific' approach to engineering economics. This involves developing mechanisms to encourage people to work towards social goals but also fit within specific communities. The paper applies this approach to random control trials, a relatively new tool drawn from engineering economics.

The paper has four parts. The first explains the basic logic of the impact of weak property rights on tools wealth-maximizing people will choose to solve moral hazard problems. The second introduces the data in Mali, which the paper will explore. The third provides the hypothesis for the Mali study, the framework through which it is explored, and the results. The fourth discusses the findings and applies them to propose a context-specific approach to random control trials.

2. Weaker property rights – organizational arrangements

Property rights

This paper revolves around the view that people, firms, franchises, and any other organizational arrangement involves strengthening *property rights* as much as feasible by incurring transaction costs. Strengthening property rights involves, as far as possible, maximizing the chances that the choices over something are carried out in the real world. People incur transaction costs taking a range of steps to support that goal. For example, locking my car is a transaction cost because it strengthens my property rights over it – the chances that I can act on my desire to drive it in the future.[4]

Most analyses of organizational arrangements focus on standard transaction costs people within the deal take to strengthen their property rights. These transaction costs emerge when people respond to endogenous factors such as the nature of the good and the nature of the transaction.

This paper accepts that the nature of the good and transaction are a source of transaction cost, but so are the costs involved in adapting an organizational arrangement to exogenous factors, particularly people's surrounding property rights system (surroundings). Third parties, or in the parlance of sociologists – society, provide this property rights system, which includes institutions,[5] rules (such as specific sections of legislation), norms, physical and digital infrastructure (roads,

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4   They do so in ways that maximize wealth net transaction costs. See a discussion in Coase (1960).

5   Often defined as the 'rules of the game' in society. See for example, Douglas North, *Institutions, Institutional Change, and Economic Performance* (Cambridge University Press1990).

bridges, wifi), education levels, and organizations (such as courts, government agencies). Adapting to exogenous transactions is a source of non-standard transaction costs. It involves steps such as learning about local laws and social norms, determining the usability of local roads and other infrastructure, and other jobs.

Organizational adaptation to endogenous and exogenous factors
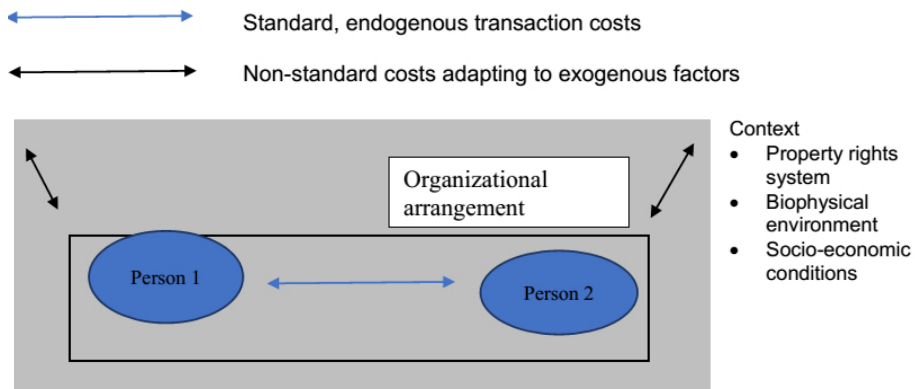
The time is ripe to examine how organizational arrangements adapt to different types of property rights systems beyond the textbook and developed country models upon which most engineering economics is based. Firms increasingly using mobile phones, other technological and innovative organizational arrangements move into communities with very different property rights systems. These are the property rights systems that operate in rural and frontier areas of Africa and other developing countries. Previously, such communities have tended to operate on local, informal property rights system, often based on customary rules, with little or no interaction with the formal government or firms.[6] However, innovative technology, donor funding from the United Nations, Gates Foundation and other organizations worth over US$ 58 billion per year along with regulatory changes have enabled firms to begin providing clean energy, clean drinking water, and a range of other services to rural and frontier areas.[7]

While several firms have made inroads into rural and frontier areas, broadly the results of the economic inclusion are generally disappointing. Despite significant strides, the majority of the world's poor are excluded from the formal economy, blocking them from living healthier and greener lives. Over two billion people lack

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6   Generally low-income, rural communities operate through informal, irregular employment, with little if any recourse to formal contracts and other enforcement organizations such as courts (Collins et al, 2009).

7   See, for example, Consultative Group to Assist the Poor <https://www.cgap.org/sites/default/files/publications/2022_01_Focus_Note_2020_Funder_Survey.pdf> (2022).

access to safely managed drinking water, three billion lack access to clean fuel for cooking, and 1.7 billion lack access to an account with a formal financial organization, such as a bank.[8]

The limited effectiveness of economic inclusion programmes has stimulated interest among international organizations, particularly the World Bank, for new approaches to achieve this policy goal. This is creating opportunities for new thinking, including from engineering economics, to better understand how organizational arrangements should adapt to different property rights systems.

Mechanism design

The paper examines a subset of engineering, mechanism design strategies to address moral hazard problems to explore linkages between organizational arrangements and surroundings. By brief introduction, moral hazard arises through the nature of the transaction – it involves situations in which one person (often labeled the principal) delegates authority to another (often labelled the agent). The agent will act on behalf of the principal. The challenge is that the agent can take private action – these are actions that the principal cannot observe (Avinah et al, 2021). Such action may not be in the principal's best interest. Alternatively, the principal can observe the action but cannot establish breach of the agreement to an outside party, usually a court, known broadly as verifiability.

Mechanism design provides a toolkit through which the principal aims to maximize the strength of her property rights by designing an incentive scheme that aligns the interests of the agent with her (the principal's) own. One set of tools tends to revolve around facilitating the principal's monitoring of the agent. Another set revolves around bonding, ensuring the wealth of the agent ultimately reflects the principal.

However, mechanism design provides little, if any guidance on which tool wealth maximizing principals will choose in different surroundings to maximize the strength of their property rights. If a firm must solve moral hazard across Mali, will it choose identical tools from mechanism design when operating in Bamako, the capital city, compared to rural areas across the country? Traditional explanations of mechanism design argue that people will choose tools which are practicable in the situation. A tool is useful if it enables the less informed party (principal) to observe the more informed (agent) and, if necessary, *verify* breach of agreement to a third party. Furthermore, the tool must be *enforceable*. This means an enforcement agency must have the incentive and ability to enforce whatever judgment it finds. This cannot be assumed in many developing countries whereby courts and other agencies face significant corruption and resource problems.

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8   See a discussion by Emilio Hernandez of the Consultative Group to Assist the Poor, *Financial Inclusion for What?* (2020). <https://www.cgap.org/blog/financial-inclusion-what>.

The key question for economic inclusion, including mobile money, is in which surroundings – namely different parts of Mali - will a tool be observable, verifiable and/or enforceable? Usually, we have little or no answer for this because mechanism design assumes that observability and verifiability are endogenous problems only, meaning they arise from the nature of the participants themselves and their desired transaction.

Exploring which mechanism design tools are appropriate for different contexts is key to the effectiveness of the economic inclusion movement. This is because firms, operating as principals need to find ways of ensuring their agents located in different parts of developing countries perform their jobs effectively. This is a particularly challenging job given the weak roads, unreliable courts, and many other barriers between firms and rural and frontier communities.[9] In this case, Orange Mali as principal must determine appropriate mechanism design tools for its agents located in different parts of Mali.

Combining property rights, mechanism design and economic inclusion

The key to connecting property rights, mechanism design, and economic inclusion revolves around understanding 'stronger' and 'weaker' surrounding property rights. A stronger system, operating exogenously on people designing mechanisms, strengthens their property rights by providing mechanisms for observation, verification, and enforcement of their agreement. In this case, the principal can use clear, fixed terms from mechanism design. A weaker system weakens people's property rights and so the principal and agent must incur costs working out substitute

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9   Conning, J. and Udry, C. (2005); Mark R. Rosenzweig, M. R. (1988). For example, significant portions of the population in Africa do not live within two kilometres of an all-season road. In Angola, this figure is 58% with similarly high percentages in Malawi (62%), Tanzania (62%), and Ethiopia (68%). Another useful example is limitations with the Internet. In 20 African countries, over 75% of the population do not have access to the Internet. In 12 more countries, this figure is over 50%. Rosenthal, J. (2017). Internet access that exists tends to be very slow and unreliable when compared to developed countries. For example, 39 African countries do not have the average internet speed, which, according to the United Kingdom's telecoms regulator, is needed to participate in a digital society. Kazeem, Y. (2017) See a discussion of the limitations of institutions in developing countries in Buscaglia, E.(2004). See limited reference in passing, eg Fafchamps, M. (2003). Hype versus reality of the 'tech revolution': Rosenthal, J. (2017). And banks operating in developing countries tend to provide deposits and loans to comparatively wealthy people who usually reside in cities rather than unbanked communities in rural areas. Freedman, P. L. (2014) . See also: Collier P. (2009). Over 1.1 billion people lack identity documentation (2017 Findex Database). See also a discussion of Mali's infrastructure later in this paper.

methods for observation, verification, and autonomy.[10] Usually, that will result in the principal providing more autonomy to the agent to work out how to provide those mechanisms. [11]

Relationship between property rights systems and tools from mechanism design
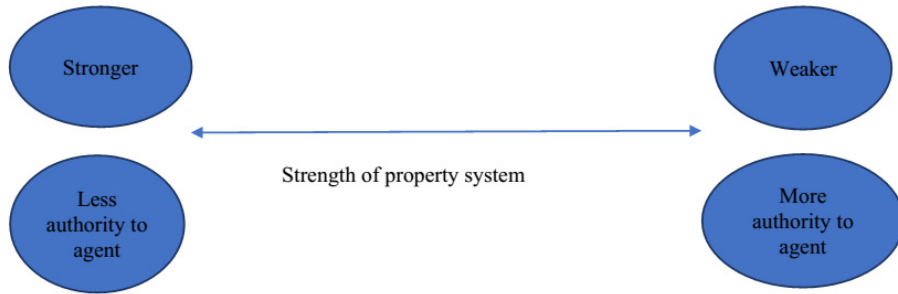
The strength of a property rights system can be understood by the extent to which third parties, rather than people designing the organizational arrangement, must do one or more of the following jobs that are relevant to observation, verification, and enforcement. These third parties could be the state, firm, collection of firms, or other type of actors.

General property rights

One is establishing the fundamentals of a property right system, which are to define, defend, and transfer property rights, and address negative externalities.[12] Mechanisms to support these functions tend to support observability, verification and/or enforcement. For example, when third parties define property rights, they often gather and produce

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10   As already noted by Macneil, contracts could not develop without institutional support, typically laws regulating property rights, support rooted in 'moral, economic', social, legal' support conditions that are external to the contracting parties (Ian Macneil, 1977. Contracts: Adjustment of Long-Term Economic Relations Under Classical, Neoclassical and Relational Contract Law. 72 Nw. U. L. Rev. 854 (1977-1978) 746 sq).

11   This view rests on an economy of scale interpretation of property rights systems. A benefit of moving from the state of nature (without third parties) to a social contract (in which third parties such as a state provide much of the scaffolding for transactions in property rights) revolves around economies of scale. Transaction costs are lower when a third party performs a range of functions rather than everyone having to perform many of those functions him or herself.

12   See Anderson, T. and F. McChesney, F., page 6. This section draws extensively on Avinah Dixit, A. (2009), pp. 5-24)

information that lowers observation costs. These include conducting national census, establishing, and implementing a nation-wide property registry, and providing passports. People's costs of monitoring and observing each other when third parties provide mechanisms to transfer rights, such as roads and payment systems, could lower the costs of physically observing each other and imposing financial penalties, respectively. Furthermore, the more third parties defend and enforce rights through, for example, investing in high-quality, clean, and capable courts, the less costly verification and enforcement will be. This is because people can, at lower cost, verify breach of agreement because a court can more easily understand the contractual relationship and does not need to incur additional price costs enforcing the arrangement (for example, people do not need a private army because they can rely upon the courts and police provided by the state).

Third party bonding and monitoring

Third parties can also provide the tools needed to address moral hazard, particularly bonding and monitoring arrangements. When effectively drafted and implemented by the third party, such mechanisms can lower transaction costs on people because they do not need to design organizational arrangements for this problem.

Ancillary support

Often, third parties can provide other goods and services which support each of these functions above. For example, third parties such as the state, can provide education. Broadly, more educated communities are better able to process information and make better use of tools that can reduce observing, verification and/or enforcement costs. For example, a better educated set of judges will be able to understand more complex cases, which then reduces people's verification costs.

Connecting to economic inclusion: weak property rights between urban and rural areas are a fundamental reason for relative inability of most firms to move into frontier areas of Africa and other developing regions. In urban areas, third parties, particularly the state, have a more significant role in property right systems, reducing the transaction cost firms face in observing and monitoring their counterparties, and otherwise solving moral hazard problems. Rural communities tend to operate in isolated communities with little recourse to formal property rights such as laws; instead, they overwhelmingly rely on social convention and customary property rights systems (Rosenzweig, 1988). Third parties, particularly the state, have tended to provide little, if any, of the infrastructure needed to strengthen property rights between these systems such as roads, public identification systems such as birth certificates, functioning and effective courts.

Without third party support, firms operating as principals incur greater transaction costs developing and operating mechanisms to address moral hazard. This is a particular challenge because banks usually have little, if any, presence in rural frontier communities. This creates a challenge for people and firms trying to find safe locations for storing money, including cash and e-money. This is because a combination of a bank's business model (comprising intermediating deposits and providing loans, holding liquidity and

capital, and extensive governance arrangements) and prudential regulation (particularly deposit insurance) enable this type of firm to store funds obtained from the public over long periods.[13] The relative absence of banks in rural and frontier areas means that firms must develop costly alternatives, which the paper explores below.

Furthermore, the lack of third-party support means that property rights systems are decentralized – localized systems – and so firms must develop innovative mechanisms to understand and then slot within such systems. Mobile money firms have appeared able to do that as explored in the context of Mali, below.

3. Mobile money in Mali

Financial exclusion in Mali was significant in 2014. Just 8% of the population held a formal bank account. About 11 million lived in rural areas (at the time of the GSMA study, this comprised of 61% of the Malian population)[14] and 42% of the population lived below the poverty line. [15]

The mobile money sector grew from 2013 when Orange Mali, a mobile money firm, launched 'Orange Money'. The service provided airtime top-up, P2P transfer (domestic), merchant payment, international remittances, and bill payment. By 2014, mobile networks covered over 40% of the Malian territory, and 40% of the population used a mobile phone (GSMA, 2015). By 2014, Orange Mali processed value equivalent to over 20% of Mali's Gross Domestic Product (GSMA, 2015).

However, Orange Mali faced the same problem still confronting many mobile money firms: how to build cash merchant liquidity systems in rural areas. Just 15% of Orange Mali's cash merchants operated in rural areas (GSMA, 2015). The firm wanted to expand into rural areas.[16]

Consistent with the theme of this paper, Orange Mali could not design the one contractual innovation for its cash merchant system which would operate effectively across the entire country. This is because of the differences in property rights systems between urban and rural areas in Mali, and between rural communities across the country. The next section explores these property right systems in greater detail.

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13   See a discussion of the operation of banks in Armour et al (2016).

14   GSMA, "Spotlight on Rural Supply: Critical Factors to Create Successful Mobile Money Agents" 2015), page 8. Note the GSMA report defined Rural as 5km outside an urban centre and 10km outside a capital city. The data is based on a transactional analysis conducted in May 2014 in Mali, page 9).

15   See a discussion of the urban rural divide in Jeffrey Bloem of the US Department of Agriculture (2021) <https://www.ers.usda.gov/amber-waves/2021/june/mali-s-rural-urban-gap-in-food-security-vanished-amid-the-coronavirus-pandemic/>

16   GSMA (2015)

The Context for tansacting in Mali

Mali is one of the largest countries in Africa with a relatively small population of 21,120,000, which is largely centred along the Niger River. The Bambara (Bamana) ethnic group and language predominate, with several other groups, including the Fulani (Fulbe), Dogon, and Tuareg—also present in the population. Agriculture is the dominant economic sector in the country, with cotton production, cattle and camel herding, and fishing among the major activities.[17]

Mali

A mobile money firm is likely to tailor its contracts for liquidity management between urban and rural areas of Mali because of the different types of property rights systems between these types of communities. Property rights systems in urban areas are much more formal, and in rural communities they are largely based on informal, local, customary systems. Most people in frontier communities had little or no interaction with the formal judiciary.[18] Roads between urban and rural areas

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17   Encyclopedia Britannia, 'Mali': <https://www.britannica.com/place/Mali>.

18   See a discussion of weak rural infrastructure, lack of rural trust in formal legal systems, use of customer and social norms in rural areas of Mali. See Moussa P. Blimpo, Robin Harding, and Leonard Wantchekon, 'Public Investment in Rural Infrastructure: Some Political Economy Considerations' (2012). <https://scholar.princeton.edu/lwantche/files/BlimpoHardingWantchekon042013.pdf>.

are also relatively weak. There is a broad divide between formal law enforcement in urban areas (largely provided by courts and police) and informal approaches in rural communities, tending to revolve around village chiefs and justices of the peace. There was little interaction between the two types of property right systems.[19] There is relatively little information on people in rural areas due to lack of birth registration and other factors. There was also significant variation between property rights systems across communities.

Mobile money

Mobile money has had some success in moving into rural and frontier areas of Mali, other countries of Africa and other developing countries, despite the issue of moral hazard and the weak property rights between urban and rural communities.[20] A person can deposit, store, transfer and withdraw funds from her mobile money account, much like a bank account. Safaricom, a Vodacom partner, launched the world's first major mobile money service in 2007 in Kenya. There are now 866 million mobile money accounts overwhelmingly located in Africa.

This paper focuses on how mobile money firms, operating as principals, solve moral hazard problems among agents. Agents are independent contractors comprising people and small organizations (such as corner stores, petrol stations and other retail outlets) in the formal and informal sectors. Some agent networks are very extensive; for example, M-Pesa in Kenya alone has 180,000 agents. Such schemes often involve other actors, including banks and marketing companies which monitor and otherwise support the operation of agents.

The question then arises of how mobile money firms adapt their tools from mechanism design to address moral hazard problems across the different communities in which they operate.

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19   This is due to other reasons, administrative backlogs, and an insufficient number of lawyers, particularly in rural areas. https://2009-2017.state.gov/documents/organization/252915.pdf.

20   This growth has emerged through regulatory deployments permitting increased contractual and organizational innovation and the advent and spread of mobile phones, which has increased and spread rapidly across Africa and other parts of the developing world. The number of mobile phones increased from zero in 2000 to over 747 million by 2018. See GSMA, The Mobile Economy, 2019 < https://www.gsma.com/subsaharanafrica/resources/the-mobile-economy-sub-saharan-africa-2019>.

Operation of mobile money agents and moral hazard problem
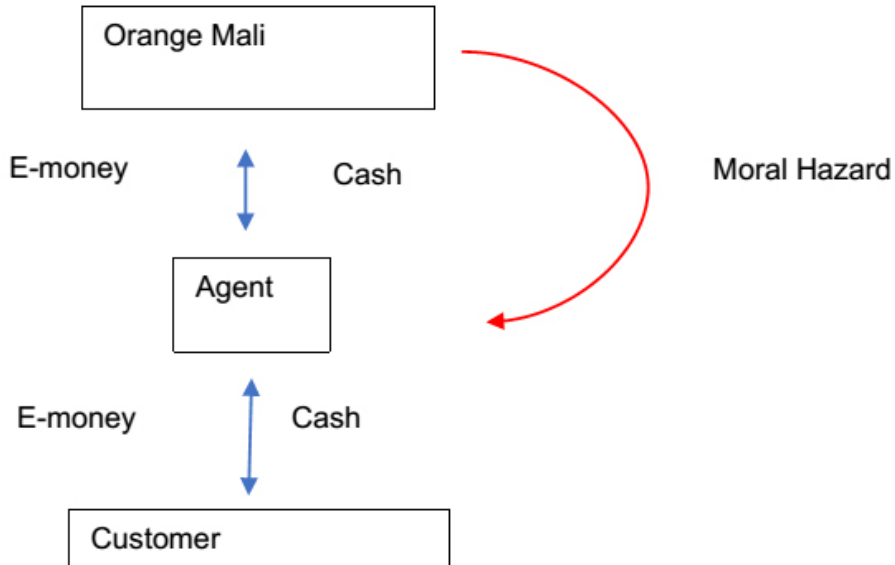
Material from a 2015 industry study, discussed below, provides methods for comparing organizational arrangements, which a mobile money firm uses as principal with agents in urban and rural areas.

Data to explore contractual variation

The data for exploring contractual variation between cash merchants in rural versus frontier areas comes from a 2015 report released by the Mobile Money of the Unbanked (MMU) programme provided by the Groupe Speciale Mobile Association (GSMA). The GSMA is an industry organization representing mobile operators and organizations across the mobile ecosystem and adjacent industries.[21]

In 2014, the GSMA conducted an empirical analysis of mobile money cash merchants used by Orange Money, a mobile money service, in Mali (GSMA, 2015). The GSMA gathered this data as part of a broader goal of understanding how 'successful' rural cash merchants operate. While this term was not specifically defined, broadly GSMA appeared to mean cash merchants with high levels of transaction history, compared to active (with a moderate amount) and ultimately dormant (with little or no transaction activity) (GSMA, 2015). Doing so could better support the mobile money industry in understanding how mobile money firms should adapt their operational strategies to service more remote locations and identify the ones upon which to first focus (GSMA, 2015).

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21   See information in GSMA, <https://www.gsma.com/aboutus/>.

The GSMA conducted research through three stages and an analysis of six months of transactional data:[22]

1. Transactional data analytics leveraged Call Detail Records (CDRs) from mobile money cash merchants and customers to gain granular knowledge of each market, in addition to transactional data for cash merchants and customers. The transactional data analysis was primarily used to segment and geo-locate cash merchants to create a baseline for defining successful cash merchants in rural areas. The GSMA analysed one month of CDR data for all mobile money cash merchants, all mobile money customers, and 50,000 random GSM customers, in addition to one month of mobile money transactional data for all mobile money cash merchants and mobile money customers.

2. Quantitative phone-based interviews with a total of 2,000 mobile money cash merchants, selected based on their location (urban versus rural) and their activity level (dormant, active, or successful).

3. Field-based interviews with 500 mobile money cash merchants, face-to-face, to capture more in-depth qualitative information. In each market, an additional 40 field-based interviews were done with aggregators. To ensure data collection and analysis were consistent across markets, the criteria for both urban and rural cash merchants, and dormant, active, and successful cash merchants, were clearly defined.

Framework and hypothesis

This paper explores the impact of surroundings on methods to solve moral hazard problems among urban agents as opposed to rural agents through the framework below. This framework aims to combine insights from literature covering property rights, mechanism design, and Elinor Ostrom and her colleagues, particularly the Institutional Analysis and Development (IAD) framework. The framework is designed to be tentative only, serving to obtain initial data for this paper and help encourage additional scholarship, and examining the interplay between organizational arrangements, particularly those to address moral hazard, and property right systems.

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22   GSMA (2015), see discussion of methodology in Appendix and page 8.

Framework for analysis
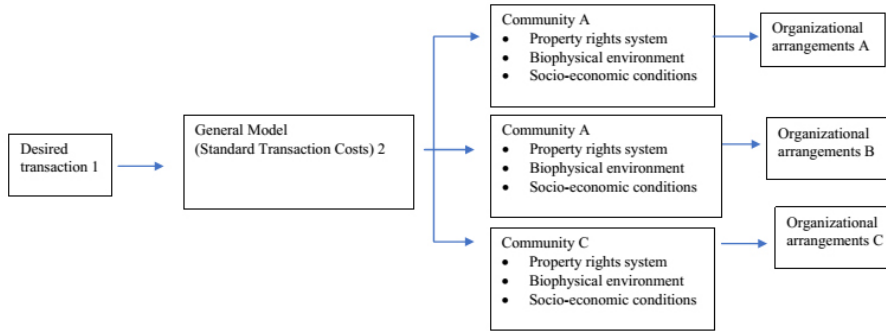
The desired transaction (Box 1), among agent networks is 'liquidity'. This involves enabling people to deposit and withdraw funds from their mobile money account, much like a bank branch or an Automated Teller Machine (ATM). Agents engage in liquidity management, managing their reserves of e-money and cash so that they can always honour customers' demands for one or the other (Kiarie et al, 2018). Each agent obtains reserves of e-money, which it needs to provide liquidity. The agent provides cash to an Orange Mali branch (or a bank branch with reserves of Orange Mali, email, or cash). In exchange, agents obtain an equivalent amount of electronic money or 'e-money' in their Orange Mali account. The agent then distributes that e-money throughout its network for agents.

The template organizational arrangement (Box 2) is the generalized scheme that Orange Mali might use to address moral hazard among its agents. Such a scheme will seek to address standard transaction costs emerging through the nature of the transaction, in this case whether the good is excludable or subtractable. Mobile money deals with a private good and actors will need to incur costs excluding others from using the good. For example, an agent will need to incur costs protecting cash stored on her premises to be used for mobile money transactions.

This scheme will also address transaction costs emerging from the nature of the transaction, which is a moral hazard problem. This is because the agent may fail to perform this job effectively and then have insufficient e-money or cash to honour customers' requests to deposit or withdraw money, much like an 'out of order' ATM or bank branch. This is because the agent may decide to reallocate her reserves of e-money or cash for other purposes. For example, an agent who also runs a laundromat service may decide to invest her cash reserves into that business. Moral hazard problems are particularly feasible because agents are usually granted considerable autonomy to build sub-agent networks.

The third box aims to explore how Orange Mali, as principal, varies its toolkit for addressing moral hazard across different surroundings, which are different communities in which the firm provides mobile money through agent networks. This involves the

exogenous variables that the IAD framework provided – biophysical conditions and socio-economic conditions – and, of particular interest to this paper, the extent to which the surrounding property rights system strengthens the property rights of people in the deal. As discussed earlier, this involves exploring the extent to which third parties define and transfer property rights, private bonding and monitoring, and other infrastructure to support contracting, such as education.

The data from the GSMA is limited to a broad urban-rural divide. A more nuanced analysis would include several different communities, providing insights on patterns of organizational adaption to different contexts.

4. Hypothesis, findings and explanation

Hypothesis

Consistent with the general hypothesis in this paper, broadly, when property rights are weaker in a surrounding, a principal will draw on tools from mechanism design, which provides more autonomy to the agent. This means that Orange Mali will use organizational arrangements, which provide more autonomy to agents in rural than urban areas. This autonomy enables the principal and agent to work out substitute methods for observation, verification, and enforcement. Orange Mali wants rural agents to be more self-sufficient/autonomous because it does not know what type of organizational arrangements (contract, handshake agreement, firm, etc) is best suited for different rural areas. This autonomy is a form of 'bridge contracts,' specifically designed to 'leapfrog' weak property rights between urban and rural communities, which amplify observability and moral hazard problems.

Bridge contracts will involve three main features. First, the mobile money firm will incur more significant costs learning about locals in rural than urban areas and determining appropriate mechanisms for observability and verifiability. This is because of lack of publicly available information such as postal systems and birth certificates mean the firm will have less understanding of rural property rights system than urban. The firm will need to develop alternative mechanisms to choose local counterparties.

The second is that contracting in rural areas is likely to be more relational in nature due to challenges with observing, verifying and enforcing agreements (Menard and Shirley, 2022). Such contracts tend to shift from mechanisms relying on contractual enforcement to ones that rely on relationships, and will not be enforced through courts (Menard and Shirley, 2022). Instead, such contracts aim to find other mechanisms to determine appropriate compliance levels and enforcement, such as membership in a well-identified community and informal social norms. This is because of high verification costs in such rural areas.

The third is lower levels of performance, and which level of performance is acceptable to both parties. This is because parties accept that contextual matters mean they cannot fully align incentives. Alternatively, even if they can align incentives, weak property rights outside of their control impede performance of any mechanisms they design

for the purposes of observation and verification. Therefore, this would involve parties, particularly the mobile money firm, accepting a wider set of outcomes in terms of liquidity from a rural rather than urban agent.

Findings

The GSMA's findings suggest that Orange Mali did vary its contractual arrangements for cash merchant liquidity management systems across urban and rural areas of Mali. In particular, the data suggests that Orange Mali used innovative contractual mechanisms to enable its rural cash merchants to be more self-sufficient than cash merchants in rural areas. This variation appears to centre on the following three points.

More information costs

First, before signing a contract, Orange Mali appears to gather significantly more information on rural than urban cash merchants. Despite some variation in market context, rural cash merchants tend to be older, with more established businesses and a broader product portfolio and are the first to market (GSMA, 2019). This suggests that Orange Mali wants its rural cash merchants to operate with less direct oversight than the firm's urban cash merchants. To support this goal, the firm looks for cash merchants, which signals an ability to manage liquidity, which such merchants signal through more established businesses.

Aggregators

Orange Mali also appears to develop complex contractual relationships with non-bank firms in rural areas, which it does not do with urban communities. In the former, cash merchants can store any excess cash with a bank. As discussed above, banks are less prevalent in rural areas of Mali. Given the vacuum of banks, Orange Mali signs contracts with 'aggregators' (GSMA, 2019). These are larger non-banking businesses that provide liquidity management systems, particularly redemption and issuance of e-money and have presence in rural areas. These include petrol (gas) stations, supermarkets, wholesalers, and large telecommunication dealers.

Aggregators become intermediaries who buy cash and e-money (float) from the provider and then resell it to cash merchants. They are typically paid a share of the percentage earned on cash merchant commissions (generally an 80/20 split, with 20% for aggregators), which creates an incentive to encourage sales and transactions at the local level. Much like a bank branch, aggregators tended to help cash merchants manage their liquidity and answer queries about training, branding, technical issues and more (GSMA, 2019).

Aggregators can use their understanding of local context to perform those roles effectively. Aggregators are located much closer to rural cash merchants than Orange Mali branches, which appears to increase the likelihood that cash merchants will effectively manage their liquidity (GSMA, 2019). Finally, aggregators can leverage their personal relationship with cash merchants, something that Orange Mali lacks.

Accepting lower levels of performance in rural areas

Orange Mali accepted lower levels of liquidity in urban than rural areas. Just 13% of very isolated cash merchants were considered successful.[23] Furthermore, most of its cash merchants – 56% – operate near a bank, which is in urban areas. The further these cash merchants are located from banks, commonly in rural areas, the less liquidity they tend to have.[24] However, Orange Mali continued to work with illiquid rural cash merchants, suggesting that the firm's willingness to continue contractual relationships is stronger in such communities, even when the cash merchant is unable to perform its role effectively. The intuition may be that over time, a rural cash merchant will become more effective in managing its liquidity.

Discussion

Broadly, the findings appear to support the contention that weaker property systems, in this case between urban and rural areas, stimulate organizational arrangements which provide more autonomy to local agents. Each method above appears to work towards this end and develop alternative observability and verifiability mechanisms.

Gathering information

Gathering additional information on potential agents serves two purposes in weak property rights systems. One is that it increases the likelihood that the mobile money firm, as principal, chooses a reliable agent who will be able to operate as a largely self-sufficient actor. This is particularly important in rural areas because the weak property rights system means the firm will have challenges observing their actions, and therefore mechanism designs here will require less observation. Furthermore, the absence of banks in rural and frontier areas of Mali makes it particularly important for agents to operate, with little training and support from Orange Mali based in urban areas of Mali. A broad product portfolio provides information on the agent's ability to manage e-money and cash reserves and can provide information that an agent will be able to become a successful agent.

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23 In the GSMA report, 'isolation" is a sub-segment of the rural definition used in this research and refers to a cash merchant's proximity to the nearest road. Cash merchants who are "very isolated" are roughly more than two kilometers from the nearest road, page 12.

24 For example, Helix found that 72% of cash merchants in Uganda are located within 15 minutes of a rebalancing point (Annabel Lee, The Future of Uganda's Mobile Money Market: Why Agent networks Are Key to Growing the Sector, <https://nextbillion.net/the-future-of-ugandas-mobile-money-market/>. Similar trends were observed in Mali and Chad, where the average travel time to a financial institution is 27 minutes, respectively. GSMA, note 23, page 21. Moreover, having access to a bank appears a key enabler of success. For example, in Mali, more than half (56%) of successful cash merchants had access to a formal financial service, and it was a key differentiator from an active cash merchant (page 21).

A related benefit of gathering information on potential agents is finding an agent who is subject to a range of informal arrangements in the community. Such arrangements can substitute for observing and verification tools that Orange Mali may need to introduce. More established agents are subject to non-contractual relationship of trusts with the community. Instead of monitoring agents itself, Orange Mali can rely upon these informal relationships, operated largely by people living in the community, to ensure that the agent broadly complies with her obligations under the mobile money contract.

More relational contracting

Orange Mali's use of agent aggregators is consistent with several components of relational contracting and reduces the need for costly observation and verification. Aggregator actors tend to have pre-existing presence in such communities. By contracting with an agent, the mobile money firm can access their local knowledge and increase the likelihood that Orange Mali agents will operate efficiently (GSMA, 2014). Furthermore, Orange Mali can delegate the tasks of training, branding technology support and more to agent aggregators, who can use their understanding of local context to perform those roles effectively.[25] Furthermore, agent aggregators are located much closer to rural agents than Orange Mali is located, which appears to increase the likelihood that agents will effectively manage their liquidity.[26] Finally, agent aggregators can leverage their personal relationship with agents, something that Orange Mali lacks. The ties and incentives embedded within personal relationships substitute for the limited ability of Orange Mali to observe and monitor agents directly.

5. Conceptual and policy implications

How, if at all, can insights from this paper, particularly the empirical material from Mali, help scholars and policy makers determine whether they can apply engineering economics to Africa and other developing and middle-income regions? As discussed, this involves including contextual factors – laws, culture, local norms, and other factors – in analysis of what people are doing and how, if at all, to shape the agreements they operate.

The key insight from the paper involves being the type of doctor who studies a patient's symptoms and then prescribes medication. This involves moving away from a one-size-fits-all approach to designing mechanisms, contractual provisions, and other organizational arrangements that engineering economics is increasingly proposing. Instead, firms and policy makers should adopt mechanisms that will better 'fit' with

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25   A further 50% of agents reported that their master agent was the first person they called when they faced any type of problem. GSMA (2014).

26   Mali followed a similar trend: 60% of agents reported it is always their master agent who visits them.

individual property rights systems. Scholars and policy makers must take this contextual approach because, as the Malian example demonstrates, contextual matters impact appropriate organizational arrangements.[27]

The section below explores how the findings from this paper could apply to a subset of engineering economics. These are 'random control trials'.

Introduction to RCTs

Random control trials (RCTs) have multiplied in number, particularly since the 2019 Nobel Prize in economics was awarded to three pioneers of this tool, Michael Kremer, Abhijit Banerjee, and Esther Duflo. Usually, RCTs involve randomly allocating a treatment to some members of a group and comparing outcomes against the remaining members who did not receive treatment (Muller et al, 2019). The idea is that RCTs allow us to know what works for international development due to its so-called "experimental" approach. For example, a scholar wishing to test whether providing credit helps to grow small firms might partner with a financial organization and randomly allocate credit to applicants that meet certain basic requirements. A year later, the researcher would compare changes in sales or employment in small firms that received the credit to those that did not. Particularly prominent RCTs have involved experiments in Kenya and India on teacher attendance (Duflo et al, 2012), the extent to which, if at all, providing textbooks increases test scores, the effect of monitoring nurse attendance (Banerjee et al, 2008), and the impact of micro-credit on the lives of borrowers (Banerjee et al, 2015).

The Nobel Committee awarded the 2019 prize to Kremer, Banerjee, and Duflo on the grounds that "their experimental approach to alleviating global poverty" has "transformed development economics" (Barnes, 2019). International organizations have driven the use of RCTs to the purpose which the Nobel Committee identified, particularly the Abdul Latif Jameel Poverty Action Lab (J-PAL). Duflo and Banerjee created J-PAL in 2003. Since then, J-PAL has conducted 876 policy experiments in 80 countries (Banerjee, 2018). RCT programmes that have been scaled up after evaluation by the network's researchers have reached more than 400 million people (Barnes, 2019). This figure does not include evaluations and field experiments implemented by development economists not affiliated with J-PAL, such as the International Initiative for Impact Evaluation (Barnes, 2019).

Advocates of RCTs argue that this method provides the most reliable evidence upon which governments should make policy. Such evidence is consistent with the broader international emphasize on "evidence-based policy", comprising "objective", "rigorous" and "rational" information, and analysis (Muller et al, 2019).

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27   The GSMA report concludes by stating "local context matters" to developing appropriate agent relationships and contracts. GSMA, note 23. page 26.

Critiques

In recent years, scholars have raised a range of concerns about the ability of RCTs to inform public debate about economic development. Critics claim that many experiments violate ethical principles.[28] Others claim that RCTs detract from rather than support international development (Chelwa and Muller, 2019).

This paper focuses on several methodological concerns raised by scholars.[29] For example, problems with quality of data in household surveys hampers the most basic understanding of growth, poverty, and inequality.[30] Sampling is also a potential challenge given that the village or clusters that are part of the treatment and the control group itself are not always randomly drawn.[31] Heterogenous treatment effects can contribute to over-claiming.[32]

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28   Stephane J Baele, 2013.

29   See, for example, Deaton and Cartwright (2018) who claim that that researchers put "too much trust" into investigation methodologies concerning RCTs-Deaton and Cartwright, 'Understanding and Misunderstanding Randomized Control Trials'

30   Deaton (2016), pp. 1223. The scholars focus on India given the difference between national and household survey estimates of per capita income levels in the country

31   Instead, the claim goes that usually populations chosen are a convenient sample that is available to those running the experiments/RCT. Therefore, the sample used for computing average treatment effects might not provide representative estimates of the average treatment effect of the program. For example, household (HH) surveys in Africa are "often weak, often outdated, are sometimes inconsistent over time within countries, have nonmatching definitions – different reporting periods, or are surveyed at different times of the year, either over time or over countries, so that it is extremely difficult…to make comparisons of poverty or inequality between countries". It is to be noted that HH surveys focus on global poverty and global inequality wherein the former requires HH survey data to understand uniformity which in turn leads to issues in the global context (Deaton, 2016: 1224

32   Further, that the average treatment effect obtained from any given RCT may be in fact only as good as the study sample from which it was obtained leading to heterogenous treatment effects, which in turn contribute to over-claiming. A useful example of this would be in the context of Purchasing Power Parity (PPP) rates wherein problems arise because this index "has properties that are not always well understood". (Deaton 2016), pp. 1225. Often PPP indexes are subject to change owing to "substantial methodological revisions" although variations may also arise owing to the choice of goods for sampling, the sampling of prices itself, choice of index formulae (eg. Laspeyres/Paasche).

This paper examines a particular methodological problem, which is the challenges of applying results from RCTs in one context to another. Scholars have begun to argue that without understanding context, governments and firms that use the results of RCTs can claim external validity too easily, meaning they can extrapolate and generalize the results of their findings across otherwise unrelated communities.[33]

Here, 'context' means the property rights system operating around the people who will be subject to an RCT, and ignoring it is a mistake because it is often much more complex than outsiders might presume. Breakthroughs in anthropology and economic development have established that local communities often operate a much more sophisticated local property rights systems than initially presumed.[34] Material from Prof. Elinor Ostrom and her colleagues is particularly informative in identifying the complex ecosystems of property rights, which people use to manage common pool resources (Ostrom, 1990).

Increasingly, scholars in economic development and neighbouring disciplines, such as medicine, are claiming that 'context' matters for the design of RCTs.[35] For example, as Cowen et al (2017: 265-92) explain:

> Some interventions will work only because of very special circumstances; they can work in some places but don't have a widespread potential to succeed. Even those that have widespread potential do not operate on their own; they will work only when the requisite support factors are in place, or some suitable substitute for them.[36]

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33   See a related point in Deaton and Cartwright, Understanding and misunderstanding Randomized Control Trials, 'Abstract'

34   See, for example, J. Ensminger, "Making a Market: The Institutional Transformation of an African Society" (Political Economy of Institutions and Decisions).

35   McCormack et al, 2002; Seckinelgin, 2016; Waters et al, 2006, 288; White n.d.

36   See also L. Pritchett and J. Sandefur, 'Learning from Experiments when Context Matters'. Our results suggest that as policymakers draw lessons from experimental impact evaluations, they would do well to focus attention on heterogeneity in program design, context, and impacts, and may learn little from meta-analyses or "systematic reviews" that focus exclusively on rigorous estimates of aver- age effects for broad classes of interventions (e.g., microcredit) across contexts that differ in income by an order of magnitude, and with big differences in social, institutional, political, and infrastructure conditions.. See also As Pritchett and Sandefur also point out, empirical heterogeneity across contexts in nonexperimental estimates of treatment effects in development economics is large: (Pritchett and Sandefur 2015:473). See especially Cowen et al (2017).

Despite the growing acceptance of the importance of context, many scholars are unsure how to incorporate this feature in either the design of RCTs or the extrapolations to be taken from them.[37] This is at least partly because of lack of understanding about what comprises context and then a lack of attention to it.[38]

Failing to analyse a community before designing an RCT creates two limitations. One, scholars do not understand the most pressing constraints in a community, and thus the jobs an RCT should perform. Scholars believe they know the problem to be solved and that the RCT should provide incentives to solve that problem. Without studying a community, scholars cannot know that problem. Such scholars are behaving like a doctor who prescribes medication ('solution') for a patient (a community) without asking the patient about her symptoms (the property rights systems and imperfections with it).

Another related problem is that without studying a community, scholars face difficulties in explaining the outcome of an RCT. A range of academic material has explained that a key reason for people's behaviour is the context in which they operate.[39] Without including context in a meaningful way, scholars struggle to explain what has happened.

Relevance for financial Inclusion

Failing to understand context impedes the usefulness of RCTs for financial inclusion. This is because many developing countries operate in highly decentralized property rights systems, making it difficult to extrapolate between two communities. Rural and frontier communities tend to operate on local, informal property rights systems, often based on customary rules, with little or no interaction with the formal government or firms.[40] Such communities often vary significantly from each other, particularly in countries with weak states. For example, over 75% of Nigerians live in rural, largely decentralized communities comprising a variety of customs, languages, and traditions among the country's 250 ethnic groups.[41] The relative weakness with the Nigerian State stems from many rural and frontier areas in Nigeria, operating as largely self-governing

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37   See for example, Cowen et al, who claim that "That context matters is fast becoming accepted across the EBP literature, but its substantive implications are not."

38   See, for example, Pritchett and Sandefur, who claim that context includes a long list of unknown factors which interact in often unknown ways". Pritchett and Sandefur, Learning from Experiments where Context Matters, pp. 474.

39   Again, the literature is far too extensive to cite in this paper. An interesting starting point is Granovetter (1985).

40   Generally low-income, rural communities operate through informal, irregular employment, with little if any recourse to formal contracts and other enforcement organizations such as courts. (Rutherford, note 8, 2009).

41   "Demographics of Nigeria." n.d. Accessed September 27, 2022. <https://www.cs.mcgill.ca/~rwest/wikispeedia/wpcd/wp/d/Demographics_of_Nigeria.htm>.

communities (Akinola, 2008). In turn, this means that any firm or government seeking to move into such communities may need to adapt their products, contracts, and other arrangements so that they can 'fit in' with such communities.[42]

Without understanding context, scholars will struggle to design RCTs that enable firms to move beyond urban areas into these largely decentralized rural and frontier communities. Scholars will also struggle to understand the results of any RCTs they design.

An RCT in-context approach, introduced above, can help design more tailored RCTs and is appropriate given it matches what firms are already doing. The next section explains how empirical data from the paper can inform an RCT in context approach.

Using results from the paper

How, if at all, can insights from this paper, particularly the empirical material from Mali, help scholars and policy makers design effective RCTs, particularly for the purposes of financial inclusion? This paper can contribute to beginning a discussion on this process.

A key insight from the Mali data is the importance of moving away from a blanket, nationwide approach, to designing RCTs and related interventions. Instead, scholars and policy makers should use a more nuanced approach involving designing interventions that can work effectively in specific communities. This involves designing RCTs that are appropriate for the 'context' in which they are designed to operate. Such RCTs must explore how to support people in performing jobs that are appropriate for that context.

An RCT in context approach reveals that scholars may need to think creatively and design interventions that are specifically suited for rural communities, as opposed to urban areas. Such interventions should be targeted still further by being adapted across different types of rural communities.

The following provide several potential starting points for designing RCTs that are specifically suited for rural areas, given the limitations with roads and other infrastructure, lack of banks, and other factors discussed earlier in this paper. Such starting points are preliminary only and should be adapted for individual communities.

One avenue involves designing innovative technological innovations specifically designed to stimulate contracting in rural areas, given the challenges of using traditional contracting techniques. For example, scholars could experiment with analysing telecommuting call records (CDR) and mobile money transactional data. Doing so could help firms identify regions with higher transactional potential in which cash merchants might operate profitability.

Firms could also experiment with contractual innovations in rural areas, and carefully designed RCTs could support this process. Firms could also follow the broad approach that Orange Mali uses, in which a potential cash merchant has a wider product portfolio, illustrating this person's ability to invest in mobile money.

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42   See related material in GSMA (2015)

A related intervention would involve RCTs that try to help build aggregators in urban areas. The data on Orange Mali suggests that such actors are particularly important. The key would involve trying to understand how to build aggregators in different environments, such as different strategies across urban to rural and between rural communities.

RCTs could also revolve around new payment products specifically tailored to rural customers and other contractual innovations that might support cash merchants in such communities. This could include training cash merchants with tools to launch additional ancillary businesses, and developing partnerships with companies in other industries, including agricultural suppliers. These could come from a range of sources such as petrol station networks and fast-moving consumer goods sectors that already operate in rural areas (Unnikrishnan, 2019). RCTs could explore the extent to which partnerships enable mobile money firms to identify and recruit potential cash merchants and manage existing cash merchant networks.

Scholars could also stimulate RCTs through government policies. For example, scholars could design an RCT that involves digitizing direct benefit transfer payments to rural areas (GSMA, 2015). Doing so could potentially begin the process of growing demand, which then makes agent networks viable. Governments could also provide subsidies or revenue guarantees for mobile money firms trying to build rural agent networks as a means of subsidizing the risk (GSMA, 2015). Also, it has become increasingly common for governments to make mobile money firms liable for actions of their agents.[43] Doing so could potentially make mobile money firms more conservative on their choice of agents and refuse to move into rural areas. Policy makers may consider trials of not making mobile money firms liable for their agents and observe the impact of growth. To that end, one RCT might involve exploring the extent to which regulating cash merchants more lightly in rural areas stimulates the formation of cash merchants.

Going further

Scholars need several tools to better understand how to design context-specific RCTs. One of these is the operation of property rights systems in a specific community. Current strands of property rights focus on the extent to which actors define, defend, and transfer property rights (Anderson and McChesney, 2003). Other scholars such as Ostrom (1990) focus on property rights systems within common pool resources. The next steps involve trying to pull together these streams of research to understand the operation of property rights within a certain community.

The next related stream of required research is understanding the binding constraints within an individual community, which is relevant to understanding what an RCT should do in that community. What part of a property rights systems is breaking down? An RCT

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43   Section 14(4) of Kenya's National Payment System Regulations was a first mover, later copied by many countries (examples).

should aim to fix such a problem. To this end, one approach to developing this line of research involves exploring the type of diagnostics that economics has produced, particularly the work in the past 20 years on this topic (Rodrik, 2010).

Finally, research is needed into the interaction between organizational arrangements (contracts, firms, informal arrangements) and surrounding property rights systems, including institutions. This is relevant for trying to project the consequences of choosing an RCT in each context. For example, this involves understanding how a contract might operate in Nairobi, Kenya (where roads, courts, and other components of a property rights system operate relatively well) compared to Wajir, Kenya (where these component parts operate much more poorly). Currently, there is little research in understanding the interaction process discussed above. Instead, research tends to focus on firms, organizations (such as the work of Oliver Williamson) or institutions (such as the work of Douglass North) (Ménard, 2014).

6. Conclusion

A deeper understanding of transaction costs emerges from the property rights system surrounding people wanting to work collectively and can enable scholars and policy makers to adapt mechanism design, market design and related fields of economics to new environments, particularly communities in Africa and other developing and middle-income regions. Primarily, data from mobile money in Mali suggests that the boundaries of the firm are shaped by far more factors than hold up problems: lack of infrastructure and information on particular communities appear relevant.

Moving forward, scholarship needs to begin by clearly linking organizational arrangements with contextual variables. Section 5 of this paper provides primarily ideas for such an appropriate study for doing so. Moving forward, scholars could look for patterns between desired organizational arrangements and actual arrangements once contextual factors are considered.

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4

Digital Financial Services and Implications of Financial Literacy on Gender and Over-Indebtedness: The Case of Kenya

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Abstract

This study examines the relationship between financial literacy and over-indebtedness from a gender perspective and considering increased usage of digital financial services. The study used both primary and secondary data sourced from the FinAccess Household Survey 2021. The results show that although gender gaps in access and usage have declined over time, disparities still exist in terms of utilization of different components of financial products, financial literacy and indebtedness. Specifically, the results show that women prefer informal channels of credit services such as Chamas compared to men whose preference is formal channels. The results further show that both formal education and financial literacy lower the probability of over-indebtedness, and that women are less financially literate than men and, for that reason, have higher chances of being over-indebted than men. The results also reveal that there is a huge demand for financial education, and that slightly more than a quarter of the surveyed population is aware of credit reference bureaus and less than a quarter can access and use them despite their significance in minimizing information asymmetry, improving credit pricing, and minimizing default rates. Based on the results, the study provides three recommendations. First, development of customized financial initiatives targeting different customer segments including women would be beneficial in minimizing financial literacy gaps and over-indebtedness. Second, the terms and conditions of loans

that form an important financial decision-making tool need to be reviewed at industry and regulatory level, with an objective of making them simple, readable, concise and user-friendly. Thirdly, enhancement of access, usage, and awareness of CRBs can be an important policy tool for minimizing over-indebtedness.

Keywords: *Digitalization, financial education, gender, indebtedness*

1. Introduction

The role of financial inclusion in promoting development and alleviating poverty continues to receive increasing attention especially in Sub-Saharan Africa (SSA), where most of the population is financially excluded. According to World Development Indicators (World Bank, 2017), only 42.6% of the total population in SSA had an account at a financial institution or with a mobile-money-service provider in 2017, in contrast to high-income countries whose financial inclusion was 93.7% of the population based on the same indicator. Although great strides have been made towards financial inclusion in some SSA countries, facilitated by advances in financial technology, gender gaps remain. For example, in 2017, 48.4% of the population with account ownership at a financial institution or with a mobile-money-service provider in SSA were male while only 36.9% were female, compared with 94.5% and 92.9% male and female account holders, respectively, in high-income countries.

Relative to other African countries, Kenya's financial sector has undergone significant transformation and development, driven by digitalization and increased use of mobile phones leading to an upsurge in financial inclusion (Ndung'u, 2019). The 2021 FinAccess Household Survey (CBK, KNBS and FSD, 2021) in Kenya shows that access to formal financial services and products has increased significantly over the years from 26.7% in 2006 to 83.7% in 2021, attributed to innovation in mobile money and banking. In terms of usage, mobile money and bank services recorded the largest growth while digital loans slowed down. Usage of mobile money grew from 27.9% in 2009 to 81.4% in 2021. A key feature of this growth is the increased uptake of 'Fuliza',[1] a mobile-based overdraft facility offered by a consortium of banks in Kenya. However, the use of digital applications recorded the largest drop in 2021 to 2.1% from a significant growth in 2019 of 8.3%, reflecting a shift in preferences from previously non-regulated digital loans[2] to formal digital loans of 'fuliza' and other mobile bank loans. The gender gap in terms of access has also declined from 12.7% in 2006 to 4.2% in 2021 as more women access financial services and products (CBK, KNBS and FSD, 2021).

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1   Fuliza is a digital overdraft facility launched in January 2019 and is offered by selected commercial banks through the Safaricom mobile money operator.

2   The Central Bank of Kenya (Amendment) Act, 2021 became effective 23 December 2021. The Amendment provides the Central Bank of Kenya (CBK) with the powers to license and oversight the previously unregulated digital credit providers.

Whereas these impressive developments portend a promising financial system, a few areas of concern on usage and quality have emerged. First is the issue regarding the relationship between increased use of Digital Financial Services (DFS) and financial literacy and whether this relationship has implications on indebtedness and gender disparities. Analysis of this linkage is important in view of the observation that provision of DFS is more focused on a person's willingness to repay rather than their ability to repay as per the algorithms displayed on most of the digital platforms. Consequently, most digital loan seekers engage in multiple borrowing, with over one-third having tried accessing loans from more than one digital lender and nearly half reporting late loan repayments (Totolo, 2018). This flaw has manifested itself in over-indebtedness brought about by debt cycle and loan stacking, partly attributed to the ease and speed at which loans are approved on digital platforms.

Analysis undertaken by MicroSave Consulting (2019) showed that out of the digital loans taken between 2016 and 2018, 2.2 million individuals in Kenya had non-performing loans and had been negatively listed for late payment or default with a credit reference bureau (Gubbins and Totolo, 2018; Mustafa et al, 2017). The percentage of non-performing loans was 16% for digital loans compared with 5% for traditional products. In addition, 62% of the borrowers had more than one digital loan, due to low loan limits coupled with short tenures. The rapid expansion of digital credit providers and easy access to loans in an environment of low financial literacy and numeracy has made consumers more vulnerable to over-borrowing, thus reversing the financial inclusion and welfare gains.

Second is the issue of present bias (self-control) on the part of the consumer, arising from behavioural tendencies that do not factor intertemporal horizons when making decisions (Xiao and Porto, 2019; Dick and Jaroszek, 2013). Past studies show that digital credit users can be segmented into three behavioural categories, which imply different risk profiles for indebtedness, product design, and marketing strategies. Of interest is the borrower who is unaware of credit terms and conditions, ignores repayment reminders, has multiple loans and does not understand the implications of negative listing by credit reference bureaus (CRBs). Consumers with self-control problems and who are not financially literate are also likely to take advantage of easy access to high-cost credit, or to be taken advantage of. A positive relationship is found between consumer behaviour (lack of self-control) and financial illiteracy and non-payment of credit and over-indebtedness (Gathergood, 2011). The theory of financial education assumes that poor financial health, including over-indebtedness, is caused by poor financial decisions resulting from lack of financial knowledge/literacy.[3] Empirical studies have also found this relationship to be true, particularly for Thailand (Rojrathanachai 2019; Moenjak et al, 2020).

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3   Financial literacy is a combination of awareness, knowledge, attitude and behaviour necessary to make sound financial decisions (FinAccess Household Survey, 2019; OECD 2016; French and McKillop, 2016). Financial knowledge is particularly important as it enables a consumer to compare financial products and services and make informed decisions.

According to the 2021 FinAccess Household Survey, the main source of financial advice was from friends and family at 45%, then 'self' at 43.3%. This is a reversal from the previous survey of 2019 where more people relied on self for financial advice. This financial behaviour is nonetheless wanting, given financial literacy is still limited to a small population. Moreover, in terms of gender, the survey results showed that 50% of females relied more on friends/family and group/Chama for financial advice compared to 39.4% of males. Financial knowledge for females was relatively low with 55.6% not able to accurately compute a 10% interest rate on Ksh 10,000 loan, implying that they are therefore unable to understand the cost of borrowing or interpret it correctly. The survey also showed that 32.8% of females could either not read short messages service (SMS) or interpreted it incorrectly. This is a clear indication of the glaring dangers of low financial literacy levels and uptake of financial services, particularly among women, which may contribute to growing indebtedness, among other outcomes. Moreover, women risk being left behind in exploiting the opportunities availed by DFS in promoting well-being and development.

Previous research shows that digital literacy is lower among women. In particular, existing evidence indicates that women struggle to understand terms and conditions from lenders and especially digital ones. As a result, they shy away from app-based lenders due to lack of understanding and awareness on how to navigate app-based user interfaces (MSC, 2019). This is manifested in the usage of the Internet to pay bills or buy goods online. Whereas, on average, 33% of males used the Internet to pay bills or buy goods online, only 20% of females used the Internet for similar services in 2017 (Demirgüç-Kunt, et al, 2020).

In view of the foregoing background, to boost uptake of digital financial products, there is a need for more work not only in enhancing financial literacy, but also closing the gender gaps. This study, therefore, seeks to address the following research questions:

1. What is the extent and performance of DFS in Kenya by gender?

2. Are there gender disparities in usage of DFS?

3. Does financial literacy differ across gender?

4. What is the role of financial literacy in the usage of DFS? Has it led to over-indebtedness?

Objectives

In relation to the research questions, the key objective of the study is to analyse digital financial services and the implications of financial literacy on over indebtedness in Kenya. Specifically, the study aims to:

1. Describe the extent and performance of digital financial services in Kenya by gender.

2. Assess the role of financial literacy in the uptake and use of digital financial services.

3. Analyse the impact of financial literacy on over-indebtedness in Kenya.

The study applies both descriptive and quantitative methods and uses secondary and primary data sets to analyse DFS and implications of financial literacy on gender and over-indebtedness in Kenya. The analysis draws from 2021 FinAccess Household Survey (CBK, KNBS and FSD, 2021), Global Findex Database (Demirgüç-Kunt, et al, 2020) and Central Bank of Kenya data sources. A detailed exploration of these data sets is undertaken to establish the extent and performance of DFS by gender and levels of financial literacy. Besides the nationwide FinAccess Household Surveys, primary data is collected to assess uptake of financial education and its implications on indebtedness.

The rest of the paper is organized as follows: Section two provides a detailed descriptive analysis of available data relating to digital financial services, gender, and financial literacy. The descriptive analysis seeks to partly address objectives one and two of the study. Section three discusses the relevant theoretical and empirical literature backing the study. Section four provides a brief write-up on the methodology used in the study while section five discusses the primary survey and regression findings. Section six concludes the paper and gives some policy recommendations.

2. Digital financial services, financial literacy and gender
Access and usage of financial products and services by gender

In Kenya, access to formal financial services and products has grown over the years. In 2021, overall access expanded to 83.8% compared to 83.0% in 2019. The improvement was attributed to improvements in digital technology, modern business models, and financial innovations, especially in mobile money and mobile banking products (CBK, KNBS and FSD, 2021). The gender gap in access to formal financial services and products has also narrowed since 2006 from 12.7% to 4.2% in 2021. In 2021, 81.7% of women compared to 85.9% of men had access to formal financial services and products. The figure below shows access to financial services by gender. Compared to other countries in the region, the gender gap is smallest in Kenya at 4.2% in 2021, 7.0% in Rwanda in 2020, and largest at 9.0% in Tanzania (2017) and Uganda (2018), respectively.

Formal access strand by gender
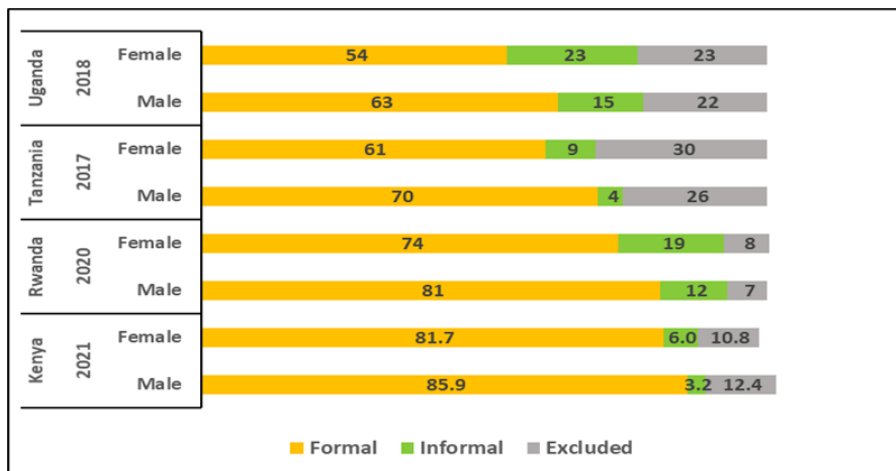
Source: FinAccess Household Survey, Various years and countries in East African Community (EAC)

Digital financial services have continued to gain prominence in Kenya. In particular, the integration of mobile money into the banking system has not only increased financial inclusion but also facilitated the usage of financial services and products (Misati et al, 2021; Ndung'u, 2019). Since the onset of the COVID-19 pandemic in 2020, there has been a significant increase in the use of digital financial services, which has enabled cashless transactions, amidst calls for social distancing and containment measures to mitigate the spread of the virus. This promoted the usage of mobile money, which increased to 81.4% in 2021 from 79.4% in 2019. Similarly, mobile banking expanded by 9.1 basis points to 34.4% in 2021, mainly attributed to the usage of *Fuliza* digital services, with 18.3% of the respondents having used them in 2021. These trends have been sustained even after the removal of cost reduction emergency measures in 2021, which had been implemented to facilitate increased use of mobile money transactions instead of cash in the context of COVID-19 pandemic. For example, the value and volume of mobile transactions rose from Ksh 148.5 million and Ksh 350.4 billion, respectively, in February 2020 (pre-COVID levels) to Ksh 164.2 million and Ksh 567.9 billion, respectively, in February 2021. In February 2022, the value and volume rose to Ksh 171.3 million and Ksh 568.71 billion, respectively, implying a possibility of entrenched customer habits even after the resumption of mobile charges in 2021.

The total number of mobile payment transactions undertaken through mobile phones by gender indicates that males are the major users, shown by both higher volumes and values compared to females. Mobile transactions by males dominate in both volumes and values, averaging 62% and 51% in the period March 2019 to December 2021, against female averages at 37% and 29%, respectively. The transactions' gender gaps remain large at 25% for volumes and 22% for values, even with the closing gender mobile ownership, indicating perhaps levels of literacy, incomes, usage, and type of phone differentiates uptake of mobile transactions (see following figure).

Total mobile payment transactions by gender
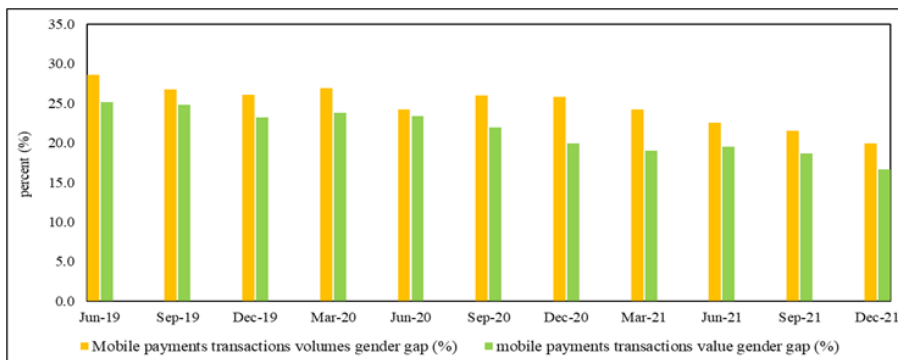
Source: Central Bank of Kenya (2022), National Payment Services

Digital platforms have transformed from simple mobile money transfers to unlocking savings, loans, investment, and insurance opportunities. In 2021, the usage of savings and credit increased, with the overall credit uptake growing by 10.4 basis points to 60.8% while savings uptake increased by 3.9 basis points to 74.0% (CBK, KNBS and FSD, 2021). Despite the growth in the usage of financial services and products, challenges remain, with a large proportion of the population (11.6%) still excluded from accessing both formal and informal financial services.

The uptake of financial services and products by gender reveals that more males use banking products, mobile banking, and phones for credit financial services compared to women, who mainly rely on informal sources such as shylocks and formally registered SACCOs and digital app mobile money for credit services. More females compared to males prefer informal financial services for credit (62.8%) (Figure 3).

Usage of credit services by gender
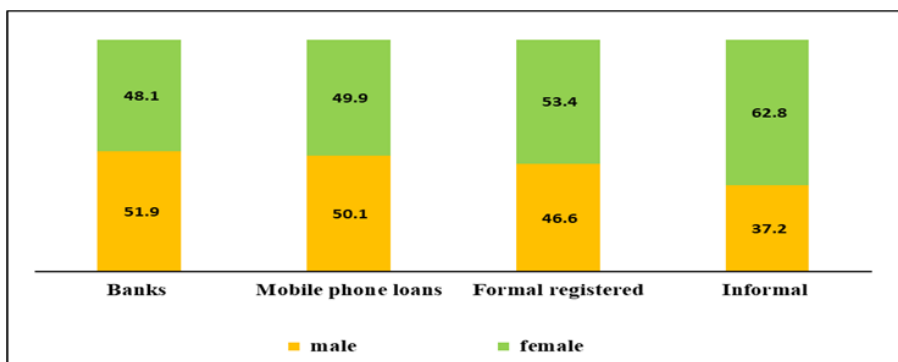
Source: CBK, KNBS and FSD, 2021 FinAccess Household Survey

In particular, the use of Chamas for credit facilities was higher in females (77%) than for males (23%). This finding supports previous studies and surveys that show that women utilize informal finance, particularly Chamas, due to homegrown terms and conditions within the group, short turnaround time, ease of access, social capital and a sense of financial inclusion that women derive from meeting, planning and executing shared goals. Additionally, the ability to use deposits and savings as collateral, low interest rate, accessibility and minimal procedures make SACCOs attractive in Kenya.

Moreover, other studies have also shown that lack of collateral, particularly title deeds is one of the key incentives for preference of informal financial channels by women, (Dalberg and FSD, 2021; KIPPRA, 2019). The participation of women in formal finance is expected to be enhanced through the enactment of the the Central Bank of Kenya (Amendment) Act, 2021, which gives CBK power to license and oversight the previously unregulated digital credit providers (DCPs), effective on 23 December 2021. While these DCP regulations are likely to moderate the interest rate on loans by digital lenders and possibly expand the number of females in formal financing, it is still important for other measures, including customized financial education products for women and simplification of terms and conditions by formal financial service providers, to be implemented to attract interest of women in formal financial services.

Credit loans from informal providers by gender
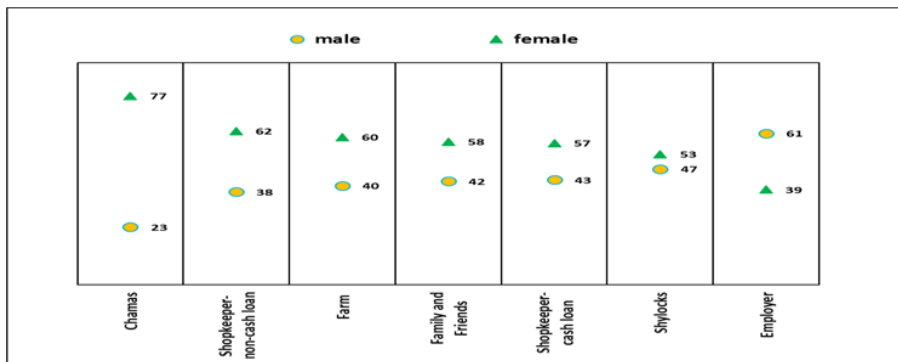
Source: CBK, KNBS and FSD, 2021 FinAccess Household Survey

Financial literacy by gender

Financial literacy is measured using four dimensions, which are considered fundamental in financial decision making, namely: (i) financial knowledge, measured using numeracy and literacy skills. Numeracy skills are defined as having the ability to compute a simple average interest rate on a loan, while literacy skills are measured as the ability to read and interpret messages and charges after making a financial

transaction; (ii) financial skills are measured using money management practices and competencies on a financial decision. Specifically, it is the ability to plan and keep aside money for emergencies and living within one's means; (iii) behavioural attributes; and (iv) attitude, both measured using awareness dependency questions. Measures of awareness include sources of financial information, advice and education, and awareness of credit reference bureau reports (OECD 2005; 2016: CBK, KNBS and FSD, 2021).

Consistent with the definition of financial literacy and 2021 FinAccess Household Survey (CBK, KNBS and FSD, 2021), a person was financially literate if he or she demonstrates knowledge and understanding (via correct answers) to the questions relating to numeracy and literacy. From the analysis, more males were able to correctly compute, read and interpret financial information compared to females. The survey shows a gender gap of about 10% in terms of numeracy and literacy, and this would have implications on uptake of formal financial services.

Numeracy and literacy knowledge by gender
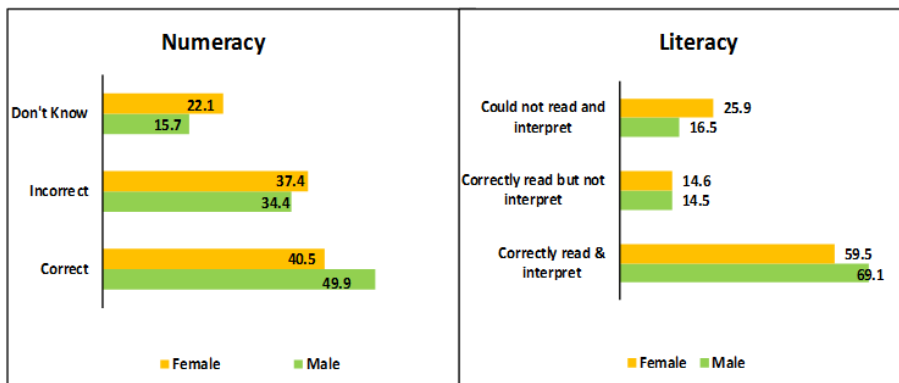
Source: CBK, KNBS and FSD, 2021 FinAccess Household Survey

In terms of financial planning, the 2021 FinAccess data revealed the main financial goals for households as education, provision for food, and investments. Gender analysis revealed that both males and females are keen on providing basic needs such as food and education for themselves and for families. However, males are keener on investing, while females focus more on health provisions. Analysis by cluster showed a higher proportion of households in urban clusters reporting the key financial goals as health, business and career improvement.

Financial planning goals by gender
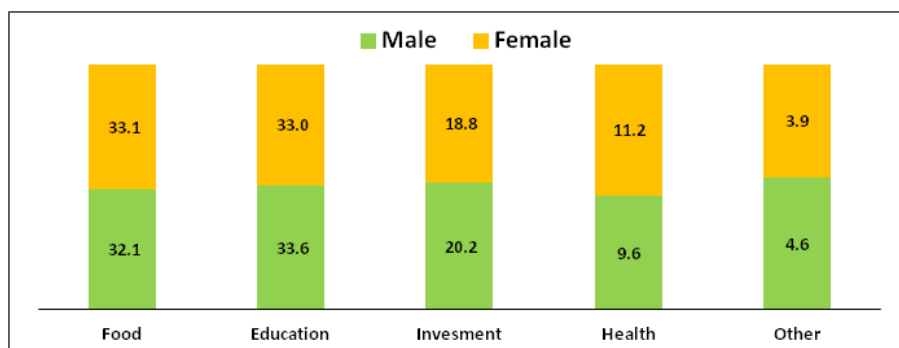
Source: CBK, KNBS and FSD, 2021 FinAccess Household Survey

In 2021, relatively more people (90.1%) relied on informal sources for financial advice compared to 78% in 2019. Specifically, family and friends (45%), self (43.3%), and Chama and groups (3.0%). The assessment by gender revealed a similar trend, with more females[4] compared to males relying on family and friends, while more males relied on self for financial advice. However, loans from family and friends recorded relatively higher default rates at 41.8% compared to banks at 21.8%, implying that the preference of family and friends by women would be suggesting a possibility of high default rates. Trends in figure titled "**Source of financial information by gender**" also show that the use of formal sources for financial advice remains low, and this calls for financial providers to incorporate financial education and financial literacy programmes on a regular basis and in their services and products.

Source of financial information by gender
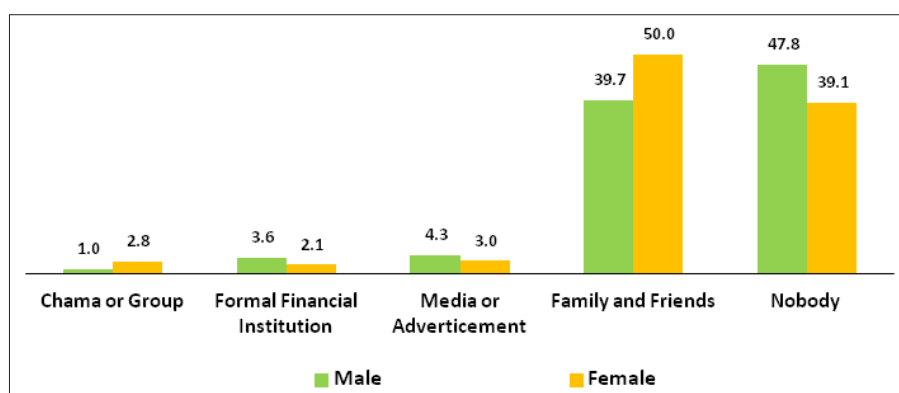
Source: CBK, KNBS and FSD, 2021 FinAccess Household Survey

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4   The decision on who and when to consult on financial matters is made at a personal/individual level. However, it is assumed that consultation of family members includes the spouses for the married women.

Credit Reference Bureaus (CRBs) hold credit data shared by financial institutions and facilitate credit lending to financial institutions. In Kenya, there are three CRBs— CREDIT INFO, Metropol, and Transunion Kenya. They are all regulated by the Central Bank of Kenya. They receive credit data from various sources such as banks, SACCOs, micro finance banks/institutions, and fintechs. Customers are encouraged to constantly check their credit reports to verify the information contained in the reports. Similarly, lending institutions are required to provide accurate information about their customers. In 2021, more males compared to females were aware of the CRBs. However, very few had tried to access or use the report. There were many respondents, both males and females, who have neither heard about CRBs nor used the reports from the CRBs. This could imply the need for awareness creation, especially considering that the uptake of digital financial products is gaining prominence.

Awareness and usage of credit reference bureau by gender
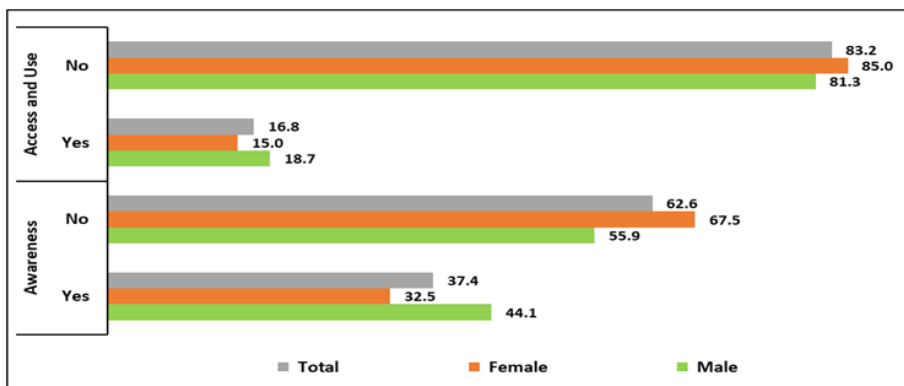
Source: CBK, KNBS and FSD, 2021 FinAccess Household Survey

It is clear from the exploration of available data that gender gaps in financial access have significantly narrowed from 12.7% in 2006 to 4.2% in 2021. However, glaring gaps persist in the use of financial services and literacy levels. It is observed, when the number of payment transactions is considered, that males perform significantly higher volumes and values compared to females. Regarding the uptake of credit, more females compared to males prefer informal sources (Chamas, shopkeepers, family and friends) and formally registered (Fuliza) compared to formal banks and mobile-based loans. The numeracy and literacy indicators show that females fell short by 10% compared to males; that is fewer females can compute interest rates and correctly read and interpret financial messages compared to males. When it came to being aware of the credit reference bureaus, more females did not know about CRBs compared to males. Lastly, when sources of financial advice are considered, more females relied on family and friends compared to males. The outlined interesting findings indicate persistent vulnerabilities that females are exposed to in their quest to access and use available financial services in Kenya.

Financial education in Kenya

An exploration of the status of financial education in Kenya reveals the existence of a few financial education initiatives provided by commercial banks, microfinance institutions, savings societies, and other players in the financial space (Table 1A in Appendix). The available education is generally targeted to the youth and women – a segment of the population believed to be vulnerable and mainly owners of micro, small and medium businesses.

The focus of the available financial programmes has mainly been on financial concepts regarding savings, planning and budgeting, financial negotiation skills, debt management, banking services, and investments. Fewer programmes extend their training to entrepreneurial skills, mentoring, and coaching. Moreover, only the microfinance institutions go into the details of teaching on loan policies and procedures. Models of financial education delivery range from in-house face-to-face/seminars/ conference structures, media/radio/TV/newspaper adverts, online –self online training/e-print material/ coaching, from print material and phone training.

It is observed that training targeted specifically towards digital financial literacy is scarce and majorly lacking. From the data explorations, we find one financial institution offering targeted Interactive Voice Response (IVR) Digital Financial Literacy Programme - German Sparkassenstiftung Eastern Africa (DSIK) together with the Association of Microfinance Institutions in Kenya (AMFI-K), launched in May 2021.

In sum, there are efforts and initiatives to financially educate people from various institutions. However, the evidence points to little focus on digital financial literacy, despite DFS being a key source of over-indebtedness in Kenya. Therefore, efforts to develop tailor-made programmes for digital financial literacy ought to be developed in line with identified needs of clients or public.

3. Survey of literature

Theories on financial education and financial literacy centre on consumer's ability to make informed financial decisions on available resources over their lifetime. Earlier literature assumed rational and well-informed individuals capable of making optimal decisions on consumption (Modigliani and Brumberg, 1954; Friedman, 1957; Ando and Modigliani, 1963). The main theoretical argument was that consumers use savings and borrowings to smoothen consumption patterns, and this decision is largely driven by liquidity constraints, preferences between current and future consumption and information on future consumption prospects. The model assumed consumers' expertise in dealing with complex economic decisions. However, recent theoretical models on life cycle optimization process have assumed that consumers' preferences are shaped by financial market fundamentals (Mankiw, 1981; Hansen and Singleton, 1983; Hall, 1988) since planning horizons are intertemporal and therefore extend beyond a single period (Hubbard and Judd, 1986; Zeldes, 1989).

Empirical literature has focused on five fundamental elements of financial literacy: knowledge, skills, awareness, attitude and behaviour, which are considered necessary for effective planning and management of financial resources (Noctor, Stoney and Stradling,

1992; Moore, 2003; Hilgert et al, 2003; Atkinson and Messy, 2012). The elements are conceptually related, since financial skills contribute to competence gains and the ability to correctly interpret financial information (Moore, 2003; OECD, 2005). Making informed choices requires knowledge of financial concepts, products and services, risks and opportunities (OECD, 2005). Decision-making, therefore, becomes important as it enables consumers to make informed choices regarding financial resources and control of personal finances. Knowledgeable consumers with financial skills benefit from the full range of financial market undertakings (Noctor et al, 1992; Hilgert et al, 2003), while individuals with lower financial knowledge are likely to make financial mistakes (Bernheim and Garett, 1996; Kimball and Shumway, 2010; Agarwal and Mazumder, 2013; Benjamin et al, 2013).

A growing body of empirical research provides evidence on the implications of financial literacy or the lack of it on consumer choices and economic outcomes (Bernheim 1996; Delavande et al, 2008; Hsu, 2011; Lusardi and Mitchell 2008, 2009; Lusardi et al, 2013; Jappelli and Padula, 2013). Past empirical findings reveal that financial literacy and financial decision making is directly related to savings decisions (Kotlikoff and Bernheim, 2001; Carlin and Robinson, 2010); credit, loan and debt (Hilgert et al, 2003; Moore, 2003; Campbell, 2006; Stango and Zinman, 2009 Lusardi and Tufano, 2009; Gerardi, Goette, and Meier, 2013; Brown et al, 2016), retirement planning (Lusardi and Mitchell, 2007) and stock market participation (Bucher-Koenen et al, 2021; Delavande et al, 2008; Kimball and Shumway, 2010; Christelis et al, 2010).

There are some recent empirical studies that analyse the impact of financial literacy on household indebtedness, focusing more on the impact of the financial crisis, COVID-19 pandemic and the uptake of digital credit. Kurowski (2021) used Polish survey data to analyse the role of debt and financial literacy on households' over-indebtedness during the COVID-19 pandemic. The findings revealed that financial literacy helps households in planning and budgeting, and that households with higher debt literacy are less likely to default because of accumulated savings. Similarly, households with mortgage loans were better able to manage their repayments as opposed to households with non-mortgage loans who were over-indebted. Wamalwa et al (2019) analysed the implications of credit uptake on household indebtedness in Kenya. The study used the FinAccess Household Survey data for 2015/2016. The findings showed that financial literacy reduces uptake of digital credit and that individuals using digital credit have low income, numerous loans and therefore face difficulties in repaying the loans, compared to those who use conventional credit.

Brown et al (2016) examined the relationship between financial literacy and debt behaviour among young Americans. The study showed that both mathematics and financial education improve repayment behaviour. Additional mathematics training leads to improved creditworthiness and budgeting, and therefore lower levels of over-indebtedness among students. Lusardi and Tufano (2009) used the debt literacy measures on numeracy, perception, and risks to assess household's financial literacy and experiences with indebtedness in the USA. The findings revealed low debt literacy, with only a third of the population being able to comprehend interest compounding and compute interest on credit cards. Specifically, the study revealed that individuals with lower levels of debt literacy incur high transaction costs, higher fees and high cost borrowing and, as a result, have excessive debt loads.

In terms of gender dynamics, studies have generally found that women tend to have, on average, lower levels of financial literacy than men (Hasler and Lusardi, 2017; Fonseca et al, 2012; Fonseca et al, 2012; Lusardi and Mitchell, 2008; Kotlikoff and Bernheim, 2001). Even for high-income countries with considerably higher overall levels of financial literacy than low-income countries, the gender gap in financial literacy is still large (Atkinson and Messy, 2012; Hasler and Lusardi, 2017; Klapper and Lusardi, 2020). When asked to answer questions on basic financial concepts, women are less likely to answer correctly compared to men and more likely to indicate that they do not know the answer. Bucher-Koenen et al (2017) found that these gender differences in financial literacy were similar across countries. Using questions on four fundamental concepts in financial decision-making: knowledge of interest rates, interest compounding, inflation, and risk diversification, Klapper and Lusardi (2020) found that worldwide, just one in three adults are financially literate; that is, they know at least three out of the four financial concepts. In particular, women, poor adults, and the less educated were more likely to suffer from financial knowledge gaps, both in developing countries and countries with well-developed financial markets. Lusardi and Tufano (2009) identified sharp differences between male and female debt literacy levels, with women either being less likely to respond correctly compared to men or not knowing the response. The findings revealed significant gender differences in young women and old women.

The literature also analyses factors determining the gender gap in financial literacy. Notably, findings by Hsu (2011) revealed that women only acquire additional financial literacy as they approach widowhood, mainly because they have higher life expectancy and tend to outlive their husbands. Fonseca et al (2012) found that greater financial decision-making, and hence financial responsibility within the household, is positively correlated with higher financial literacy for men, but not for women, and that men are more likely to increase their financial knowledge when they are in charge of the financial and economic decisions. Fonseca et al (2012) analysed potential explanations for the gender gap in financial literacy and noted that within the households, men more often than women, specialize in making household financial decisions thus, acquiring more financial knowledge, while women specialize in other household functions. Based on micro-data from the household, income and labour survey in Australia, Preston and Wright (2019) used Oaxaca-Blinder decomposition technique to examine the determinants of the gender gap in financial literacy and found that labour market variables such as sector, occupation, industry, union membership and labour market status were more important in explaining the gender gap in financial literacy; human capital variables such as age and education were not statistically important. However, the large unexplained gap suggested that the main determinants are neither human capital nor labour market factors.

In sum, the body of empirical literature on the role of financial literacy including gender disparities and implications on financial behaviour and decision making is growing. The findings generally show positive impact of financial illiteracy on household indebtedness. Low levels of financial literacy exacerbate consumer and financial market risks, especially given the rapid expansion of digital financial services which, while they continue to enhance financial inclusion, have come with new challenges

as increasingly complex financial instruments enter the market (Klapper and Lusardi, 2020; Lyons and Kass-Hanna, 2021). However, studies that examine these emerging patterns and relationships are still relatively limited. Recent research has even proposed the need for a framework to operationalize the concept of digital financial literacy as the traditional financial literary definitions are insufficient to capture peculiarities of financial services within a digital context (Lyons and Kass-Hanna, 2021). Moreover, existing studies have largely focused on developed countries with little focus on low-income countries particularly in Africa. Yet, the region in general and specific countries such as Kenya have experienced proliferation of modern technology and financial innovations, entailing a variety of financial products and services, which require financial knowledge and skills.

4. Methodology

The study used cross-section household survey data on financial inclusion and primary data to provide a detailed analysis of digital financial services and implications of financial literacy on gender and over-indebtedness in Kenya. Both qualitative and quantitative analytical methods were used. The descriptive analysis provided information on gender dynamics of access to and usage of financial services in Kenya over time, and established the extent and performance of digital financial services by gender and various measures of financial literacy. The empirical analysis examined the impact of financial literacy and gender on over-indebtedness.

Research design and sampling method

The secondary data used in the analysis was sourced from the 2021 FinAccess Household Survey database. The survey was administered nationally across 22,024 households in Kenya during the period June-October 2021 and provided information on financial inclusion across four dimensions, namely: access, usage, quality, and welfare (CBK, KNBS and FSD, 2021). The access dimension covered access to formal, digital, and informal financial services. The usage dimension measured actual use of both formal and informal financial services and products, including savings, credit, investments, pensions, insurance, among others. The quality dimension assessed financial knowledge, skills, and awareness, while welfare measured gains from the usage of financial products and services.[5] Financial skills were based on money management practices and capabilities, which include decision-making skills on financial matters, and sources of financial information and or advice.

Primary data was also collected to provide additional information on financial education. A structured questionnaire targeting users of financial services from bank, non-bank and telco-based digital financial services was developed. The questionnaire focused on the extent of over-indebtedness and whether financial education had any role on the ability to make sound financial decisions. The survey targeted 60 respondents. A non-probability sampling method

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5   The sampling frame and design of the survey is provided in the 2021 FinAccess Household Survey report (CBK, KNBS and FSD, 2021)

was used to identify potential respondents who use digital financial services. Snowballing sampling technique was applied to identify the subsequent respondents. The questionnaires were administered through telephone interviews and face-to-face, to those that accepted to a meeting (see Appendix A2 for the full questionnaire).

Empirical model

To empirically assess the impact of financial literacy on over-indebtedness, the study used the 2021 FinAccess Household Survey data to estimate an econometric model defined in Equation 1. The dependent variable used in the model is over-indebtedness, measured using various indicators, namely arrears, debt burden and amount of outstanding loans. Similarly, the main explanatory variable is financial literacy, measured using knowledge, skills, behavioural and awareness indicators. The control variables used individual demographics and household socio-economic characteristics, namely gender (female), age, marital status (married), income (log income), education, and employment (employed). The estimated model is presented in Equation 1.

$$\begin{aligned} Indebtness_i = \alpha &+ \beta_1 finlit_i + \beta_2 gender_i + \beta_3 age_i + \beta_4 agesq_i + \beta_5 marital_i + \beta_6 education_i \\ &+ \beta_7 digital_i + \beta_8 income_i + \beta_9 employed_i + \varepsilon_i \end{aligned} \tag{1}$$

Where:

1. Over-indebtedness

The variable of over-indebtedness was derived from respondents who indicated to be using credit products from either formal, digital, or informal financial services. Three indicators were computed, namely: arrears, debt burden, and the number of outstanding loans.

(i)   Arrears was captured as a binary indicator. Individuals who had loan products and indicated to have paid late, missed a payment, and never paid any amount captured as one, while those who indicated to have met all their obligations on time as otherwise.

(ii) Number of outstanding loans was measured as a count variable and by type of loan. The individuals with four loans or more were considered as over-indebted: and

(iii) Burden of loan - the number of measures taken to repay a loan, where a higher debt burden required a combination of measures to clear outstanding loans.

2. Financial literacy

Financial literacy was defined based on the four main attributes, namely financial knowledge, skills, awareness, and attitude. All the attributes entered the model as a binary variable.

(i)   Financial knowledge was measured by the ability to compute basic financial transaction cost accurately (numeracy) and the ability to read and interpret financial information (literacy).

(ii) Behavioural attributes captured by awareness of the credit reference bureau report and whether the respondent had made use of the report.

3. Control Vvariables

The control variables were captured using social-economic attributes of the respondent and included binary variables: gender, education, employment, marital status, the amount earned (income), and age of the respondent. Household earnings may have positive effects on credit uptake because of the absence of liquidity constraints and uncertainty about future earnings (Zeldes, 1989; Romer, 2008), but may also have positive effects because of buffer stock saving behavior (Deaton, 1991).

5. Discussion of primary survey and empirical findings

Survey findings on impact of financial education on indebtedness

Characteristics of respondents

A diverse group of respondents was interviewed, with 70% of the respondents being in the age bracket of 20-40 years, while 30% respondents were in the age bracket of 41-70 years. The target was to have 50% of each of the sexes; however, the respondents comprised of 53% and 47%; that is 32 women and 28 men, respectively. All respondents had at least a bank account in one bank, even though not all had a regular source of income or a stable job or business. In addition, to bank accounts, all respondents had access to different bank and non-bank digital applications on their mobile phones, plausibly to diversify their ability to access credit.

Credit uptake and frequency

In the past one to four years, 76% of the respondents had accessed loan facilities while 14% had not accessed any loans from banks or digital apps. From the 46 respondents who had accessed loans, 21 were women and 25 were men. The sources of loans were as expected – diverse – from commercial banks, MNOs, Digital Apps, SACCOs, microfinance banks and others (staff welfare and *Chamas*) with the majority being from mobile network operators (MNOs) and digital lenders. Moreover, there was a higher frequency in borrowing digital loans and MNOs, compared to borrowing from commercial banks. It is noteworthy that all the 21 women had MNOs and digital loans and only four had ventured into getting commercial loans.

Sources of loans and the number of times the different loans were taken
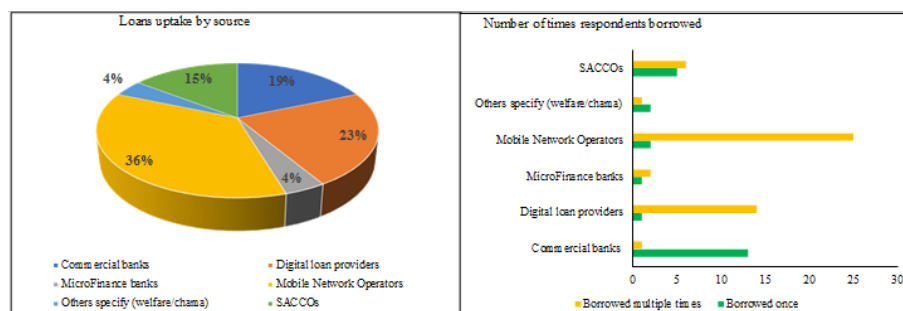
Source: Computations from survey outcomes

Financial education

The survey results showed that 40% of the respondents had received financial education (FE) while 60% had not received any financial education. The fact that fewer respondents from the sample had received financial education shows scarcity of its availability, or poor marketing strategies on the part of the providers. From the 24 respondents that had received financial education, five were women while 19 were men, and they got to know about the financial education programmes by virtue of association; that is, from institutions they banked with or social groups they belonged to, for example the INUKA tribe for young entrepreneurs. The remaining 36 respondents who indicated they had received financial education 26 were females while 10 were males, a clear indication of low financial education uptake among women. Nearly all the respondents that had not received FE had no idea it existed and did not know where to get it from. Twenty-one (88%) respondents indicated that they found the training to be useful in: financial management; awareness of financial products and services; financial decision-making; and understanding terms and conditions for loan repayment. Four (12%) respondents did not find the FE training to be useful, indicating that it was complicated, and they did not understand much during the training. Moreover, they indicated that the training was geared towards ensuring they repaid their loans rather than imparting financial knowledge.

Financial education and indebtedness

The questionnaire also sought to understand whether those that had received FE were better off in terms of indebtedness. Eight respondents (35%) indicated they still had too much debt and experienced difficulty in paying the loan before and after FE, while a bigger proportion of 10 respondents indicated they were comfortable in repaying their loans while six had received FE but had not taken any loan. The high number of both genders being able to repay their loans and better manage their finances after FE indicates the importance of FE and its potential for reducing indebtedness. Moreover, when the respondents were asked whether they would recommend FE to friends, family, and colleagues all agreed that financial education was important and they would recommend and even enroll in it again, for knowledge attainment. From the 46 respondents who had taken loans, 41 had multiple loans, which included all the 21 women with loans.

When asked to comment on a statement that "financial literate persons were more aware of their finances and made good decisions on their finances, and therefore had low debt levels" 45 respondents agreed with the assertions of the statement while 15 respondents disagreed. It is noteworthy that from the 15 who disagreed with the statement, 12 were women while three were men. Some reasons for agreeing with the statement were:

(i) Knowledge enhanced decision-making for borrowing and repaying.

(ii) FE ensured understanding and good management practices of finances.

Reasons for disagreeing included:

(i) Borrowing and spending habits are different from financial intelligence quotient (IQ).

(ii) Indebtedness depended on individuals' character and not on whether one had FE or not.

(iii) People borrow to deal with problems, so FE did not matter. Nonetheless, no one wanted to be highly indebted.

(iv) Those with FE borrow more and live beyond their means.

The fact that 75% of the respondents link financial education to better debt management coupled with the findings above that show that over 40% of the respondents serviced their loans better or refrained from excess borrowing after financial education implies that positive outcomes on managing indebtedness at individual level is possible, with targeted and intentional financial education.

Reading of terms and conditions

Amazingly, 40 respondents indicated they read the terms and conditions (T&C) of the loans they took, although they also indicated they understood bits and pieces of the information provided. Six respondents did not bother to read the T&C at all, given the small print, length and difficulty in understanding. Five of those that did not read T&C and had accessed loans were women and one was male. Twenty-eight respondents who read the T&C did not understand what monthly rate of interest meant in annual terms. When asked which T&C were easier to understand, 50% indicated those of banks as the bankers took time to explain to the customers while the others indicated either they did not know or found the T&C for digital apps easier to understand.

The findings seem to suggest there is a definite need for financial education among users of digital financial services while the suppliers of the FE are few and not known. Moreover, the recipients of financial education appreciate their improved ability to better manage their finances after the FE and resist the urge to over-borrow and be caught up in debt cycle. However, access of FE would take deliberate effort from users to look for where the FE is available/being offered. The providers of loans should endeavour to simplify and make information content in T&C more user friendly, understandable, better in appearance, to avoid misinterpretations and entice users to read.

Empirical findings

The results from the empirical estimation for Equation 1 are presented below. The regressions in models 1-3 used the Probit model, since the dependent variable is a binary outcome that equals one if the respondent reported being in arrears, and zero otherwise. The marginal effects reported in model 1 reveal that the probability of falling into arrears is 1.5% higher for females relative to males. Similarly, having a digital loan increases over-indebtedness. Model 2 includes measures of financial literacy. The findings show that being financially literate reduces over-indebtedness. Specifically, knowledge in the computation of financial costs as captured by numeracy lowers the probability of falling into arrears by 7.4% while literacy knowledge reduces the probability of over-indebtedness by 8.5%. Model 2 also reveals a lower probability of females falling into arrears, confirming the important role of financial literacy in managing financial matters.

Regression results

	Arrears			Number of Outstanding Loans			Debt Burden		
	Model 1	Model 2	Model 3	Model 4 (Fuliza)	Model 5 (Mobile)	Model 6 (Informal)	Model 7	Model 8	Model 9
Female	0.0151*	0.0010**	-0.0210***	0.012***	0.0013	0.473***	0.0179**	0.0206**	0.0215***
	(0.0089)	(0.0090)	(0.0098)	(0.0042)	(0.0030)	(0.1161)	(0.0080)	(0.0080)	(0.0080)
Digital	0.0006***	0.0011***	0.0015***						0.0012***
	(0.0003)	(0.0003)	(0.0003)						(0.0005)
Numeracy		-0.0740***	-0.0608***		-0.0054	-0.2209**	-0.0579***		
		(0.0107)	(0.1163)		(0.0039)	(0.0660)	(0.0084)		
Literacy		-0.085***	-0.093***	-0.0706***	-0.0248***	0.0202			
		(0.0109)	(0.1210)	(0.0046)	(0.0036)	(0.0818)			
Education			-0.1605	-0.0531***	-0.0349***	0.1626**		-0.0164***	-0.0187**
			(0.1124)	(0.0052)	(0.0044)	(0.0810)		(0.0084)	(0.0085)
Credit reference bureau					-0.0951***	0.3158***		-0.0286**	-0.0315**
					(0.0039)	(0.0586)		(0.0144)	(0.0145)
Age			0.0063***	0.001***	-0.0048	0.0742***	0.0092***	0.0092**	0.0091***
			(0.0174)	(0.0001)	(0.0038)	(0.0186)	(0.0013)	(0.0013)	(0.0014)
Age squared			-0.0001***		0.000469	-0.0009***	-0.0001***	-0.0001**	-0.0001***
			(0.0000)		(0.0004)	(0.0002)	(0.0000)	(0.0000)	(0.0000)

Continued

	Arrears			Number of Outstanding Loans			Debt Burden		
	Model 1	Model 2	Model 3	Model 4 (Fuliza)	Model 5 (Mobile)	Model 6 (Informal)	Model 7	Model 8	Model 9
Marriage			0.0019	-0.0114**	-0.0128***	0.2816***	0.0316***	0.0322***	0.0326***
			(0.0015)	(0.0042)	(0.0032)	(0.0857)	(0.0084)	(0.0084)	(0.0084)
Income			-0.0449***	-0.0244***	-0.0125***	-0.0392			
			(0.0049)	(0.0018)	(0.0014)	(0.0750)			
Employment			0.014	-0.0581***	-0.0104**	0.4928***			
			(0.0132)	(0.0042)	(0.0032)	(0.0913)			
Intercept				1.22	1.3	-2.199			
				0.0151	0.0121	0.565			
No. of observations				19,617	19,617	19,619	12207	12207	12207
Pseudo R square				0.0055	0.0049	0.045	0.011	0.0088	0.008

Dependent Variable

Consistent with the findings by Wamalwa et al (2019), results in model 3 confirm the significant and negative effects of financial literacy indicators on over-indebtedness even after controlling for the demographic and socio-economic characteristics of the respondents. Similarly, digital loans increase the probability of loan arrears and therefore over-indebtedness. This could be attributed to the stringent repayment measures and the cost of servicing the digital loans. However, the probability of females falling into arrears changes from being positive in models 1 and 2 to negative after accounting for the demographic characteristics. The results in model 3 indicate that the probability of falling into arrears is 2.1% lower for females relative to males. These results are consistent with the findings in Meyll and Pauls (2019), who showed that females have a lower probability of falling into arrears and are more uncomfortable with debt (Almenberg et al, 2018), and being key decision-makers, male-headed households utilize digital credit more than conventional credit (Wamalwa et al, 2019).

In models 4-6, the dependent variable is the number of outstanding loans individuals have with the various loan providers. The higher the number of loans the more indebted one is. Poisson regression is used since it is suitable for count data analysis. Two sources of loans are considered: informal loans (welfares, Chamas, friends, relatives) and digital loans (mobile bank and apps based, and Fuliza loans). The digital loans are estimated separately given their increased uptake evidenced in the recently concluded 2021 FinAccess Household Survey (CBK, KNBS and FSD, 2021). We control for robust standard errors as recommended by Cameron and Trivedi (2010) for mild violation of underlying assumptions. The findings in models 4 and 6 are positive for gender Fuliza (0.012) and (0.473) informal loans, implying that as women increasingly access digital-based loans, the number of Fuliza and informal loans increased, therefore, women became more indebted compared to men. The gender variable is not significant in model 5, plausibly indicating more males are indebted when mobile loans are considered compared to females.

In models 7 to 9, the dependent variable is a measure of debt burden regressed against different configurations of the explanatory variables. The debt burden indicator captures the number of measures taken to repay a loan and may include one or a combination of the following: loan refinancing, use of savings, sale of assets, reducing expenditure on food or non-food products, and starting a business or working more hours. A higher debt burden depicts a situation where a combination of measures is needed to offset an outstanding loan. The explanatory variables include age, marital status, sex, literacy, numeracy, education, and knowledge of and access to a credit reference bureau (CRB) report. An interactive term, awareness, is generated by combining responses on awareness of the CRB report, and access to the report. Access to the report is considered more useful to the decision-making process of households. The effect of the CRB awareness measure is captured in model 9.

The marginal effect in models 7 to 9 reveal a statistically significant gender gap. The analysis shows that women are approximately two percentage points more likely to have a higher debt burden. The effect of gender on the debt burden remains robust even as we include other control variables. The results also show that financial knowledge (financial

numeracy or literacy), education and CRB awareness are important explanatory variables. We observe that in specifications where we include either literacy or numeracy as an indicator of financial knowledge, the education variable defined as some secondary level of learning or higher is not significant. This suggests that literacy, numeracy, and education each capture aspects of financial knowledge. The results are consistent with the finding that low levels of financial literacy result in higher debt burden, default, and delinquency (French and McKillop, 2016). The indicator on CRB awareness is statistically significant in model 9 in which financial knowledge is by education. The result shows that women who interact with the respective CRB reports are approximately 3.2 percentage points less likely to have a high debt burden.

Models 1-9 account for individual demographics and household socio-economic characteristics including age, education, marital status, income, and employment. The results reveal that age increases over-indebtedness but tapers off as age advances. This finding is consistent with Ando and Modigliani (1963) life-cycle hypothesis, where the younger age groups borrow, thus increasing their debt level in the process of assets acquisition and as they age, they repay their debts. Models 4 and 5 considered those that had secondary school education and had ability to read financial messages and find a negative relationship for the education (-0.0531) and literacy (-0.0248), with the *Fuliza* and mobile loans, which indicates the higher/better the education level and literacy, the lower the number of loans women took. Gesthuizen (2011) finds that acquisition of education increases the cognitive ability for one to understand and use digital infrastructure and access digital credit for themselves and others in a responsible manner, which supports this finding. In the case of informal loans (model 6), education, literacy, and awareness of credit reference did not matter. The findings reveal that income reduces arrears and number of loans across all the categories. This could be attributed to buffer stock savings, especially with anticipation in income fluctuations (Deaton, 1991). Similarly, having some secondary education reduces over-indebtedness, while the married tend to accumulate debt.

6. Conclusions and policy recommendations

This study sought to examine digital financial services and financial literacy and their implications on over-indebtedness, from a gender perspective. The study uses both secondary and primary data and undertakes both descriptive and quantitative analysis to assess the implications of uptake of DFS and financial literacy on over-indebtedness from a gender lens. The descriptive analysis mainly relied on secondary data from the 2021 FinAccess Household Survey and primary data based on a purposeful survey on 60 beneficiaries that had received financial education and those that had not received financial education in the last 36 months. The regression analysis was based on FinAccess Household Survey data, 2021 (CBK, KNBS and FSD, 2021).

The descriptive analysis shows that although gender gaps have significantly declined over the years in terms of access and usage of financial services and products, the male gender still dominates mobile transactions in terms of both volume and value, and that mobile banking expanded in 2021 due to usage of Fuliza digital services. The analysis

further showed that more than half of females utilize informal channels including the use of Chamas for credit services while males rely more on banks for similar services. The analysis also showed that males are financially more literate than females as they can correctly compute, read, and interpret financial information. More females also rely on financial advice from family and friends while more males relied on self for financial advice.

Results from the survey showed that financial knowledge is key and is good for financial decision-making, considering that over half of the respondents either consistently serviced their loans or minimized loan uptake after receiving financial education compared to before receiving it. This result implies that positive outcomes on managing indebtedness at individual level are possible with increased financial education. The findings further showed preference of digital financial services as a source of credit based on perceived favourable terms and conditions, and that they held multiple loans mainly from these digital financial service providers. The perception that such loans have favourable terms and conditions is an indication of low financial knowledge – a lack of understanding on implied costs/fees/interest rates/financial computations and misinterpretations of the harsh terms and conditions. The fact that there is a huge demand for financial education as indicated by the survey findings corroborates the argument that borrowers prefer relatively highly priced digital products due to lack of financial awareness.

The econometric analysis separately used arrears, number of outstanding loans and the debt burden as indicators of indebtedness. Generally, the results show that gender matters for indebtedness, with more females than males likely to be indebted regardless of the indicator used. Specifically, the results show that the probability of falling into arrears and a heavy debt burden ranges between 1.2% and 2.1% higher for females compared to males. The over-indebtedness is amplified in cases of single females as implied by the results, which show a negative relationship between accumulation of digital loans and marital status. The results further indicate that both education and financial literacy are important in explaining over-indebtedness, complementing the survey results that revealed a high demand for financial education. Additionally, awareness of and access to credit reference bureau reports contributes to reduction of the debt burden, implying that utilization of CRB would be minimizing information asymmetry between borrowers and lenders and thus facilitating appropriate credit scoring, besides encouraging customers to maintain financial discipline as a measure that contributes to favourable loan pricing.

It can be concluded from these results that financial education and literacy is inevitable in reducing over-indebtedness, and that there is a huge financial literacy gap despite its overwhelming demand by consumers. However, there are gender disparities in financial literacy and education that have contributed to higher levels of indebtedness among women. Thus, to effectively address the existing gap of financial knowledge, it may be useful to explore various policy initiatives, including design and development of customized financial literacy programmes for different customer segments of the population, including targeted financial literacy programmes towards women. While

financial service providers would be the most appropriate implementers of such initiatives, other actors in the financial system including government would target schools and community level platforms. In this context, coordinated efforts across various players on financial literacy interventions may be critical. Additionally, the results showed that the terms and conditions of loans by various financial providers are bulky and complicated even for those who are financially literate, implying a need for a review of terms and conditions by all financial service providers with an objective of making them less complicated, easily readable, concise and user friendly. This recommendation may require intervention of the respective financial regulators to ensure that all the customer needs are incorporated in the reviewed terms and conditions templates.

Based on the results, it can be observed that enhancement of access, usage and awareness of CRBs can be an important policy tool for minimizing over-indebtedness. The results showed that less than 40% of the population are aware of CRBs and only 17% access and use CRBs. This implies that consumers are not aware of the potential benefits of the role of CRBs price competitiveness of credit facilities and minimizing default rate. Apart from measures to enhance awareness of CRBs, it is also important for further investigation to be conducted to establish the determinants of usage, access and awareness of the CBRs to understand whether the design, structure and content of the reports requires modification.

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Appendix

Table 1A: Financial education initiatives

Name of Bank/Institution	Name of initiative	Year of inception	Targeted group	Time period	Channel
Equity*	GOK sponsored programme which was availble for MFIs	2007	Youth and women, MFIs	Six weeks training programme before accessing loan facilities	face to face seminars with follow up weekly meetings
	Equity Group Foundation and The MasterCard Foundation -Financial Education Program	2011	Youth and women	12-weeks	
NIC/NCBA			Upper and middle income groups	Regular quarterly e-newsletters	Electronically distributed materials
Post Bank	Student In Free Enterprise (SIFE)		youths in universities		
Stanbic Bank	Ubunifu (IFC & Stanbic)		handcrafters country wide (all)		
	Equity Group Foundation and The MasterCard Foundation Launch Financial Education Program in Kenya				
Others					
VISA	Financial literacy	2007	all consumers -- banked, underbanked and unbanked	Scheduled 3 day road shows	Road shows in major towns
MFIs KWFT, Faulu, Jamii bora	Financial education, masomo in collaboration with JKUAT		Clients/customers	Weekly, adhoc	seminars
KWFT				Annual	seminars
Faulu			Economically active low income adults(rural and urban)	Weekly adhoc, demand driven	Face to face and mulitmedia tools. Diversified financial education delivery channels and tools.
Jamii bora					
Inuka	Inuka program	2014	MSMEs	3 months program	Face to face and online
Juhudi Kilimo			rural smallholder farmers and micro entrepreneurs		
Musoni					
My Oral Village **		2011			
Free to grow			Low income employees of large companies with low levels of literacy		Face to face training
Financial Academy & Technologies					
Orali Mobile		2020	Women		

Source: Various reports by authors

*   The Equity Group and Mastercard Foundation are initiatives that aim at advancing learning that promotes financial inclusion for majority of population. The initiatives are of two kinds: one is more general supporting students at the secondary school level to Technical and Vocational Education and Training (TVET) Act and the second is targeted to impart financial knowledge to the youth and women entrepreneurs.

**   My Oral Village is an institution that has focused on building an interface to enable women who are illiterate and innumerate to be able to understand financial information and ably participate in accessing and using financial products and services. They also provide supplementary/introductory course materials for

financial management. The idea is to have women access financial services without having to go through any written documentation, but orally. My Oral Village markets their literacy programmes through social media, direct contact of digital and financial institutions and rely on the trained women to inform others about their programmes. The training delivered to the women has proven to be highly useful. However, there has been no assessment done on the impact it has had on indebtedness.

5

The Old and the New Economics of Financial Inclusion[1]

Peter Knaack

Abstract

The past decade has witnessed dramatic technological advances that have changed the economics of financial inclusion. This paper contrasts the old and the new economics of financial inclusion and draws policy implications. The old model of financial inclusion was not able to defy the logic of financial markets, relying on subsidies and nudges from state authorities to make financial institutions include underserved segments of the economy. The new economics of financial inclusion derive from digital automation. It has dramatically lowered transaction costs and increased returns to scale, allowing services at lower margins and lower volumes than ever before to be commercially sustainable. Rather than banks, digital newcomers such as mobile network operators or BigTech firms are protagonists of digital financial inclusion. They are willing to make significant investments that foster financial inclusion even when it is not profitable in the short run, because it allows them to leverage a feedback loop of data analytics and network externalities that also harbours the danger of creating new monopolies and oligopolies. Regulators may thus face a Faustian bargain: trade private sector-led financial infrastructure investment now for anticompetitive behaviour later. To avoid the short end of the Faustian bargain, regulators can consider a two-step policy: laissez-faire first, rectification later.

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1. Introduction

Financial inclusion has proven to be welfare-enhancing. As a solid and growing body of research has shown, low-income and rural households can use domestic and international remittances as an informal risk-sharing tool to enhance their resilience vis-à-vis economic shocks. Moreover, digital financial services allow the under-banked and unbanked to save and obtain credit to diversify and branch into higher-income occupations. Climate-vulnerable populations can leverage digital financial services to adapt to and enhance their resilience to climate risk. Innovative green services can even help them turn from victims into agents to combat global warming, financing low-carbon technologies to help mitigate climate change.

The past decade has witnessed dramatic technological advances that have changed the economics of financial inclusion. This is good news because the old model of fostering financial inclusion has seen limited success. At the same time, the new model of financial inclusion entails new dilemmas and trade-offs. This paper contrasts the old and the new economics of financial inclusion and draws policy implications for regulators and policy makers in emerging markets and developing economies around the world.

The old and the new economics of financial inclusion: key differences

Old Financial Inclusion	New Financial Inclusion
Banks and MFI as key actors	BigTech and MNOs as key actors
Labour-intensive	Data-intensive
Financial inclusion vs profits	Financial inclusion as source of profits
Interventionism: use nudges, regulation, subsidies to push banks to reach BOP	Laissez-faire: provide regulatory enablers to allow newcomers to start with BOP
Main concerns: financial literacy, stability	Main concerns: competition, privacy, data governance

The old model of financial inclusion was not able to defy the logic of financial markets. Financial services providers derive their profits mainly from high-margin (i.e., rich customers) or high-volume business (i.e., in urban areas). Providing financial services to the bottom of the pyramid (BOP) challenges their commercial sustainability and thus requires government interventions in the market. Consequently, policy makers around the world have used a combination of subsidies, regulations, interest rate caps, sectoral credit targets, and credit guarantees to make banks and microfinance institutions (MFIs) provide affordable financial services to underserved market segments such as MSMEs, low-income and rural households.

In many countries, government interventions at prodding banks to reach the BOP have seen limited success. Despite a combination of government-provided incentives and obligations, commercial banks and MFIs on their own have failed to expand their network of access points (branches and automated teller machines - ATMs) significantly. No-frills accounts are only reluctantly offered by banks, and often shunned by customers. In a few countries, top-down interventionism has succeeded, in most it has not. A lesson learnt is that financial inclusion initiatives are limited at best and doomed at worst if they centre on traditional actors such as banks and MFIs (microfinance institutions).

The new economics of financial inclusion derive from digital automation. It has dramatically lowered the costs of providing financial services and increased returns to scale, allowing services at lower margins and lower volumes than ever before to be commercially sustainable. Digitizalition leads to better risk-adjusted returns for financial firms, representing a positive supply shock. Therefore, the commercially sustainable production possibility frontier has expanded. However, firms vary dramatically in their capacity to change their business model and harness the benefits of digital transformation. This has consequences not only for the financial services market, but also for the range of meaningful policy actions to foster (digital) financial inclusion in developing countries.

Banks are not protagonists of digital financial inclusion. Most of the success stories in financial inclusion over the past decade happened with commercial banks at the margins, even despite their resistance. Non-bank digital financial intermediaries such as mobile network operators (MNO) or BigTech firms are not encumbered by high operating costs, legacy business models, and other constraints that hold back traditional players. Even though banks are not protagonists, they partner with MNOs or BigTech firms to provide capital for digital credit, keep customer funds in savings and trust accounts, and offer a range of financial services under prudential supervision. At the same time, they compete for retail deposits, data, and customer relationships.

MNOs and BigTech firms are willing to make significant investments that foster financial inclusion even when it is not profitable in the short run. This is because, unlike traditional financial services providers, they have incentives to reach scale that extends beyond the financial sector. Digital platforms can leverage a "DNA feedback loop": data analytics, network externalities, and interwoven activities. While this feedback loop provides them with an incentive to reach the BOP, it also harbours the danger of creating new monopolies and oligopolies in the absence of corrective regulation. Regulators may thus face a Faustian bargain: trade private sector-led financial infrastructure investment now for anticompetitive behaviour later.

To avoid the short end of the Faustian bargain, regulators can consider a two-step policy: laissez-faire first, rectification later. The two phases of this policy can be summarized as follows:

1. Do not engineer market change from above, remove regulatory obstacles to it. There is a surprising disconnect between top-down efforts to foster financial inclusion and actual progress in the uptake of (digital) financial services from below. M-Pesa

and AliPay did not respond to G20 commitments or policy targets from any finance ministry. Rather than advocating interventions from above, policy makers may want to renew their focus on regulatory enablers of market change. To foster market entry, proportional regulation is key. Do not wait for banks to deliver digital self-disruption; lower barriers to entry for digital newcomers instead. Let a thousand oligopolies bloom: private firms have an incentive to invest in financial services infrastructure because they can reap the benefits of limited competition, at least for some time. Substance matters more than form: wholesale legislative reform and regulatory sandboxes, for example, have not proven to be key drivers of financial inclusion.

2. Rectify once the network is established. Once a well-functioning digital retail payment (mobile money) system and a wide and dense agent network is established, begin rectification. This includes interoperability, agent non-exclusivity, data sharing, and a crackdown on horizontal mergers, exclusivity agreements that bind platform suppliers, and other anti-competitive practices. Patent law provides useful lessons for this policy approach. In the financial services sector, close cooperation between financial stability, data governance, and competition authorities is necessary to make rectification successful, along with institutional distance from vested interests.

The rest of the paper proceeds as follows. Section two describes the old model of financial inclusion and highlights its limits. Section three outlines the new economics of financial inclusion and the key role played by digital automation. It shows how non-banks can benefit more from digital innovation than traditional players, and what drives them to invest in fostering financial inclusion without government subsidies. A fourth section lists regulatory concerns that remain relevant, even in a new digital world. Section five introduces the Faustian bargain that is offered to regulators across the developing world. It gathers examples of anti-competitive practices from two jurisdictions with the longest history of digital financial market development, which is Kenya and China. The concluding section draws lessons from rectification actions in both jurisdictions and draws some tentative policy recommendations.

2. Old financial inclusion

By the 2010s, development economists had produced some evidence that financial inclusion contributes to poverty reduction (Demirgüç-Kunt et al, 2008). The use of financial diaries by researchers such as Collins et al (2009) show that for much of the population in developing countries, existing financial instruments are risky, badly designed for their needs, unreliable, or expensive. The authors assert: "This made us realize that if poor households enjoyed access to a handful of better financial tools, their chances of improving their lives would surely be much higher." (Collins et al, 2009: 4).

Policy makers hoped that banks would provide this handful of better financial tools. Even though banking systems in Sub-Saharan Africa and other low- and middle-income regions are more profitable than those of advanced economies, they are

less efficient, more concentrated, and less competitive (Beck and Cull, 2013; Beck and Levine, 2018; Gottschalk, 2016). The client roster and loan portfolios of banks tend to be skewed towards large firms, high-income individuals, and sovereigns. Financial inclusion advocates promoted a series of policies to change this situation. They encouraged the expansion of credit to Micro, Small and Medium Enterprises (MSMEs) by issuing loan guarantees and creating credit information bureaus to address information asymmetries. They hailed the creation of microfinance institutions (MFIs) as complements to banks in fostering financial inclusion (Cull et al, 2013). They nudged banks to increase the number of financial access points by expanding their branch and ATM networks. And they asked or required banks to offer free, no-frills accounts to low-income households. Often, such top-down policy measures and targets would be enshrined in a National Financial Inclusion Strategy. By the end of the 2010s, 34 developing countries had published such a strategy document (World Bank, 2019a). But after over a decade and a half of such financial inclusion efforts, the results are at odds with the expectations of its advocates.

First, despite a combination of government-provided incentives and obligations, commercial banks on their own have failed to expand their network of access points significantly. In contrast, mobile money agent networks have grown exponentially in countries where governments have allowed *non-banks* to provide mobile money services, creating a grid of access points multiple times denser than what would have been considered fathomable in the bank-centred model of old financial inclusion.

Progress in financial access networks
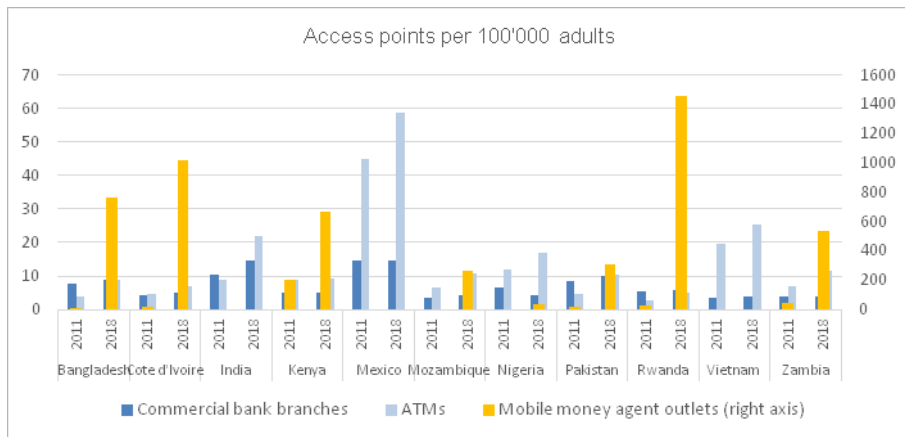
Source: IMF Financial Access Survey

Second, MFIs have failed to make a dent in offering financial inclusion and in improving the economic well-being of their customers (Karlan and Zinman, 2009; Banerjee et al, 2015; Duvendack et al, 2011). In some well-publicized cases, microcredit became a nightmare for vulnerable people (Bateman and Maclean, 2017).

Third, the old model of financial inclusion has never achieved commercial sustainability (Mader, 2018). A recent study of 1,335 MFIs found that subsidies amount to 13c per dollar lent, or US$ 248 per borrower on average (Cull et al, 2018). World Bank economists approach such interventionism with wariness rather than enthusiasm. François Bourguignon and Michael Klein, Chief Economists of the World Bank Group in 2008, put it succinctly: "Despite best efforts, it seems likely that provision of some financial services to the very poor may require subsidies." (Demirgüç-Kunt et al, 2008: xi).

The situation for banks is similar. Bankers argue that because transaction costs in finance are high, they require either high margins or large volumes to be commercially sustainable. In response, financial inclusion advocates have used a combination of subsidies, regulations, interest rate caps, sectoral credit targets, and credit guarantees to make banks provide affordable financial services to underserved market segments such as MSMEs, low-income and rural households. As mentioned above, some governments have nudged or obliged commercial banks to offer no-frills accounts. But mystery shopping exercises sponsored by CGAP (a financial inclusion advocacy organization) reveal that bank clerks seldom offer them to prospective customers (CGAP, 2014; Gine et al, 2017). Setting policy targets of account ownership can also lead to shallow inclusion or outright window dressing. Research in South Africa reveals that 90% of social security (SASSA) account holders withdraw all their money at the beginning of the month, treating a bank account like a mailbox (Finmark Trust, 2016). Bangladeshi authorities obliged banks to offer no-frills "10 Taka" accounts, but only 4% of them were actively used (Iqbal, 2014). In 2015, half of India's flagship financial inclusion Jan Dhan accounts had no money in them when bank officials quietly deposited one rupee in each to meet government targets (Yadav and Mazoomdaar, 2016). In sum, the old model of financial inclusion relied on an array of interventionist measures to push traditional banks to offer services to parts of the population that they considered unprofitable. However, just as the limits of this approach became apparent, technological change made the economics that informed the old model of financial inclusion obsolete.

3. New financial inclusion

Digital automation is the key technological breakthrough that has transformed financial inclusion in the 2010s. It has dramatically lowered the costs of providing financial services, allowing services at lower margins and lower volumes than ever before to be commercially sustainable. Digital automation has also allowed people to adopt financial services in ways few economists had anticipated. However, firms vary dramatically in their capacity to change their operational model and harness the benefits of digital transformation. This has consequences not only for the financial services market, but also for the range of meaningful policy actions to foster (digital) financial inclusion and address second-order problems.

The central tenet of new financial inclusion is that digital automation lowers the transaction costs of financial services and increases returns to scale. Human involvement in back-office tasks such as settlements, conduct risk management, etc can be reduced dramatically, even though investment in resilient IT infrastructure

has risen. Some customer-facing services such as wealth management advisory can also be automated, such that the cost of each client relationship approaches zero (Philippon, 2019). Others, such as cash-in-cash-out, remain relatively labour intensive, but agent banking has significantly lower fixed and variable costs than branches, while being more versatile and customer-friendly than ATMs. Thus, digitizalition lowers the break-even point for financial services providers, and it allows them to reap greater economies of scale (Lee and Teo, 2015). Consequently, digital financial service providers can operate profitably at much lower volumes and margins than their traditional competitors.

Cost and breakeven points for traditional and digital financial services providers
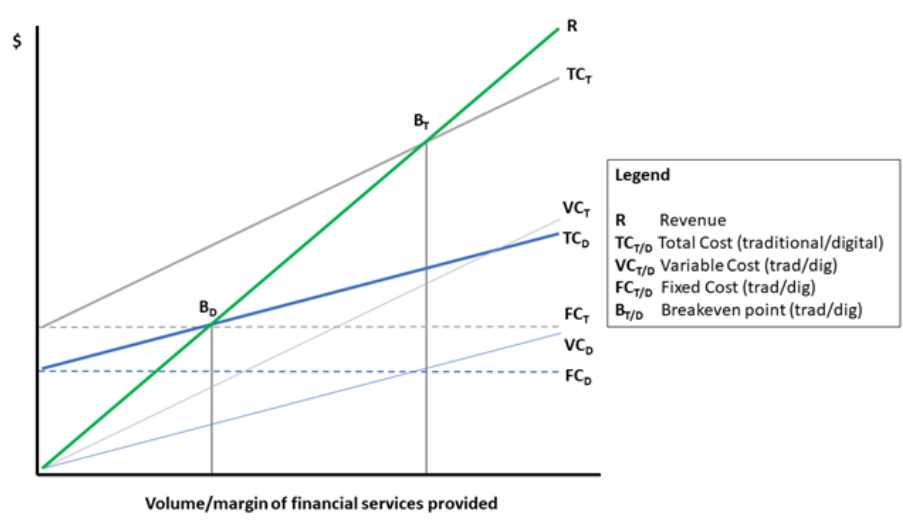
Source: Author

Mobile money, that is retail payment systems that allow users to transfer funds between simple cell phones, is an illustrative case of new financial inclusion. Households and small firms in developing countries are using mobile money in ways that defy traditional models of financial intermediation. Field research in Kenya shows that mobile money is used to weave a wider net of informal insurance and risk sharing. Households in need can reach out to friends and family near and far for emergency transfers when faced with negative shocks, rather than having to decrease consumption or sell assets (Jack et al, 2013; Jack and Suri, 2014; Bharadwaj et al, 2019). Such informal risk sharing mechanisms do not neatly fit financial market categories: it is insurance but without a premium; it is credit but at zero interest and with state-contingent repayment terms, and it is a financial network of diffuse reciprocity rather than a transaction between a firm and customers. In this respect, financial anthropologists in the tradition of Mauss (1925/2002) who conceive of (financial) gifts as a community-constituting web of support, obligation, and group solidarity might have a more valid assessment of the economic function of mobile

money than mainstream economists (Johnson, 2016). While this network of informal insurance and credit does not generate rent for the providers of capital, it significantly improves the economic situation of its members. Financial inclusion allows individuals to increase resilience, avoid asset sales under distress, switch to higher-risk but more profitable jobs (such as retail commerce), increases returns on savings, and thus raises household income to lift people out of poverty. Women are more than twice as likely to benefit from financial access (Jones and Gong, 2021; Suri and Jack, 2016; Wakadha et al, 2013).

Digital credit assessment is cheaper and not dependent on collateral but may be of equal or higher predictive quality than traditional methods. Digital models use data from cash flows, social networks, and other alternative sources. The empirical studies published to date show that not only are digital models at least as accurate as traditional models in predicting default (Freedman and Jin, 2017; Gambacorta et al, 2019; 2020; Petralia et al, 2019; Beck et al, 2022), they also work with similar accuracy for "unscorable" customers, who are not registered at credit information bureaus (Berg et al, 2020; FinRegLab, 2019; Jagtiani and Lemieux, 2018). Importantly, predatory lending and over-indebtedness remain salient concerns, as the following section will discuss. But both the cost reduction in credit assessment and the potential to accurately price credit risk for customers without collateral or a credit history make digital credit a noteworthy tool for financial inclusion.

Digital automation also introduces much-needed competition in the remittances market. At the G8 Summit in 2010 and the G20 Summit in Cannes in 2011, policy makers committed to bringing down the price of remittances to 5% in five years. Ten years later, that goal has still not been reached, and the "5-in-5" ambition of policy makers compares unfavourably to the "6.8-in-10" result in 2020 (figure in next page). However, a breakdown of the trajectory of remittance prices over the past decade by provider type reveals a stunning picture. It shows that banks have remained by far the most expensive remittance operators, with average fees still above 10% in 2020. Money transfer operators (MTOs) have also consistently missed the 5% goal, and post offices have even increased their fees over time. At the same time, mobile money operator fees started at around 5% and have since decreased to slightly above 3%. In other words, despite 10 years of efforts by policy makers, traditional players have failed to reach the price level that digital newcomers achieved from the start. In Kenya, digital competition by M-Pesa has pushed competitors in the domestic market such as Western Union and MoneyGram to lower their prices (Mbiti and Weil, 2016).

The technological innovations that underly digital finance reduce the cost of service provision and lead to better risk-adjusted returns for financial firms, representing a positive supply shock (Beck and De La Torre, 2007). Thus, in principle, financial service providers can use the digital windfall to provide cheaper service to existing customers and expand their customer base, in particular to rural areas (lower volumes) and low-margin clients (such as poor households and MSMEs) that are currently excluded.

Remittance prices of traditional and new providers
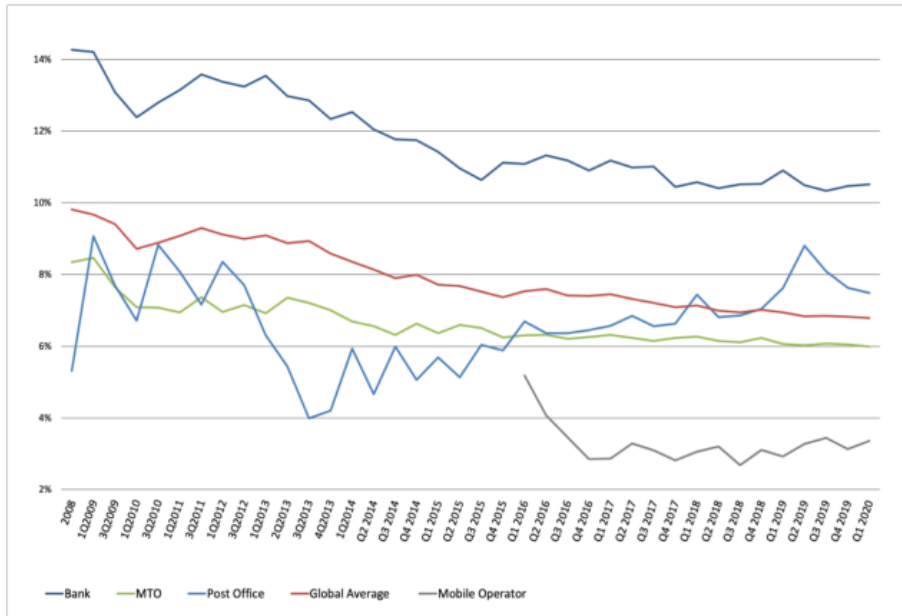
Source: Modified from World Bank (2020)

Fintech and the commercially sustainable production possibility frontier
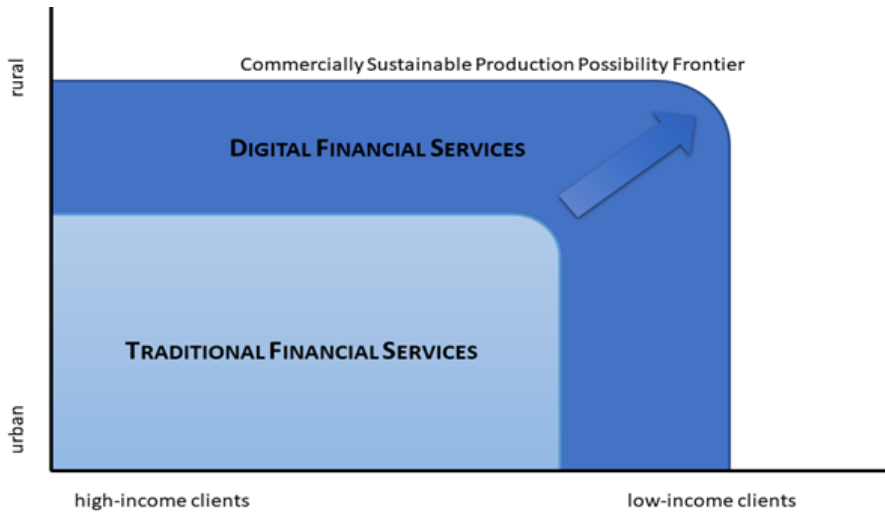
Source: Xu (2019)

Banks, however, are not protagonists of digital financial inclusion. Even though old financial inclusion policies focused on them, most of the success stories over the past decade occurred with commercial banks at the margins, even despite their resistance. In Kenya, the banking association pressured the Acting Finance Minister in 2008 to order an audit over M-Pesa because of concerns that the newcomer would compete with bank deposits (Ndung'u, 2021). In South Africa, commercial banks exert pressure to keep non-banks excluded from the National Payment System, stifling the rise of non-bank Digital Financial Services (DFS) providers (World Bank, 2019b). In the eight countries of WAEMU and Ghana, financial inclusion stalled for years because mobile money providers had to partner with a commercial bank. Regulatory changes in the mid-2010s freed non-banks from this obligation and the number of mobile money agents and accounts has grown exponentially since then (Mattern and McKay, 2018; Mattern and Riquet, 2019).

The relationship between commercial banks and non-bank digital providers is one of "coopetition" (Nalebuff and Brandenburger, 1996). Banks have some reasons to be concerned: non-banks tend to be more agile, have lower operating costs, and offer better products to a wider range of customers, including low-income households and MSMEs. They also compete for retail deposits, data, and customer relationships. Banks can also partner with non-banks to provide capital for digital credit, keep customer funds in savings and trust accounts, and offer a range of financial services under prudential supervision.

Mobile network operators (MNOs) and BigTech firms have emerged as key actors in digital financial inclusion, with regional variations. In Sub-Saharan Africa, MNOs as mobile money providers are key drivers of financial inclusion, supported by expansive agent networks that exchange e-money and cash. Kenya is the trailblazer in this field, where mobile money accounts outpaced banks as financial access providers as early as 2009, only two years after the introduction of M-Pesa (Heyer and King, 2015; Ndung'u, 2021). In Tanzania, Zambia, and Rwanda, mobile money accounts represented the majority of all transaction accounts as early as 2015 (World Bank, 2016). By 2021, there were 518 million active mobile money accounts in 98 countries processing US$1 trillion in transactions annually (GSMA, 2022).

In China and other East and South East Asian countries, BigTech firms drove mobile money adoption in the absence of an agent network (Chen, 2016; Mittal and Lloyd, 2016). In 2016, the processing volume of e-payments in China reached US$ 790 billion, eleven times that of the United States (Woetzel et al, 2017). In 2022, two BigTech firms (Alipay and WechatPay) count on 1.3 billion and 0.9 billion digital wallets, respectively (Fintech News, 2022).

Microfinance institutions are struggling to keep up with the new economics of financial inclusion. The business model of microfinance institutions is analog and labour-intensive; it involves a costly branch network, extensive community engagement, credit assessment by humans, and social collateral. Over the past decade, microfinance institutions have not reached scale, and many are pushed to the margins by the lower-cost and more convenient DFS provided by MNOs or BigTech firms (FSD Kenya, 2021). Some, such as Baobab MFI in Madagascar, have tried to go digital, but they have lost their community engagement edge while still not being as competitive as fintech credit firms (IFC, 2018).

4. Things that stay the same

While digital automation has overcome some obstacles to financial inclusion, others remain relevant. Volatile and small incomes, geographical barriers, informality, literacy and trust remain key constraints on the demand side. Some of them, such as literacy and trust, gain renewed importance as new instruments and products create unprecedented opportunities for financial scams, cyber-attacks, and other criminal behaviour (Bylander and Res, 2021). While digital technology can address geographical barriers and lack of documentation to some extent, other demand-side constraints require policies that transcend the financial sector.

Digital technology and agent banking have reduced geographical barriers to financial inclusion, but not eliminated them. Field research in the DRC has found that agents in low-income urban areas make enough profit from frequent low value interactions, akin to Unilever Hindustan's "low price, low margin, high volume" model of reaching the bottom of the pyramid (Cull et al, 2018). But low volumes challenge profitability of agents in rural areas (Hernandez et al, 2020). Informality and lack of documentation continue to be a concern, but they may not be the key obstacle to financial access in many low-income countries. Countries that have made major gains in financial inclusion, such as Kenya, Tanzania, and Bangladesh, also feature a high degree of informality.

While digital technologies can help address some financial risk, as indicated above, they cannot ameliorate or may even exacerbate other kinds of risk. Financial intermediaries using fintech still face traditional risks such as credit, liquidity, conduct and operational risk. Financial capability, and investor and consumer protection are concerns that should be at least as salient among fintech firms as among traditional providers. Moreover, fintech may expose market participants and regulators to unprecedented challenges in areas such as cyber risk (cloud computing, data integrity), complexity (algorithm assessment), interoperability and competition (data ownership, platforms, application Programming Interface), integrity (crypto-assets), and macro-stability (unsupervised linkages among financial intermediaries, untested algorithms and credit models) (CGFS and FSB, 2017; FSB, 2017).

Responsible financial access also remains a salient concern. As the protagonists of new financial inclusion reach the bottom of the pyramid, they incorporate an increasing number of customers with limited financial literacy and numeracy (World Bank, 2022). Predatory lending at triple-digit annualized interest rates has been common in the informal sector in many developing countries. Unfortunately, some digital lenders are expanding, with business models based on rudimentary algorithms that are too similar to that of loan sharks, as the recent experience of Kenya, Tanzania, and South Africa shows (Izaguirre, 2018; Kaffenberger et al, 2018). Regulatory intervention to prevent over-indebtedness was a concern for microfinance advocates a decade ago – it remains one today.

Gender inequities persist in digital finance. Even though the gender gap in digital financial access tends to be lower than for its traditional counterpart and is shrinking, it is significant. Men are more likely to open mobile money accounts and use digital

financial services in general than women (Shin et al, 2021). Policy makers should look at obstacles to fintech adoption by women, including lower trust in male mobile money agents (Barooah et al, 2018) or privacy concerns, and take appropriate action.

5. The Faustian bargain

Technological change and digital automation have not only transformed the financial services market, rendering some financial inclusion policies obsolete. They have also created a new, second-order challenge for policy makers: Unlike banks, MNOs and BigTech firms have the incentives and the necessary capital to invest in a significant expansion of their service networks to facilitate access to financial services even among MSMEs, rural and low-income households. But while such network expansion helps excluded parts of the population obtain access to better financial services without draining the public purse, digital financial inclusion comes at the cost of establishing a novel monopoly or oligopoly of platform providers. This section lays out the logic behind this Faustian bargain.

MNOs and BigTech firms are willing to make significant investments that foster financial inclusion even when it is not profitable in the short run. Unlike traditional financial service providers, they have incentives to reach a wide customer base. In a recent report, the BIS summarizes the incentive structure of these companies neatly, stating that digital platforms are able to leverage a "DNA feedback loop": data analytics, network externalities, and interwoven activities (BIS, 2019; Frost et al, 2019). The following paragraphs will briefly elaborate on each in turn.

MNOs and BigTech firms are keener to harness the value of data than traditional financial services providers. These two types of non-banks are protagonists of financial inclusion because each additional customer is a valuable source of data for them. DFS providers can train artificial intelligence-powered financial models on their proprietary database, for example when making credit decisions (Ding et al, 2018; Hau et al, 2018). Such data-driven decision-making may help address current financial access gaps. For example, Ant Financial microloan data reveals that women are more creditworthy than men, with 20% lower default rates ceteris paribus (Zhang, 2017). Conversely, there is a risk that algorithms accentuate existing inequalities or discriminate against certain customers in ways that are neither transparent to regulators nor the firm itself (Feyen et al, 2021). MNOs and BigTech firms also use customer data to inform the non-financial part of their business.

The network externalities of digital platforms justify significant up-front investment. Once a digital platform reaches a critical mass of customers, it can expect to reap the benefits of network externalities (including customer loyalty) and monopsony (selling other firms access to customers at a markup). M-Pesa, Ant Group, and Tencent have excelled at both, and aspiring platform providers elsewhere have long taken notice. In addition, operating costs per customer decrease significantly as DFS networks reach scale. An analysis of proprietary data from six mobile money operators by McKinsey reveals that the profit margins on digital transactions can exceed 75% for first movers. Moreover, established players spend less money on marketing (because customers

and agents approach the firm on their own) and cash distribution, as individual agents collect and disburse cash in more equal measure each day (Osafo-Kwaako et al, 2018). The benefits of market dominance can be massive: in 2019-2022, M-Pesa was expected to generate 50% of the revenues of Safaricom, the MNO that operates the platform in Kenya, according to GSMA (2019) research.

The ability to cross-sell services provides an additional incentive to reach the bottom of the economic pyramid. The capital and effort MNOs and BigTech firms dedicate to fostering financial inclusion can in part – and ironically – be attributed to the fact that financial services are not their core business. DFS can conveniently be added to existing infrastructure (e.g., mobile or e-commerce networks), and they serve to lock customers into a firm-owned service environment and thus reduce client attrition. In short, unlike banks, MNOs and BigTech firms have both the capital and incentives to expand the financial access network even when it is not profitable for their financial business, at least in the short-term.

Prematurely imposing interoperability can undermine these incentives. Mozambique is a case in point. Over the past half-decade, several mobile money providers have engaged in competition over network dominance, investing in telecommunications towers, network equipment, and agent outlets. Researchers at the International Growth Centre make an explicit case against imposing interoperability at this time because it would reduce company incentives to invest. They argue that the regulator can make policy changes a later point, once the market has matured (Hoernig and Maugeri, 2017).

What is not to like about private firms dedicating massive investments towards expanding the financial access infrastructure, a public policy goal designed to help underserved communities use a better and wider range of financial services than what they currently have at their disposal? The Faustian side to the bargain surfaces in the anti-competitive behaviour MNOs and BigTech firms may exhibit once they have reached market dominance (Feyen et al, 2021). Kenya and China are noteworthy examples.

The speed of M-Pesa uptake was breathtaking: only five years after its launch in 2007, 70% of Kenya's adult population was using the mobile money service (Ndung'u, 2021). Today, the number of mobile money accounts outnumber the country's population. The network of mobile money agents multiplied by a factor of 10 between 2007 and 2010, and again by 2022 (Central Bank of Kenya, 2022a). Thus, in a matter of years, M-Pesa has established a financial access infrastructure that dwarfs the country's bank branch and ATM network, at no cost to official coffers. Quite the opposite, M-Pesa generates revenue for the Kenyan government in the form of taxes and dividends (Tyce, 2020). The Treasury is the second-biggest shareholder of Safaricom, the MNO that operated and now owns M-Pesa in Kenya (Mwaniki, 2022).

M-Pesa is one of four mobile money providers in the country, but it commands a 99% market share today, up from around 75% during much of the 2010s (Gilbert, 2020). Its dominance of the mobile market allows M-Pesa to charge a hefty mark-up on two kinds of fees: (1) transaction fees for customers; and (2) access fees for financial service

providers to offer products to M-Pesa customers. First, money transfer fees in 2022 are between equal and 60% higher than for Airtel, M-Pesa's closest competitor, and up to twice as much for "unregistered users" of other mobile money services. Notably, Airtel customers can transfer money among themselves for free, whereas M-Pesa customers have to pay fees both within and out-of-network (Safaricom, 2022). Second, MNOs control the gates to the Unstructured Supplementary Service Data (USSD) messaging network that underlies mobile money on feature phones. The price of access to Safaricom's USSD network was twice as high as for the second largest MNO, and 10 times that of the third provider, according to a price comparison from 2014 (Mazer and Rowan, 2016). MNOs also control mobile subscription and mobile money transaction data, which reveals valuable customer attributes such as liquidity, regularity and scale of cash flow, and breadth of a customer's social network (Blechman, 2016). MNOs' role as gatekeepers for both kinds of data may discourage competition and privilege individual firms that enter in exclusive arrangements with the MNO to access data and customers. At the same time, innovative newcomers that operate on smartphones only can obtain user data independently, attenuating the power of MNOs.

M-Pesa resisted calls for interoperability for many years. Interoperability requires multidimensional negotiations on issues such as membership criteria, participation in rule-setting, operations, dispute management, and technology. Here, mobile money providers can find focal points of agreement, either alone or with the prodding of authorities. Negotiations regarding switch and interchange fees appear to be more complicated. If end users are to pay no additional fee for out-of-network transfers, mobile money providers need to negotiate internal interchange fees in line with expected costs and revenues for bilateral customer transfer streams, all subject to differentials in market power. This may be why interchange pricing is often negotiated bilaterally. In 2015, out-of-network transfer charges were three times as high as within the M-Pesa network (Mazer and Rowan, 2016). It took until 2018 for M-Pesa to sign an interoperability agreement with the next biggest two providers — Airtel Money and Telkom TKash (Cook, 2018).

China provides another noteworthy example of the Faustian bargain. Two BigTech firms, namely Alibaba and Tencent, entered the retail payment business in 2003 and 2013, respectively. By 2021, Alipay has 1.3 billion users, closely followed by WeChat Pay with 900 million (Feyen et al, 2021). In the mid-2010s, QR codes that link to the payment networks became ubiquitous, allowing individuals to easily transfer money and even small MSMEs such as street food vendors to get paid digitally. Cash flow analysis of digital payments allowed Ant Group (the finance company spun off Alibaba in 2014) to innovate further. It launched the 3-1-0 model of microlending, where a loan application takes three minutes, and loan decision one second, with zero humans involved. No collateral is required. Ant Group is now the biggest online lender, specializing in MSME loans and consumer credit. In 2020, microlending activities generated 40% of Ant Group's revenue and 48% of its profits (Isjwara, 2021; Liu et al, 2020).

As the digital retail financial market in China matured, a duopoly emerged. Alipay and WeChat Pay make up over 90% of the digital payment market in China. The two are not interoperable, and websites owned by one conglomerate typically only accept their in-house payment service, not the competitor's (*Tencent Opens WeChat Further to*

Rivals as App Walls Come Down, 2021). Until 2021, when the PBOC issued guidelines on a unified barcode, each payment provider had their own exclusive QR standard (Zhang et al, 2019). Ant Group also engaged in creative interpretations of financial rules and regulations: its microlending products (Huabei and Jiebei) did not meet prudential capital requirements. It has securitized its micro-loans to gain greater leverage, and its insurance-like service (Xiang Hu Bao) does not have an insurance licence (Zhu, 2021). Ant Group also abused its dominant market position to exclude peer operators, and parent company Alibaba presented some vendors with the choice to sell exclusively on its platform or not sell at all. Customer data from Alibaba companies are kept in-house for commercial use. At the same time, consumers complain about the risk of data leakage and unauthorized use of their personal data (Walsh, 2021). Concerns about over-indebtedness among college students are rising as online lenders target advertisement at this consumer group.

6. Conclusion: What to do?

Faced with the Faustian bargain, regulators in some jurisdictions opt to retain barriers to market entry and keep the digital retail payments system on a tight, bank-dominated leash. This can lead to stagnation in digital financial inclusion as non-banks are discouraged from investing in financial access networks, with important differences across jurisdictions.

Policy makers who have adopted a more laissez-faire approach have often seen the private digital financial services sector thrive, with a plethora of second and third-generation services building on top of retail payment platforms. At the same time, market abuses by dominant players have required corrective policy intervention. Again, Kenya and China provide lessons from such rectification measures.

In Kenya, the 2011 National Payment Systems Act and additional e-money regulations in 2013 gave monitoring and regulatory power over mobile money to the Central Bank. In 2014, the Competition Authority of Kenya (CAK) ruled that Safaricom could no longer require agents to exclusively work for the company. The Central Bank of Kenya also put a ban on exclusivity agreements in agent contracts in 2014. After the 2014 ruling, the percentage of agents working for one company has steadily decreased from a high of 96% in 2013. Ending agent exclusivity has increased the profitability of agent outlets and benefited customers (Mazer et al, 2016).

In a separate case, CAK reprimanded M-Pesa for a lack of transparency on prices for transactions going through its network. M-Pesa in turn agreed to lower its service charges and to inform payment service providers of transaction prices via real-time notification after initiation, but before completion (Business Daily, 2017). In April 2018, CAK, the Communication Authority, and the Central Bank of Kenya took a joint initiative to nudge all mobile money providers to sign agreements for the seamless transfer of funds between individual e-wallets (Ombok, 2022). Since April 2022, customers can pay merchants on an interoperable platform, no matter which mobile money wallet they use (CBK, 2022b). Meanwhile, the Central Bank of Kenya has issued new regulations covering all digital credit providers (Digital Credit Providers Regulations, 2022).

In addition, Kenya updated its data governance framework with the 2018 General Data Protection Regulations and the 2019 Data Protection Act. The new legal framework identifies the Communications Authority of Kenya (CA), Competition Authority of Kenya (CAK), and the Central Bank of Kenya as the major enforcers of privacy regulations. The 2019 Act prompted Safaricom to establish an internal office for data protection to review how the company handles consumer data.

In China, regulatory authorities have reigned in excesses in the digital financial market since 2016, when a booming P2P credit market harboured repeated cases of regulatory arbitrage and fraud (Gruin and Knaack, 2019) . BigTech platforms offering financial services enjoyed a high degree of leeway until recently. In November 2020, the State Administration for Market Regulation (SAMR) started drafting a new antitrust guideline to curb monopolistic behaviour in a first attempt to define anti-competitive practices online. The new guideline by the market regulator directly addresses tech giants such as Alibaba and Tencent (Liu and Ren, 2020). In the same month, financial supervisors canceled the stock market launch of Ant Group, scuppering what would have been the world's largest IPO to date. The top management of Ant Group was summoned for a joint meeting with the People's Bank of China (PBOC), the banking, insurance, and securities regulators, and the State Administration for Foreign Exchange. The authorities accused Ant of scant awareness of the law, defiance of regulatory compliance requirements, regulatory arbitrage, abuse of its market dominance, and of inflicting damage to the legitimate rights and interests of consumers. Ant is required to address a long list of such wrongdoings, and the company had to undergo a rectification process that is still in process (Pan, 2020). In a separate decision, financial supervisors and the Ministry of Public Security banned online microlending platforms from granting new consumer loans to college students and required platform providers to show proof of secondary payment channels, effectively placing the onus of ensuring "responsible" financial access to the firm, and not the customer (Yue and Jia, 2021).

China has also witnessed significant changes in data governance in 2021. In March 2021, data governance authorities tightened the rules for BigTech platforms. The Cyberspace Administration of China (CAC), the Ministry of Industry and Information Technology (MIIT), the Ministry of Public Security, and the SAMR jointly issued rules that restrict what kind of personal info apps can demand (Cyberspace Administration of China, 2021). MIIT, which also serves as China's telecom regulator, ordered 90 apps to be withdrawn from several app stores, citing violations of users' rights. In the summer of 2021, China's parliament passed two laws governing data, the National Data Security Law to address cyber-risks and data sovereignty, and the Personal Information Protection Law that dictates how personal data is to be collected and utilized (Wang, 2021). Analysts disagree on the reasons and effects of the laws once they are implemented, but some agree that the legal changes are meant to rein in BigTech companies, and also to present to the world a model of how individual and national rights can be protected against increasingly powerful digital firms (Mok, 2021).

More recently, Xi Jinping addressed the Politburo of the Communist Party in a speech on developing the country's digital economy, stating that "it is necessary to rectify and standardize conduct and practices that harm the public interests and impede fair

competition in the development process, prevent monopoly by platform companies and disorderly expansion of capital, and investigate and punish acts of monopoly and unfair competition in accordance with the law." (Xi, 2022). Given such a clear message from the top, BigTech platform operators can expect continued scrutiny regarding regulatory arbitrage or anti-competitive practices in the future.

Two preliminary lessons can be drawn from both the Kenyan and Chinese cases. First, rectification started after the market had reached a certain degree of maturity. The authorities in both jurisdictions had adopted a laissez-faire approach first and only tightened the rules once market abuse and consumer right infringements by dominant firms became a salient concern. Second, financial supervisors cooperated across regulatory siloes. In Kenya, the Central Bank consults with the antitrust regulator and telecom regulators to govern the mobile money market. In China, new rules and regulations are usually issued jointly by several relevant ministries and regulatory agencies. Regulators in China and beyond must balance the goals of encouraging innovation, protecting consumer interest, and enhancing the international competitiveness of national firms (Zhang, 2021). This balancing act requires both careful policy sequencing and a focus on cross-agency cooperation. While the jury is out on the effectiveness of the rectification measures discussed above, Kenya and China harbour valuable policy lessons for regulators in East Africa and the rest of the world.

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6

Financial Technology in Tanzania: Assessment of Growth Drivers

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Abstract

This paper provides an in-depth insight of existing fintech environment in Tanzania, focusing on growth-driving and retarding factors and bringing up opportunities for scaling up fintech solutions to a broad range of the population. The analysis is descriptive, based on information gathered from various institutions, open data sources and interviews from key informants in the market. The analysis incorporates both fintech start-ups and incumbent fintech companies, including mobile money. The findings show that most of the fintech innovations in Tanzania are in payments and lending—driven by mobile money providers, of which most have integrated with banks and financial institutions to facilitate delivery of banking services. Gaps have been established in the legal framework governing nano-credit (mostly offered by mobile money operators) and the protection of fintech innovations in nascent stage. A 'test and learn' institutional set-up is also missing, making it challenging to nurture and/or support fintech innovations from the initial stages. Although there is improvement in support infrastructure, there is slow adoption and use of smartphones capable of supporting most digital transactions. Also observed from the analysis is absence of a coordination platform for fintech players. To address these challenges, the paper recommends a review of the legal framework to accommodate new fintech innovations and products from the market, including nano-credit; institutionalizing 'test and learn' approach to facilitate engagement with fintech innovators; and facilitate establishment of a platform for coordinating fintech ecosystem, including a fintech association for self-regulation and capacity building.

Keywords: *Fintech, technology, digital financial services, innovations and electronic payment*

1. Introduction

Since 2009, Tanzania, like most other developing countries in Africa, has witnessed significant transformation in access and delivery of financial services, with a growing proportion of the unbanked population financially included. The impact of financial technology (fintech) on this end is unprecedented in bringing on board competing or complementing financial products and services offered by traditional financial service providers. The term "fintech" is narrowly and broadly defined. AFI (2016) narrowly defines fintech *'as application of technology in finance'*, while UNCDF (2021) broadly defines fintech as "*technologically enabled financial innovation that could result in new business models, applications, processes or products with associated material effect on financial markets and institutions and the provision of financial services*". The latter definition is adopted in this paper.

Fintech facilitates digital finance around the globe, with the business models and services driven by artificial intelligence, big data, smart contracts, biometric identification, blockchain technology and mobile Internet access (UNCDF, 2021; AFI, 2016).

> "*Digital financial services are comprise of a broad range of financial services accessed and delivered through digital channels including payments, credit, savings, remittances and insurance. It also includes mobile money (AFI, 2016)*".

Fintech is thus an enabler to delivery of digital financial services and its application is not new in the financial sector. It has been used by banks for years to automate systems and back-end procedures. As pointed out by Gomber et al (2018), there is increasing shift to more consumer-centric oriented services in financial institutions across the globe, with fintech companies offering automated financial products and services at a low price.

In a nutshell, fintech is important as it:[1]

(i) Increases access to financial services by the public at low cost (see also AFI, 2020). With adoption of fintech, it is now possible for customers to operate multiple bank accounts and cards through a single interface, thus reduce payments and remittance costs across banks.

(ii) Improves transactions security. With technology, it becomes easier for banks and other financial institutions to enhance cybersecurity, thus reduce vulnerability of the financial system to cyber criminals.

(iii) Makes it easier to upgrade payment systems to suit market demand, competitiveness, and customer retention.

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1   https://www.tatvasoft.com/outsoucing/2021/04what-is-fintech.html.

(iv) Improves efficiency in processing payments and loans, and by extension enhances economic growth. Payments are possible in remote places where financial institutions are not present, 24/7 and during holidays.

(v)   Improves transparency of remittance customers in both sending and receiving payments.

Increasingly, fintech innovation connects mobile wallets with other digital payment platforms such as Visa, MasterCard and PayPal, and thus enhances exchange of goods within and across countries (Maganyi et al, 2022). The level of adoption and use cases, however, varies across countries, explained by social and economic environment, business environment, demographic characteristics, and advancement in digital infrastructure, among others. In essence, these factors differentiate levels of evolution of fintechs as discussed by Cracknell and Wilkinson (2021). [2]

There is a gradual development and shift through stages of evolution of fintech in Tanzania. Anecdotal evidence shows low uptake of opportunities for upscaling usage and adoption of digital technology from supply and demand side. Making use of opportunities and unlocking potential at each stage of the evolution of financial technology is necessary to ensure gains of digital financial services are maintained and financial markets grow sustainably. This paper aims to:

(i)   Evaluate the progress of fintech innovations focusing on growth-enhancing and retarding drivers.

(ii) Assess the implications of existing governance structures, the legal and regulatory framework, support functions and the fiscal regime, in scaling up fintech innovations and use by a broad range of the population.

Drawing from the objectives, the proposed research aims to respond to the following questions:

1. How have fintechs evolved in Tanzania?

2. What are deriving or deterring forces of adoption and acceptance of digital financial services in Tanzania?

3. Is there room to upscale digital financial services further in Tanzania to address financial needs of mass population, especially the youth, women, and rural poor?

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2   See Cracknell and Wilkinson, article in Regtech Africa magazine, July 2021, Second Edition. They posit five generations for Zambia: 1st Generation: Channels – Mobile Money and Agent Banking; 2nd Generation: extending the use case - Nano credit and merchant services; 3rd Generation: The emergence of fintech and use cases; 4th Generation: The emergence of fintech-enabled 'real world' services and 5th Generation: Fintech as a national asset.

The contribution of this paper is in two areas. First, it systematically illustrates the evolution of fintech in Tanzania and the contribution of the same in expanding digital financial services to various segments of the population, especially to the unbanked. Second, it gives insights of fintech and digital financial services operating landscape in Tanzania, including the legal and regulatory environment, supporting functions, infrastructure, and governance. Analysis in these areas not only reflects areas of strength and weakness, but also identifies challenges and opportunities in the market.

The rest of the paper is organized as follows: Section 2 focuses on literature review while section 3 gives brief highlights of the approach taken in this paper. Section 4 presents an overview of the financial sector in Tanzania. This is followed by section 5, which discusses the fintech-enabling environment. Section 6 gives highlights on the evolution of digital payments systems in Tanzania. Implication of fintechs in financial innovation is discussed in section 7, followed by a discussion on opportunities for upscaling fintechs in section 8. Finally, section 9 concludes the paper.

2. Literature review

Theoretical literature

Globally, there is increasing awareness of the importance of fintech in transforming the functioning of the financial sector; that is, digitalization and datafication of financial services, markets and regulation. The magnitude of the impact is, however, ubject to factors that vary within and across countries (Reddy and Singh, 2015; Wibella et al, 2018; Marumba and Mutsikwa, 2013). Inherent characteristics of consumers including their level of formal education, financial literacy, income, age, location, gender and development of financial system, supporting functions and infrastructure, legal and regulatory environment come into play for effective absorption of fintech products and services. It is not only the presence of a suitable environment for fintech growth that matters; it is also a synergy between players in fintech ecosystem and innovative ways to accommodate innovations in the market that matter most. Most of the regulators allow fintechs to operate without strict financial regulation to offer them opportunity to experiment (Korynski, 2019). A good example is the regulatory approaches implemented by Kenya, Tanzania, and Philippines of 'test and learn'–a precursor to the 'regulatory sandbox' (AFI, 2020; Schindler, 2017).

Fintech penetration in the market is also a function of other factors, including technology, changes to the macroeconomic or financial landscape (Schindler, 2017). Digitalization in payments and other financial services enables economies reap their optimal potentials in revenue collection, investment and realize dynamic economic growth (Pillai, 2016). Pillai (2016) argues that technology and functions to facilitate processing of government payments such as Government-to-Person (G2P), Person-to-Government (P2G) and Business-to-Government (B2G) are essential as efficiency and accuracy of such payments affects public trust in digital payments. Notwithstanding, demand factors are also important in driving innovation as insufficient demand drives financial innovations outside the market (Schindler, 2017).

Though fintechs improve access to financial services, they come with a number of risks and threats from data privacy practices and cybersecurity threats (AFI, 2020; Korynski, 2019). It is thus suggested that continuous monitoring and adoption of regulatory frameworks and

supervisory practices is necessary to safeguard the stability of the financial system (AFI, 2020; Schindler, 2019). A step towards this move entails assessment of the current market structures to ensure conformity with rapidly changing fintech innovations.

Fintech markets are of different nature. While some are more developed in terms of number of active fintechs, types of services they provide and market segments they operate, others are still under-developed, characterized by limited number of fintechs, low investments and fragmented ecosystem. Korynski (2019) conclusion is thus worth noting, that:

(i)   There are differences of fintechs operating across countries with larger diversity observed in more mature countries than in less developed countries.

(ii) Fintechs operate in all segments of the financial market but mostly found in payment services, lending, and financial advisory services.

(iii) Some fintechs offer financial services to the unbanked individuals without including the same into the mainstream financial system.

(iv) Policy support on fintech differs across countries – while some countries have coherent approach, others do not.

Regarding fintech funding, analysis shows differences across countries. The factors explaining such diversity include structural features of the national economy, ranging from regulatory quality, depth of the financial markets and their innovation capacity (Cornelli et al, 2021). This is the reason why United States, United Kingdom, several European markets, and China rank high in fintech innovation (Cornelli et al, 2021). Considering competition and other barriers to new fintechs, 57 countries have already set regulatory sandboxes to allow innovators conduct pilot trials (World Bank, 2020). Other countries that have resorted to other regulatory approaches include those implemented by Kenya, Tanzania, and Philippines of 'test and learn', a precursor to the 'regulatory sandbox' (AFI, 2020).

Empirical literature

Understanding market structures and people's interest is critical in upscaling applications of fintechs. There is a growing volume of literature that correlates evolution of fintechs and improved digital transactions, and the role they play in reducing distress that banks and other financial institutions face in periods of prolonged economic recession (Pinshi, 2021; Sahay et al, 2020). While some fintechs complement services offered by traditional financial institutions, others substitute. For example, Fuster et al (2019), using mortgage loan data in United States, found that fintech peer-to-peer (P2P) lenders processed applications 20% faster, suggesting increased competition to traditional finance. Another study by Tang (2019), using regulatory change as an exogenous shock to bank credit supply in the United States, established P2P lending platforms substitute rather than complement traditional banking services. Overall, Fuster et al (2019) and Tang (2019) suggest that P2P fintech lending target high-risk borrowers and expand credit to marginalized bank borrowers. As argued by Liao et al (2017) and Hayvrylchyk et al (2017), market structures matter on the outcome of Fintech innovations. In areas with low diversity of bank branch network and lower bank concentration, fintech innovation products and services are likely to compete with banks (Hayvrylchyk et al, 2017).

Overall, therefore, fintechs are important to the economy as they enhance economic growth and by extension household welfare as they lower the cost of expanding financial services to new customers. This argument is consistent with Appiah-Otoo and Song (2021) who established a positive relationship between money transfer and payment applications on economic growth and per capita household consumption in China, respectively. The impact of fintech in other developing countries is also huge, proven by evidence from Africa, Asia, Latin and South America (Aron, 2018). Poor consumers in developing countries are now able to hold cash in their mobile wallets, thanks to cheap and/or recycled handsets and perform financial transfers easily and cost effectively (Ozili, 2018; Aron, 2018, and Africa Development Bank, 2012). They are also able to build savings and investment in productive activities and thus lower poverty levels (Arnold and Gammage, 2019; Schaner 2016; and Prina, 2015).

The role of fintech in financial inclusion is also notable. Tok and Heng (2022) using Global Findex data, found a higher positive correlation between Fintech and digital financial inclusion compared to traditional measures of financial inclusion. The role of fintech in narrowing the income gap and rural-urban divide was observed, but no impact was noted on gender divide, suggesting a need of other interventions in addressing the gender gap. Digital payment is the most common instrument of digital payments, led by mobile money, one of the earliest fintech solutions (Sahay et al, 2020). Gradually though, expansion of user data that comes with mobile money has spurred digital lending, with digital lenders using alternative data from payment providers and other sources to identify borrowers credit worthiness (Sahay et al, 2020).

Several factors influence use and adoption of fintechs from the supply side and demand side. The influence of such factors varies across countries. Aurazo and Vega (2021), using Peru's Household Budget Surveys (2015-2018) data found that among other variables, Internet access accounted for higher usage of digital financial services and households in top quantiles of per capita income had higher likelihood of paying with digital instruments. Further, Lema (2017) assessed factors influencing the adoption of mobile financial services in the unbanked population in Chamwino District in Tanzania and established that perceived usefulness, perceived cost and social influence significantly influence adoption of mobile financial services. In India, Wibella et al (2018) found perceived trustworthiness of digital financial services being the most influencing factor on the use of digital financial services.

Another empirical work includes that of Ogege and Boloupremo (2020) in Nigeria. Ogege and Boloupremo (2020) using ANOVA regression analysis on 303 respondents found a positive correlation between the increase in technological advancement and its usage by younger consumers. Ogege and Boloupremo (2020) concluded that rapid expansion of fintech innovations and the pressure they create on traditional financial institutions drive the latter to actively engage with fintechs in an attempt to improve their service and make their services more convenient.

Drawing from the literature are the following: First, fintech growth is highly dependent on a number of factors (supply and demand side); one factor cannot drive fintech alone. Second, collaboration between players in the fintech ecosystem is important to ensure sustainable growth of fintechs. Third, is the importance of quality of the legal

and regulatory framework, depth of the financial markets and innovation capacity of such markets in attracting fintech investments in a particular market. Fourth, fintechs either complement or substitute services offered by traditional financial service providers, but the nature of the two depends on the level of development of the financial market.

3. Approach

Analysis in the paper is descriptive with a qualitative method approach. It is based on review of various documents, analysis of secondary data and information gathered through interviews and discussions with key informants in financial institutions, aggregators, digital finance development facilitators and other relevant stakeholders. Annex 1 presents a list of interviewed stakeholders. The paper covers both new and incumbent fintechs, mobile money inclusive.

Based on the existing literature, conceptually this paper considers information technology (IT) and innovations allied with it as a key driver of fintech in Tanzania. Associated with this is the interaction between IT innovations, enabling business environment (legal and regulatory infrastructure), supporting infrastructure and financing. Borrowing from Imerman and Fabozzi (2020), Pazarbasioglu et al (2020), and Pillai (2020), the fintech ecosystem is described in the table below.

Fintech ecosystem focus areas

Financial technologies	Areas impacted include payments technology; digital wealth management, fintech lending, crowdfunding, insuretech, proptech, digital banking (online and mobile banking).
Functional areas	Enabling business environment for incumbent and new players, financial regulations, risk management, consumer protection, funding and supervision/monitoring.
Market conditions	Market readiness (e.g., number of people subscribed to mobile money and/or with bank accounts); strength of financial sector (banks and non-financial institutions), number of aggregators, interoperability between payment systems and coordination platform for key players; financial literacy, financial technology literacy and consumers' redress and recourse mechanisms.
Supporting infrastructure	Digital identification, credit reference bureaus, payment gateways, credit systems, connectivity infrastructure.
Emerging technologies for financial services	Internet of things, blockchain, artificial intelligence, big data analytics, cybersecurity, biometrics, open-source computing and cloud computing. Banks and fintech companies have developed technologies based on these elements taking on board privacy, risk and other management issues to scale up their outreach at a convenient manner.

Source: Adopted and modified from Imerman and Fabozzi (2020), Pazarbasioglu et al (2020), Pillai (2016)

There are notable development/milestones in each of the areas illustrated in the Table as illustrated in the subsequent sections. The progress in the market is not past the second generation; that is, it is not beyond nano-credit and merchant payments. Notable progress is observed in the first generation, where the access level of mobile money and agent banking is huge, facilitated by, among others, digital identification and mass SIM card registration.

Overview of financial sector in Tanzania

The financial sector in Tanzania is comprised of banks, which account for about 70% of financial sector assets (NFIF, 2018); insurance, pension funds, Savings and Credit Cooperative Societies (SACCOS), credit companies and moneylenders, and community groups (see figure titeld "Landscape of Tanzania financial sector"). The sector is wholly regulated after enactment of Microfinance Act, 2018.[3]   The Bank of Tanzania is vested with powers to regulate and supervise all deposit taking financial institutions and some non-deposit taking financial institutions as provided in the Bank of Tanzania Act, 2006; Banking and Financial Institutions Act, 2006; Foreign Exchange Act, 1992; National Payment Systems Act, 2015 and the Microfinance Act, 2018. Other regulated and supervised financial institutions are bureau de change, leasing companies, mortgage refinance company, microfinance service providers (Tier 1: Deposit-taking microfinance institutions and Tier 2: Non-deposit taking microfinance institutions including individuals and moneylenders), credit reference bureaus and payments systems. Tier 3: SACCOs, and Tier 4: Community groups). Supervision and regulation role is delegated to Tanzania Cooperative Development Commission (TCDC) and President's Office Regional Administration and Local Government (PO-RALG), respectively. The role of these two institutions is to ensure that the supervised institutions abide by the legal requirements.

Landscape of Tanzania financial sector

Banking
Institutions, Branches and Bank Agents,
Credit Reference Bureaus (CRB)

Insurance
Companies, Brokers and Agents

Pension
Public Pension Funds

Securities
Stock Exchange, Brokers/Dealers, Custodians,
Bond Traders, Investment Advisors, Fund
Managers, and Nominated Advisors

SACCOS
Non-Bank Payment Service Providers
Electronic Money Issuer (EMI);
Aggregators and Agents

MFIs
MFIs and Money Lenders

Community groups
 VSLA, SACAs and VICOBA

FINANCIAL SECTOR

Source: Adopted and modified from NFIF (2018)

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3   Prior to 2019, non-deposit taking microfinance institutions and community groups were not regulated.

As at 2020, banks' branch network stood at 969, rising from 430 in 2009. The concentration of the branches was in five regions (Dar es Salaam, Mwanza, Arusha, Mbeya and Kilimanjaro), accounting for 52% of all the operating branches (Bank of Tanzania, 2020a)[4].

Categories of banking institution supervised by Bank of Tanzania

Category	2016	2017	2018	2019	2020
Commercial Banks	38	38	40	38	35
Development Banks	2	2	2	2	2
Microfinance Banks	4	5	5	5	4
Community Banks	12	11	6	6	5
Financial Institutions	3	3	0	0	0
Total	59	59	53	51	46

Source: Bank of Tanzania

Key financial sector indicators

Indicator	Value
Licensed banks and financial institutions (2020)	46 (969 branches)
Bank assets (billion)	TZS 34,690
Deposits (Local)- billion	TZS 17,776
Deposits (Foreign)- billion	TZS 6,990
Where do people save (Adults: Finscope 2017)*	
Banks	3,901,002
Home	11,981,649
Mobile money	9,752,505
Where do people borrow (Adults: FinScope 2017)	
Family and friends	19,226,368
Savings groups	5,015,574
Mobile money	1,114,572
Banks	835,929
Licensed Microfinance Services Providers (Tier II: Microcredit companies: December 2021)	760
Licensed Microfinance Services Providers (Tier II: SACCOS: December 2021)	668

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4   Tanzania has 31 regions (26 in Mainland and 5 in Zanzibar)

Continued

Indicator	Value
Where do people borrow (Adults: FinScope 2017)	
Licensed Microfinance Services Providers (Tier IV: Savings groups: December 2021)	28,054
Number of Bank Agents (2021)	40,410
Number of ATMs (2021)	2,041

Source: FinScope Tanzania (2017), and Bank of Tanzania.
*Estimates in 2017 (27,864,302).
Note: Exchange rate in 2020: 1US$=TZS 2,300.

Digital payments have also gained space in the banking industry through various channels, including Automated Teller Machines (ATMs), Point of Sale Devices (POS), Internet banking and mobile (SMS). The number of ATMs reached 2,058 from 1,361 in a span of eight years (2012-2020) while that of POS increased to 47,496 from 1,910 (BoT, 2020). The value of mobile banking and internet banking transactions have exhibited an upward trend, thanks to innovations leveraged in mobile phone technology. The value of Internet banking grew from TZS 17.8 trillion in 2012 to TZS 64.9 trillion in 2020, whereas that of mobile banking stood at TZS 25.0 trillion from TZS 302 million. These improvements could not have happened had it not been for the fintech innovations that were interfaced with banks' core functions.

Together with the Bank of Tanzania, other regulators of financial sector are Tanzania Insurance Regulatory Authority (TIRA), Capital Markets and Securities Authority (CMSA), and Tanzania Communication Regulatory Authority (TCRA). These regulators collaborate to ensure the smooth functioning of the financial sector as a whole. The following is a snapshot of each of these regulators:

Tanzania Insurance Regulatory Authority (TIRA): Established by the Insurance Act No.10 of 2009, it is responsible for supervising and regulating players in insurance industry including insurers, insurance brokers, insurance agents, surveyors, loss assessors and adjusters. By 2017, there were 30 insurance companies, 158 insurance brokers, 51 insurance surveyors, loss assessors and adjusters and 640 insurance agents (Ogolla, 2017). Insurance industry is still underdeveloped, with the uptake of insurance services standing at 15 percent of adult population in 2017 (FinScope Tanzania, 2017). Increasingly, however, insurance companies are adopting financial technology solutions, including mobile money platforms, in delivering various products and connecting with brokers and agents. Such products include Tigo-bima –health cover offered by MILVIK – a fintech.[5]

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5   https://www.tigo.co.tz/news/tigo.

The Capital Markets and Securities Authority (CMSA) was established in 1995 by the Capital Markets and Securities Act, 1994 (Amended in 2010) with a role to supervise capital markets-related matters. Entities falling under this category include brokers/dealers, advisers, fund managers, collective investment schemes and bond traders. There is low public awareness in stock market trading. Noting this challenge, Dar es Salaam Stock Exchange in collaboration with Maxicom Africa (Maximalipo) launched DSE mobile trading in 2015 to enable individuals to register at the stock exchange and purchase shares. The platform is accessible through all major mobile networks (Tigo, Voda, Halotel, Airtel and Zantel). Another related platform is *DSE Hisa Kinjani* – a mobile trading platform developed by the e-Government Agency (eGA) and launched in 2020. Notably, CMSA Act, 1994 does not provide room for fintechs to raise money on capital market unless the company fulfils a set of criteria—the criteria that are generic to all companies listing on the stock market for purposes of raising funds.

Tanzania Communication Regulatory Authority (TCRA) has powers to regulate and supervise telecommunications, electronic technologies, and other information communication technologies, among others. Its powers are provided in the Tanzania Communications Regulatory Authority Act, 2003. One of the key roles of the Authority includes promoting competition, economic efficiency and safe services to low income and disadvantaged consumers. Vigorous licensing process of telecommunication service providers, with licence conditions to fulfil (network facilities licence, network service licence, and application service licence) has led to development of strong players and competition in the telecommunication industry. This, together with mass registration of SIM cards (KYC biometric SIM card registration) is increasing the confidence of service providers and consumers, and linkage to various services databases.

Social Security Regulatory Authority (SSRA) is vested with powers to regulate social security activities in the country provided under the Social Security (Regulatory Authority) Act, 2008. Prior to 2018, there were five mandatory pension fund schemes falling under the mandate of the Authority: Government Employees Provident Fund (GEPF), Parastatal Pension Fund (PPF), Local Authority Pension Fund (LAPF), Public Service Pension Fund (PSPF), and National Social Security Fund (NSSF). The number has had little effect on the uptake of pension services, with only 4.0% (1.1 million adult population) served (FinScope Tanzania 2017)[6]. So far, not much is observed in terms of innovations/startups in this area within Tanzania and across the East Africa region, though there are computer-based solutions in the back-end office, which have improved efficiency in service delivery.

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6   Following the passing of the Act by Parliament in 2018 (Act No. 2 of 2018) to consolidate social security schemes PPF, PSPF, LAPF and GEPF have been merged to one scheme known as Public Service Social Security Fund (PSSSF).

5. Fintechs enabling environment

Policies, plans and other initiatives

A drive to digital systems in the financial sector appears in the national development policies and plans across the region. Growth of modern networks and technologies together with adequate human resource capacity are considered a means to achieve competitive, faster, equitable, sustainable, and inclusive growth. Recent national policies, plans and initiatives that promulgate adoption and use of digital technology in Tanzania include:

(i) **National Information and Communication Technology Policy (NICTP) of 2016[7].** The policy focuses on, among others, enhancing human capital in information and communication technology (ICT), access and availability of affordable broadband services and establishing reliable, interoperable, and sustainable ICT infrastructure. In the implementation of the policy, several milestones have been achieved, especially on the development of digital physical infrastructure, where all regional headquarters are currently connected to the National ICT Broad Band Backbone. This, together with investment by telecoms in mobile phone infrastructure and growing competition in the telecommunication industry, have raised mobile tele-density from 13.1 subscribers per 100 people in 2008 to 82.2 in 2019 (World Bank, 2020). This has not only created a platform for digital revolution in finance, but also set an environment for introduction and growth of digital-based services in health, education, public administration, judicial and market information.

(ii) **National Microfinance Policy, 2017:[8]** The policy articulates and promotes microfinance services and associated innovations for stable financial system and broad-based financial services. The policy also puts emphasis on developing systems, platforms, and distribution channels for digital microfinance services.

(iii) **National Five-Year Development Plan 2021/22-2025/26[9]** that among others, aims to promote innovation and application of ICT for citizens to benefit from digital revolution including digital-based services in finance, education, public administration and market information. The plan recognizes absence of the national digitalization strategy and appreciates the importance of flexible and dynamic legal and regulatory framework to guide digital innovation activities such as research and new tech-startups, fair competition, protection of patents, registration, cyber security and financing.

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7   https://www.ega.go.tz/uploads/publications/sw-1574848612-SERA%202016.pdf

8   https://mof.go.tz/docs/Policy%20-%20Fedha%20English%203%20(2).pdf

9   https://mof.go.tz/docs/news/FYDP%20III%20English.pdf

(iv) **Financial Sector Development Master Plan 2020/21-2029/30** aims at creating a stable, sound, efficient and inclusive financial sector. The plan is developed in recognition of challenges facing financial sector including inadequate infrastructure to support fintech, low knowledge and protection of consumers of digital financial services and low literacy level of financial technology—all together acknowledged to have reduced users' confidence in electronic transactions. The Plan has several indicators, some of which are highlighted below.

Selected indicators in the financial sector (2021–2030)

Indicator	Baseline (2018)	Target 2030
% adult population using bank services	17%	50%
% adult population covered by insurance services	15%	50%
%adult population covered by pensions	6%	30%
% population listed in the capital markets	0.04%	5%

Source: URT (2021)

Achieving the set targets entails definitive measures from the legal and regulations perspective to encourage investment in digital support infrastructure, skills development in ICT, financing, and financial education.

National Financial Inclusion Framework, 2018-2022:[10] This is the second rolling Framework after the end of the first one that lasted for three years (2014 -2016). The framework extends unrealized targets in the first Framework but focuses more on usage financial services focuses on application of technological solutions (see following table). These are to be achieved through multiple initiatives including improvement of financial services providers' collaboration—to be achieved through harmonization of the national money grid (interoperability), expanding the test and learn approach using sandboxes and financial support to innovators. Since the framework is a public-private stakeholder initiative, engagement and commitment of stakeholders is always put at the forefront through regular meetings and follow-ups.

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10 https://www.afi-global.org/wp-content/uploads/publications/2017-12/NFIF%20 2018-2022.pdf

Selected national financial inclusion targets

Dimension	Specific Outcomes	Measure	Baseline	Target
Addressability	Adults own mobile phones	% adults owning a mobile phone	63%	75%
	Adults have unique and verifiable identification	% adult population registered in the National Identification database	23%	90%
Uptake	All adults have a registered account which can transact	% adults with registered accounts that can transact	76%	85%
Usage	All adults save, borrow, transact and mitigate financial risks	% adults with formal savings	43%	60%
		% adults using digital payment services	60%	70%
		% adults with formal savings	43%	60%
		% adults using insurance services	15%	50%

Source: National Financial Inclusion Framework, 2018.

Fintech regulatory regime

From a regulatory perspective, fintech regulation is necessary to minimize risks that may emerge when operationalizing the innovative systems. It is, however, widely accepted that too much regulation at the onset of innovation may undermine expansion. The 'test and learn' approach was used when M-Pesa was introduced in 2008. The Payments Systems Act, 2015 and Payments Systems (Electronic Money) Regulations, 2015, together with other related regulations govern digital financial services in the country. All e-money products and services are approved/licensed by the Bank of Tanzania. The regulatory framework in place makes it mandatory for the financial service provider launching a fintech product or service to obtain approval from the Bank of Tanzania and keenly observe regulatory requirements. The following table is a summary of the key legislations governing fintechs in Tanzania.

Fintech regulatory environment in Tanzania

Major legal Framework	Thrust	Implication
Bank of Tanzania Act, 2006	Provides for establishment of the Bank and its principal role of formulation and implementation of monetary policy, supervision of banks and other financial institutions, payments systems and related matters. Allows the Minister for Finance to make necessary legislation to smoothen the provision of financial services.	Sound and stable financial system. Credit to private sector increasing (averaging 11.7% between December 2021 and April 2022), stable and low inflation (below the medium-term target of 5%) over 2018-2021.
Banking and Financial Institutions Act, 2006	Provides for regulation of banks and financial institutions, regulation and supervision of savings and credit cooperative societies and schemes with the objective to ensure stability, safety and soundness of the financial system and risks to depositors.	Sound and stable banking sector in terms of capital adequacy, liquidity, asset and profitability levels. Core capital stood at 17.2% in 2020 while capital adequacy was 18.1% against threshold of 10% and 12%, respectively.
Microfinance Act, 2018	Sets for licensing, regulation and supervision of microfinance business and related matters including consumer protection—disclosure of relevant information, terms and conditions and financial education to customers, and transparency of credit costs.	Led to establishment of a defined framework for microfinance activities in the country — activities that were not regulated before. These included digital transfers and payment services.

Continued

Major legal Framework	Thrust	Implication
Payments Systems Act, 2015	Gives the Bank of Tanzania powers to, among others, regulate, supervise, investigate and oversee the operations of payment systems; provide settlement services to payment systems; and own and operate real-time gross settlement system.	Improved e-cheque clearing system across banks, provided for electronic money issuance and circulation, including those issued by mobile payment systems.
Payments Systems (Electronic Money) Regulations, 2015	Provides for regulation of payment instruments, electronic money, and other related activities of payment service providers. It outlines approval procedures of issuer (bank or non-bank) of electronic money.	Made entities that were not banks or financial institutions (including mobile money operators) to establish separate legal entities for issuance of electronic money, opening of trust accounts and its management. Increased access to financial services to unbanked consumers.
The Microfinance Non-Deposit Taking Microfinance Service Providers Regulations 2019	Provides for Bank of Tanzania to regulate microfinance service providers under tier 2; that is, credit companies. Process to license and conditions associated with authorization of the business, prohibited activities, preparation of books of accounts, lending policy, loan agreement and collateral are provided in the regulations.	Defined a licensing framework for microfinance activities in the country and set a mechanism to protect customers from usury pricing (interest rate) and other malpractices.

Continued

Major legal Framework	Thrust	Implication
Bank of Tanzania (Financial Consumer Protection) Regulations, 2019	Targets all financial service providers and provides for responsibility of financial service providers in ensuring consumer rights are adhered to.	Different from before, brought a consumer redress and recourse mechanism encompassing uniform consumer complaints framework such as time to resolve various consumers' issues. Gradually, this is increasing banks and financial institutions customers' confidence in the country's financial system.
The Banking and Financial Institutions (Microfinance Activities) Regulations, 2014	Applicable to microfinance banks and financial institutions engaged in microfinance activities (accepting deposits from the public and use the same for on-lending).	Promoted microfinance activities and specifically enhanced provision of credit to individuals with non-traditional collateral.
The Banking and Financial Institutions (Disclosures) Regulations, 2014	Applies to banks and financial institutions and requires such institutions to ensure high level of transparency to enable bank customers and the public to make informed decisions. Issues such as language, content and frequency of disclosure are specified in the regulations.	Improved transparency in banks and financial institutions. Such institutions are inter alia publishing their financial statements on quarterly and annual basis in at least two newspapers in both Kiswahili and English languages. Such institutions have also established complaint redress mechanism.
The Anti-money Laundering (Electronic Funds Transfer and Cash Transactions Reporting) Regulations 2019	Provides for conditions and procedures for reporting currency transactions and electronic funds transfer.	Banks and financial institutions have developed systems that prevent acts of money laundering, risks of fraud and losses to customers. This involves adequate KYC assessment.

Source: Author's compilation

Post-December 2020, issuance of electronic money is restricted to mobile money operators (MMOs) and banks with a view to strengthening oversight of electronic money operators and safeguard the stability of the financial system. The restriction does not, however, apply to banks and non-MNO entities already issued with the licence. Much as the move by the Bank was necessary, the interviewed stakeholders argued that the decision would stifle innovations and payment technologies from developing and expanding. It would also limit new e-payment technologies such as PayPal and PayTM from penetrating the country's market.

The digital financial services regulatory framework in place applies to banks and non-bank financial institutions in general, and they are not product specific. Therefore, nano credit issued by MMOs is yet to be regulated, raising concerns of predatory practices, especially on high interest rates. Nano credit in other countries has special regulatory framework. A good example is Kenya where Digital Credit Providers Regulations were introduced in 2022 to bring all digital lenders who were previously unregulated into the orbit of the Central Bank of Kenya. [11]

Digital payment infrastructure

The payment infrastructure in Tanzania has evolved in tandem with the technological advancement and needs of the market. New systems have been developed and others are upgrading, together with the rules governing them. The systems range from high value real time gross settlement systems to low value real time retail payment systems. These systems include Tanzania Automated Clearing House (TACH)[12], which facilitates interbank payment clearance including cheques and other e-payments (Tanzania Interbank Settlement System – TISS included). TACH has so far reduced transaction time from 3-7 days to one day. Other systems in place are East African Payment System (EAPS) that interfaces East African Partner States real time payment systems to facilitate use of local currency in payment settlement; and Sothern Africa Development Community – Real Time Gross Settlement systems (SADC-RTGS).[13]

Overall, there is significant improvement in volume and value of transactions passing through the systems. In TISS, for example, the value of transactions grew from TZS 25.0 trillion in 2005 to TZS 174.3 trillion in 2021, while US$ values grew from US$ 2.5 billion in 2011 to US$ 21.0 billion in 2021.

Another development by the Bank of Tanzania in collaboration with the Ministry of Finance and Planning is establishing a payment platform known as Tanzania Instant Payments System (TIPS). This multilateral interoperability system aims to enable real

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11   https://www.globallegalinsights.com/practice-areas/banking-and-finance-laws-and-regulations/kenya

12   The system was introduced in 2015 leading, dissolving clearinghouses, which were in Bank of Tanzania Branches.

13   TISS was launched in 2005, while EAPS and SADC-RTGS were launched in 2013.

time payment exchange between different digital finance service providers—specifically between e-money issuers: between banks, banks and MMO and between MMOs— the setup does not provide for other payment systems/e-money providers. The system is developed by local experts, accommodates both USSD and application technologies and is housed and maintained by the Bank of Tanzania. Piloting of the system started in July 2021, involving two mobile network providers (Airtel and Tigo) and three banks (National Microfinance Bank, CRDB Bank and Exim Bank). Once rolled out, sending money will only involve searching the name of the registered sendee in the mobile network. Participating financial institutions will pay fees for transacting through the system, but such fees are expected to be low.

6. Evolution of digital payment systems in Tanzania

Electronic payments in Tanzania

Electronic payments were mooted in Tanzania from early 2001 when technology-created platforms facilitated delivery of banking services (transfers and withdrawals). The fintech-related devices and channels improved efficiency in the banking system but had no significant impact on the outreach of banking services to majority of the population. Formal banking penetration in 2006 was only 9.0% of the population (15 years+), with 37% relying on semi-formal and informal channels; and 54% total excluded (FinScope Tanzania, 2006).

The introduction of mobile money, the first fintech solution of its kind in the country, brought significant changes in the market. This innovation that leverages on mobile phones was introduced in Tanzania by two mobile network operators (Vodacom and Zantel) in 2008, though Zantel (Z-Pesa) left the market to Vodacom (M-Pesa)[14] just after entry after failure to perform. Two years down the line, other operators flocked into the market, offering services and products like those of M-Pesa: airtime purchase, cash transfer and withdrawal. The first three years of this innovation were a learning period, with the Bank of Tanzania adopting 'test and learn' approach. MMOs were directed to collaborate with commercial banks by opening a trust account, such that amounts in trust accounts were at any time required to equal e-float in circulation. For the period 2008-2017, MNOs were allowed to operate mobile money business in this fashion, with approvals based on "no objection letters" from the Bank of Tanzania. The "no objection letter" specified the oversight and regulatory requirement for the conduct of the business, including (see also GSMS, 2014):

- Presentation to the BOT before approval.

- Having a licence from TCRA for the provision of value-added services.

- Having a risk management plan.

- Opening trust account in commercial bank.

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14   https://www.asokoinsight.com/content/quick-insights/tanzania-fintech

The powers to prudentially regulate and oversee the conduct of the market were provided by the enacted Payments System Act, 2015. Section 6(1) (c), (d) and (g) of the Act give the Bank powers to license and regulate activities and/or instruments related to:

- Funds transfer from one account to another using any electronic device.

- Transfer of electronic money from one electronic device to the other.

- Provision of electronic payment services to the unbanked and under-banked population.

The following figure illustrates the evolution of electronic payment in Tanzania prior to and after the launch of mobile money scheme (2002 to 2020).

Evolution of electronic payment in Tanzania
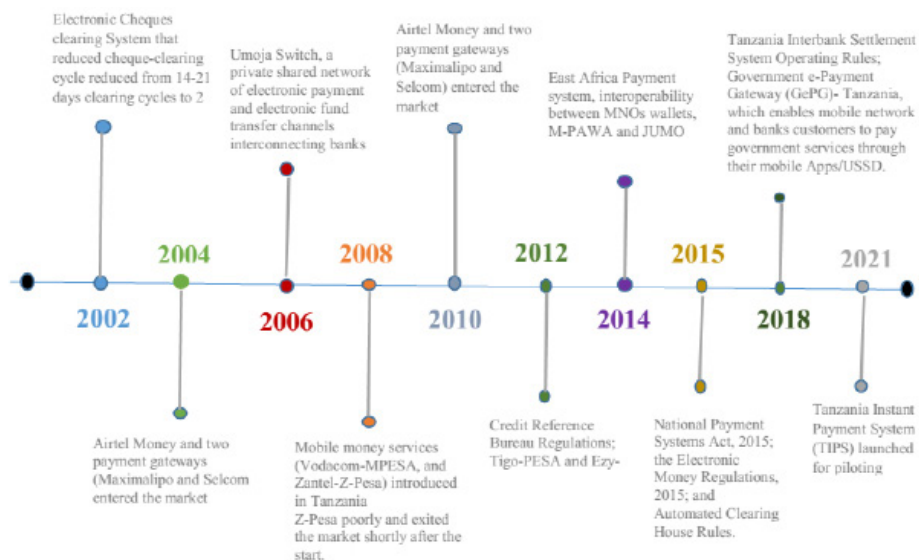
Source: Constructed by author

Telecom fintech platforms

As at December 2021, there were six mobile money telecoms in the market, of which three dominated the market; namely Vodacom (M-Pesa), Tigo (Tigo-Pesa) and Airtel (Airtel money). The structure is somewhat different from other markets in the region as shown in the table titled "Scope of mobile money network operators in Tanzania compared to other countries in East Africa region." The registered mobile money accounts totaled 108.5 million, of which 33.1 million were active accounts transacting a total of US$ 49 billion in 2020 (BoT, 2021b). The following figure shows the layout of the market both in terms of subscription of cellular phones and mobile money scheme, with Vodacom accounting for 40.0% of the market share, lower compared to the level in 2015, partly due to competition.

Mobile-cellular subscription and mobile money services (December 2021)
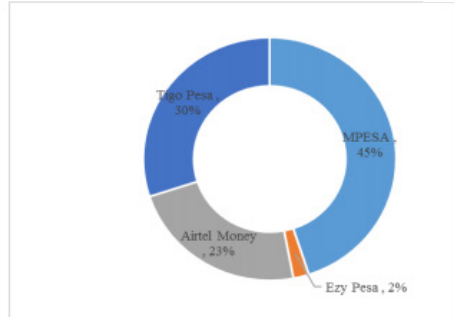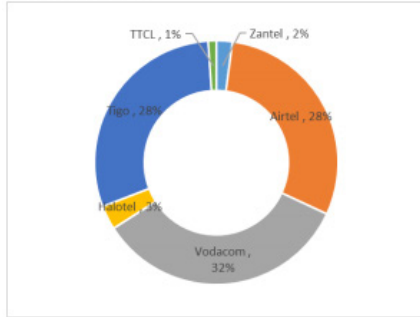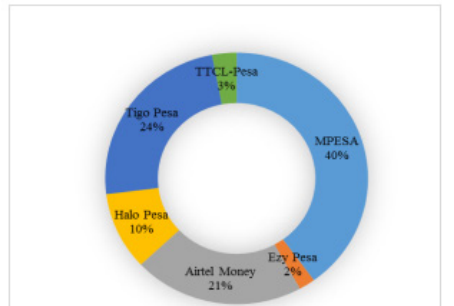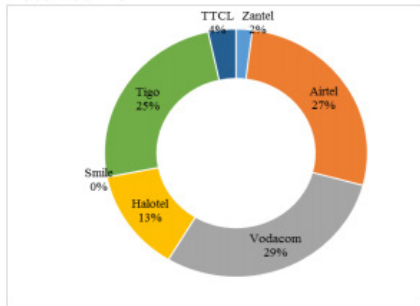
Source: TCRA (2015; 2021)

Analysis also shows the maturity of the Tanzania mobile money market characterized by different types of transactions, including transfers and withdrawals, P2P, B2G, C2B, G2P and P2G payments and deposits. The P2P and P2G transactions are common, facilitated by the stand-alone MNO mobile money platforms or platforms interfaced with banks and/or private and government electronic platforms. Markedly, is the transition from P2P to merchant payments (B2P), small volume payments to bulky payments, and emergence of fintechs that use mobile and bank systems to enable international transfers. Dominance in the market explains rapid evolution of products in the market. For example, leaders in the market in the likes of Vodacom-Tanzania are willing to invest in products or services banking on its wider network coverage and customer base, with expectation of quick returns before adoption of similar technology by competitors.

Scope of mobile money network operators in Tanzania compared to other countries in East Africa region

Country	Number	MNOs	Customers (Mil, 2020)	Stage of growth
Tanzania	6	M-Pesa (Vodacom), Tigo-Pesa, Airtel Money, Halopesa (Halotel), Ezy Pesa (Zantel) and TTCL-Pesa. Market Leader: M-Pesa (40%)	51	Close to maturity with many players. Most of the transactions take place outside the network (cash transaction is still high in the economy, about 70%). Interoperability of mobile money operators exist and fintech innovations are taking opportunity of the infrastructure.
Kenya	4	M-Pesa (Safaricom), Airtel Kenya (Airtel Money), (Orange) Orange money and Telkom Kenya (T- Cash). Market leader: M-Pesa (98.8%: March 2020)	61	Advanced. Innovations in the market are largely driven by M-Pesa with growing number of transactions taking place within the network (i.e. payments, savings and credit). Fintech start-ups are taking opportunity of the mobile phone infrastructure. Interoperability of mobile money operators exists.
Uganda	4	MTN Uganda (MTN Mobile money), Airtel Uganda (Airtel money), Afritell Uganda/Orange Uganda (Afritell Uganda Money) and Uganda Telecom (M-Sente): Market leader: MTN (54.7%)	28	Maturing. Most of the transactions take place outside the network (cash economy dominates) and emerging fintech start-ups take opportunity of the mobile infrastructure. Interoperability of mobile money operators exist.

Continued

Country	Number	MNOs	Customers (Mil, 2020)	Stage of growth
Rwanda	3	MTN Rwanda (MTN Mobile Money), Airtel Rwanda (Airtel money) and Tigo Rwanda (Tigo-Pesa): Market leader: MTN Mobile money (34%)	7.6	Growing but with increasing adoption of services beyond cash-in/cash out (P2P and G2P. Most of the payments take place outside the network. Mobile money not interoperable.

Source: Compiled by Author

Observed are the growing values of mobile money transactions, similar to other countries in the East African region. The transaction values reached US$ 48.5 million in 2020 (about 78.0% of Gross Domestic Product), with significant improvements observed in 2019 and 2020 on account of measures taken by governments and financial institutions to encourage use of the digital financial services to circumvent COVID-19 challenges. Growth is not only in volume of transactions, but also in growth of number of agents, users, and active accounts (see table below).

Mobile money performance indicator

Item	Jan-13	Dec-21
Mobile money accounts	27,430,274	108,481,990
Active users	8,078,452	33,142,118
Mobile money outlets (Agents)	98,412	838,759
Value in trust account (Billion, TZS)	195.4	1,184,155

Source: Bank of Tanzania

Related is improvement in mobile money interoperability—industry players led initiative, mainly MNOs. The system allows instant transfers of e-money between different mobile money providers—reducing transaction costs and improving access. The value of transactions stood at nearly TZS 700 billion a month in 2021 from TZS 12.2 billion a month in 2014. A slump observed from July 2021 is partly explained by introduction of a mobile money transaction levy. Interoperability is also growing between MMOs and financial institutions, enabling customers to transfer money, make withdrawals, pay bills, check balances and access financial statements. Data on volume and value of transactions of such transactions was not accessible at the time of drafting this paper.

Value of mobile money transactions in selected East Africa countries
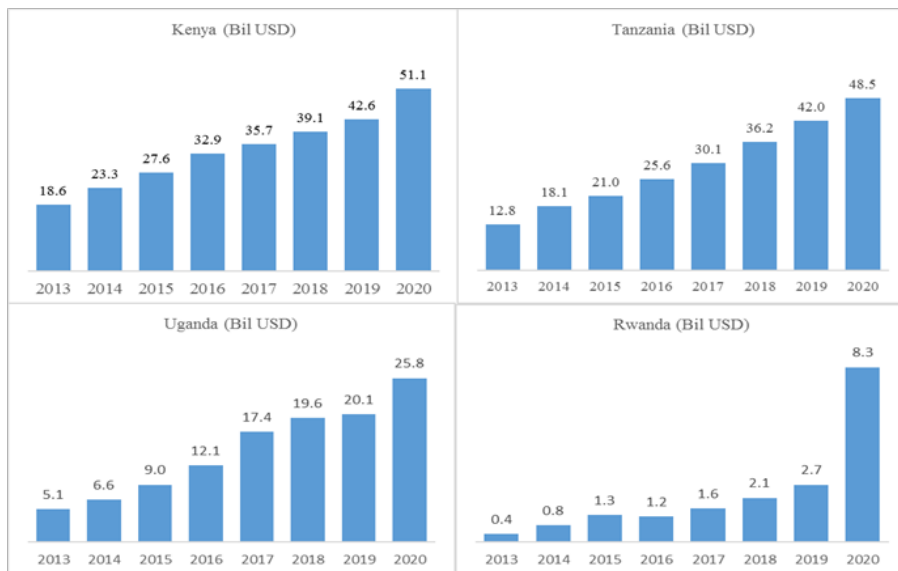
Source: East African Central Banks (Computation by the Author)
Note: Exchange rates per 1 US$: Rwanda (Rwf: 864.5); Uganda (Ush 3,636.1); Kenya (Ksh 102) and Tanzania (TZS 2,250).

Mobile money interoperability
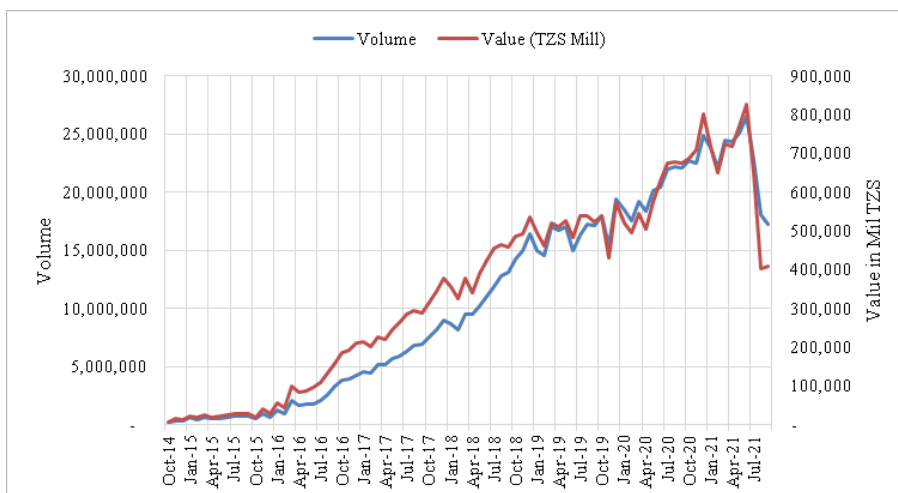
Source: Bank of Tanzania (2021)

Telecoms – financial institutions partnered fintechs

There are several financial products and services offered through fintech innovators in partnership with banks. These are enabling fintechs, which facilitate financial institutions, to deliver financial services to the end consumers. Financial products and services offered through this manner are based on the tripartite agreements between financial service providers, vendors, and MMOs. Products and services range from savings, credit, remittance, and insurance. Some of the products are as shown in the following table.

Selected fintechs interfaced with financial institutions

NO.	Platform/ Fintech	Institution	Customer Aggregator	Nature Of The Solution
SAVING				
1	Timiza Akiba	Letshego Bank Tanzania and technology provider – JUMO		A savings solution offering Airtel customers a platform to save for a goal.
2	Halal Pesa	Amana Bank		A saving platform interfacing Amana Bank and M-PESA customers abiding to Sharia laws.
SAVING AND LENDING				
1	M-Pawa	NCBA Bank	Vodacom	Savings and micro-loan product. It is a solution built on M-Pesa network, facilitating traditional banking services (lending and savings). Both savings and loans have interest component. A similar solution in Kenya is M-Shwari by NCBA Bank-M-Pesa; Kenya Commercial Bank (KCB) – M-Pesa; and Mokash and NCBA in Uganda and Rwanda.

Continued

NO.	Platform/ Fintech	Institution	Customer Aggregator	Nature Of The Solution
SAVING AND LENDING				
2	M-Koba	Tanzania Commercial Bank	Vodacom	A platform that enables groups (friends and other savings accumulation groups) to save, lend to members and share earnings. Borrows Village Community Banks model, which are small savings groups established by members for a similar role. With this digital platform, members are provided with a room to contribute anywhere and at any time. The platform has improved transparency and simplicity—reducing the challenge of safekeeping cash collected from members.
3	Halo Yako	FINCA Microfinance Bank Limited	Halotel	Solution that enables FINCA customers to save and access small instant loans.
4	Timiza Vikoba	Maendeleo Bank	Airtel Tanzania	Facilitates savings and credit for groups of 5 to 50 persons. Loans are offered to members after 4 weekly savings—offered on rotational basis.
LENDING				
1	Songesha	Tanzania Commercial Bank (Known as TPB)	Vodacom Vodacom	Overdraft facility that enables customers to proceed with M-Pesa transaction (e.g. send money, buy airtime and bundles, transfers float to another mobile wallet, pay merchants, pay bills such as electricity, water and TV subscriptions or purchase airtime and bundles) when they do not have enough float in their wallet.

Continued

| NO.	Platform/ Fintech	Institution	Customer Aggregator	Nature of the Solution
LENDING				
2	Wakala-Songesha (Various banks)			Provides overdraft facility to M-PESA customer with insufficient float in the wallet when conducting a cash-in transaction at a mobile agent.
3	Tigo Nivushe	Jumo Tanzania Services Company	Tigo	It is an instant loan facility to enable Tigo customers' complete transactions through their wallets in periods of cash constraints. The customer can be provided with a loan facility up to TZS 20,000 and if the repayment is made on time, the customer can qualify for additional loan. A good example in the region include Fuliza in Kenya—offered by Safaricom's M-Pesa and NCBA.
INSURANCE				
1.	Tigo-Bima Mkononi	Milvik Tanzania Limited—fintech for health	Tigo	Provides healthcare insurance cover to unbanked customers outside the mainstream of insurance system. The cover ranges from TZS 1.9 million to TZS 12.9 million.
2.	VodaBima	Insurance companies operating in the country (10 as at March 2022)	Vodacom	Helps insurance clients to access variant insurance services without visiting insurance provider in person.
MERCHANT PAYMENTS				
1.	Lipa-kwa Tigo	Tigo		Mobile payment solution that facilitates customers to make payments through USSD (number codes), QR codes and In-App. It enables merchants to receive payments from their customers through mobile wallet.
2.	Lipa kwa M-Pesa	Vodacom		Merchant payment solution that enables merchants and retailers collect payments either through USSD (number codes), QR codes and In-App.

Source: Bank of Tanzania (2021)

Big banks such as NMB and CRDB had by 2012 developed their own gateways or aggregating platforms for e-banking services—small banks rely on private aggregators, such as Selcom and Maximalipo. The gateways have so far facilitated cashless payments through Point of Sales (POS), QR codes and other e-commerce solutions that enable merchants to accept credit/debit cards. Aggregators are licensed by the Bank of Tanzania and operate as per the provisions of the National Payment Systems Act, 2015 and its related regulations, mainly the Payments Systems (Electronic Money) Regulations, 2015.

Other fintechs

There are other fintechs established and operated by players other than MNOs, but leverage on mobile phone technology, MNOs network and big data systems. They are either core fintechs focusing on payments/remittances, lending/financing, savings, insurance, and financial management) or enabling fintechs. Core fintechs account for a bigger proportion of fintech start-ups and incumbent fintechs operations in Tanzania. Assessment of fintech startups in Tanzania in 2020 indicated that ventures in core fintech start-ups accounted for 97%, with majority focusing on payments/lending and savings (UNCDF, 2021). The picture is different from the rest of the region with bigger number and diversified fintechs. In Kenya, for example, fintechs are broadly diversified, ranging from crowdfunding platforms, fintech facilitated platforms such as fintech for gig-workers, health fintechs (health-techs), energy-tech (M-solar), e-commerce, credit, agriculture, and payments to blockchain. Nairobi is ranked by Findexable at 37 with Dar es Salaam ranked at 262 globally.[15]

Number of fintech start-ups in Tanzania by product

Source: UNCDF (2021) Analysis

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15   https://gfi.findexable.com/
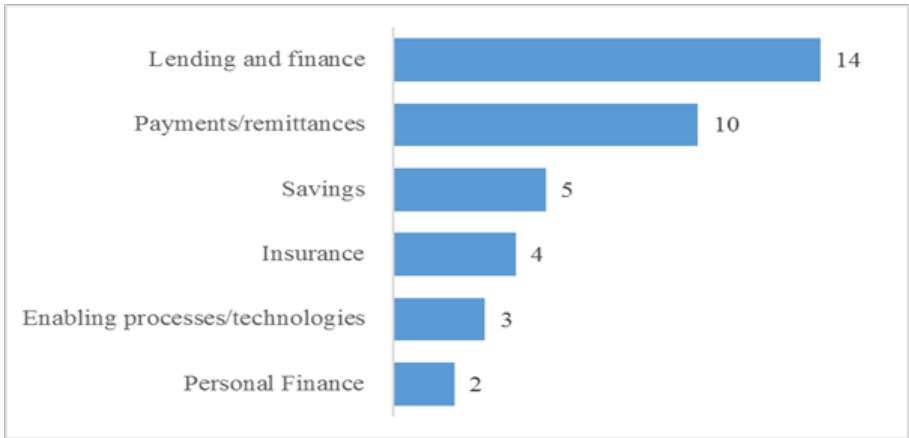
Fintechs in Tanzania (core and enabling) by service provider

Source: UNCDF (2021)

Analysis also shows that fintechs in crowdfunding are emerging but are few. Most of use cases are observed in funds mobilization for election campaigns, major football clubs fundraising programmes, and contributions in religious organizations. Likewise, insurance fintechs are also growing, but the services are yet to encompass bigger proportion of the rural population whose incomes are seasonal and vulnerable to poor weather. Example of such fintechs are Jamii and MyHi.

Fintech nature, ownership and financing

Fintech innovations are of different nature depending on investors' objectives (short-term and long-term), targeting and the nature of customers. Wave Money in Uganda,[16] for example, focuses on developing a customers' base by offering very low-cost wallet possibly with a long-term goal of building huge customer base for future value-added services (VAS) through the platforms. Analysis based on UNCDF (2021) findings show that most fintech startups and innovations in East Africa are business to business (B2B), followed by business to customer (B2C). B2B and B2C fintech start-ups in Tanzania accounted for 52.0% and 30.0%, respectively, of total fintech startups (UNCDF, 2021).

In relation to ownership, most of the fintech companies and start-ups in Africa, and in particular Tanzania, are foreign-owned and funded. This is partly explained by challenges inherent in locally established fintech start-ups, including lack of collateral for securing enough capital, appropriate support networks (hubs, incubators and mentorship connections) and prerequisite skills (UNCDF, 2019). Analysis from the market further shows that companies with a proportionate mix of public and private ownership are more vibrant on innovations than wholly state owned, the case for Vodacom Tanzania and Airtel-Tanzania versus Tanzania Telecommunication Company (TTCL). Investment in market research, choice of technology, fee structure, branding, risk management and customer management are important elements for greater acceptance and growth of any fintech, regardless of ownership. Safaricom, for example, was able to capture the market in Kenya right from its launch largely due to focusing on these attributes, the approach that was not deployed by the rest of MNOs in the region (Cracknell, 2015 and Argent et al, 2013).

Apparently, fintech start-ups in Africa are increasingly benefiting from external investment flows, growing to US$ 1.0 billion in 2021 from US$ 160.3 million in 2020, with investment averaging at US$ 5.6 million from US$ 1.6 million in 2020[17,18]. In the first seven weeks of 2022, fintechs in Africa were able to raise US$ 1 billion, beating the

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16   It is a mobile money platform in Uganda offering mobile wallet at zero withdrawal and deposit fees to account holders (a person using the platform), but at 1% for someone helping account holder depositing/sending money through an agent.

17   https://bit.ly/3CTSXAZ

18   https://thebigdeal.substack.com/p/-1-billion-usd-in-7-yes-seven-weeks?utm_source=url&s=r

record of raising the same amount in 2021 (21 weeks).[19] Most of the deals in Africa are in lending, payments, and remittances, with Kenya, South Africa and Nigeria being the top recipients.[20] Tanzania-based fintech companies NALA and Ramani[21] secured US$ 10 million[22] and US$ 150,000, respectively, in 2021. Opportunities offered by big players in other markets, as is the case for Safaricom and Equity Bank in Kenya, explain differences in flow of external funding. These two entities are well linked with innovators and investors, making it easy to test and scale-up innovations. Other than telecoms, other fintechs in Tanzania are too small and immature to compete with foreign entrants in the market or cross borders to extend outreach.

Fintech rankings in selected African countries (2021)

Country	Rank	Score	City(ies) with highest penetration	Number of Fintech Companies/ Startups
Tanzania	na	na	Dar es Salaam	33[23]
Kenya	31	4.475	Nairobi	344
Uganda	64	0.885	Kampala	78
Rwanda	61	1.065	Kigali	44 (2019)
Nigeria	57	2.983	Lagos	144[24]
South Africa	44	3.126	Johannesburg and Cape Town	93[25]

Source: Compiled by the Author from various sources[26,27,28]

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19   https://thebigdeal.substack.com/p/-1-billion-usd-in-7-yes-seven-weeks?utm_
      source=url&s=r

20   https://member.fintech.global/2022/01/19/fintech-investment-in-africa-nearly-
      quadrupled-in-2021-driven-by-paytech-and-lending-deals/

21   This is a sales platform that helps salespeople to track their inventories, register their
      customers and record their sales transactions. It was founded in 2020.

22   https://member.fintech.global/2022/01/19/

23   UNCDF (2021)

24   Statistica.com

25   https://www.fintechtimes.com/country-reports/

26   https://gfi.findexable.com/fintechs

27   https://tracxn.com/explore/FinTech-Startups

28   UNDF Analysis for Rwanda (2019)

The well-established fintechs, particularly those that have bolstered capacity in terms of skills and financing, are extending services to other countries. A good example is NALA-Tanzania, a payment platform established in 2017 aiming at enabling payments from United Kingdom. At its onset, the platform operated in Tanzania, then extended to Kenya and Uganda, and further to Ghana, with plans to advance to other 12 countries, including Nigeria.

At what level is Tanzania in fintech growth?

As noted earlier, Tanzania is largely in the second generation of fintech growth, trying to scale usage. The first generation, which is more about promoting access and usage of basic digital services, is largely attained. A significant proportion of the population is accessing basic financial services through mobile money, and fintech enablers are in advanced levels of growth, creating an opportunity for upscaling fintech innovations and products. Detailed analysis of opportunities in place is in section 6. The attributes of the two-fintech generations are illustrated below.

First and second fintech generations

1st generation: Channels – Mobile Money and Agent Banking	• High number of the population with basic services. • Mobile money services are the most featuring product including person–to–person (P2P), transfers, cash-in-cash out and bill payment. • Fintech enablers, ranging from widespread MNOs network infrastructure, agents interoperability, financial education, digital identity and electronic know your customer (e-KYC), agent banking, countrywide cell signal coverage and addressing liquidity constraints of mobile money agents and customers.
2nd Generation: Extending the use case – Nano credit and merchant services	• Growing number of nano-credit by mobile money providers. • Developing merchant services.

Source: Cracknell and Wilkson (2021)

Overall, there are several nano credit providers (as highlighted earlier under "Telecoms – financial institutions partnered fintechs") and merchant payment services are growing. The analysis based on discussion with some key players in the market shows, however, that users of these services are still few. Only 4.0% of adults accessed credit through mobile phone in 2017 (FinScope Tanzania, 2017).

7. Have fintechs improved financial inclusion?

Role of fintechs in financial inclusion

Fintech innovations, albeit not in volume and capacity comparable to developed countries, have improved financial inclusion, mainly access and usage of financial services in the country. The uptake and use of formal financial services other than banks

rose more than six-fold in the period 2009-2017. The use of informal channels (informal savings groups and individuals) by the population aged 15 years and above narrowed from 29.0% in 2009 to 6.7% in 2017, while financially excluded adult population dropped from 55% to 28% (Figure 8).

Uptake of financial services (% of adult population)
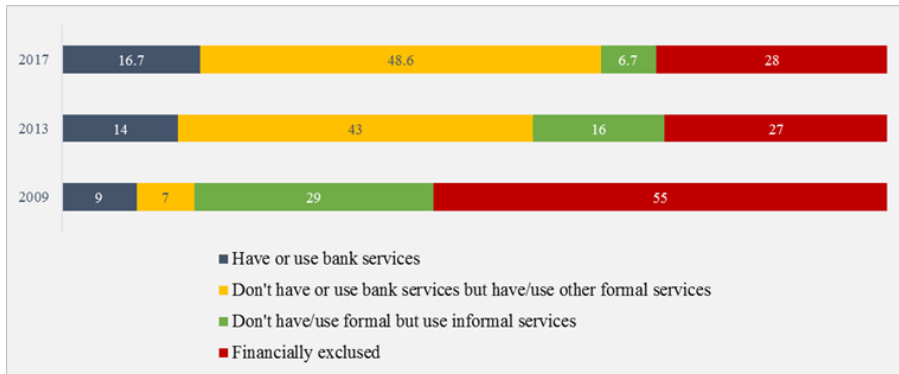
Source: FinScope Tanzania (2017)

The improved level of access is largely driven by access to mobile phone devices with major marks observed across multiple fronts (Finscope Tanzania, 2017).

• Adults owning mobile phone	→ 63%
• Adults accessing mobile money services	→60%
• Adults accessing mobile phone	→93%
• Adults living in household with mobile phone	→80%
• Adults saving through mobile money	→35%

Notwithstanding improvements in uptake of financial services, exclusion levels are remarkably high in rural areas and for females. Rural accounted for 79% of the exclusion, while female accounted for 47% of the first two quantiles (FinScope Tanzania, 2017). The figure below illustrates the gender and rural-urban divide in financial uptake. Several factors are associated with this phenomenon, including low-income (poverty), affordability of fintech products and services, inappropriate fintech solutions, low financial and digital literacy, lack of necessary documentation, low uptake of smartphones and inadequate legal framework (Finscope Tanzania, 2017 and World Bank, 2017).

Gender and urban-rural divide in uptake of financial services

Gender Divide

Rural-Urban Divide
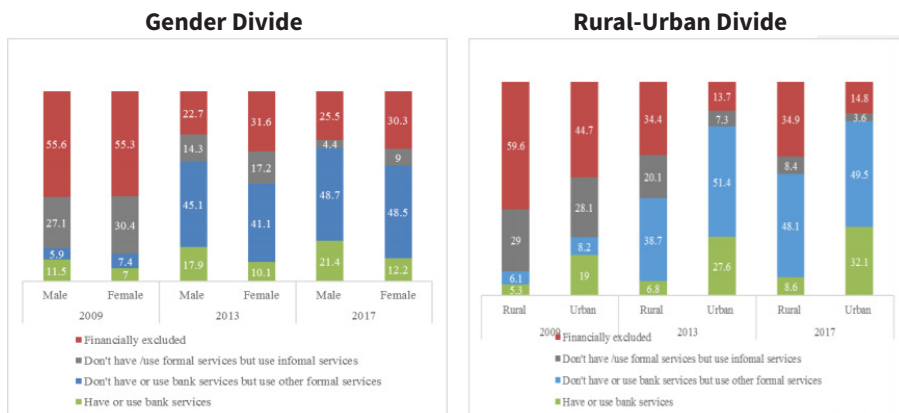
Source: Finscope Tanzania (2017)

The influence of mobile phone in other areas

Banks

The use of mobile phones in facilitating transactions in traditional financial institutions, in particular banks, is growing with majority of banks interfacing their core banking systems with mobile network operators systems (aggregators of mobile customers information), National Identification database (a recent move) and credit reference systems. In this endeavour, as stated earlier, there are banks with their own fintech solutions and others collaborating with fintech companies, either mobile phone or any other. Improvement so far is observed in growth of mobile banking transactions, which grew from TZS 57 million in 2008 to TZS 24,973.3 billion in 2021. The use of both mobile and Internet banking is, however, skewed on individuals with bank accounts, employed and having education higher than primary, male and the rich.

Mobile banking and Internet banking in Tanzania

Mobile banking

Internet banking
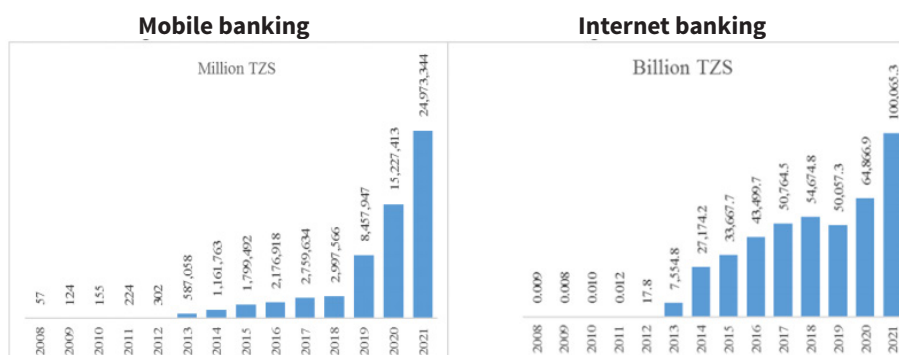
Source: Bank of Tanzania

Used a mobile phone or the internet to access a financial institution services in 2017

With an account, age 15+	78%
Rural (age 15+)	35%
Income, richest 60% (age 15+)	42%
Income, poorest 40% (age 15+)	29%
Secondary education or more (age 15+)	54%
Primary education or less (age 15+)	32%
Older adults (age 25+)	38%
Young adults (age 15-24)	34%
Female (age 15+)	33%
Out of labor force (age 15+)	21%
In labor force (age 15+)	43%
Male (age 15+)	40%
With a financial institution account, age 15+)	31%
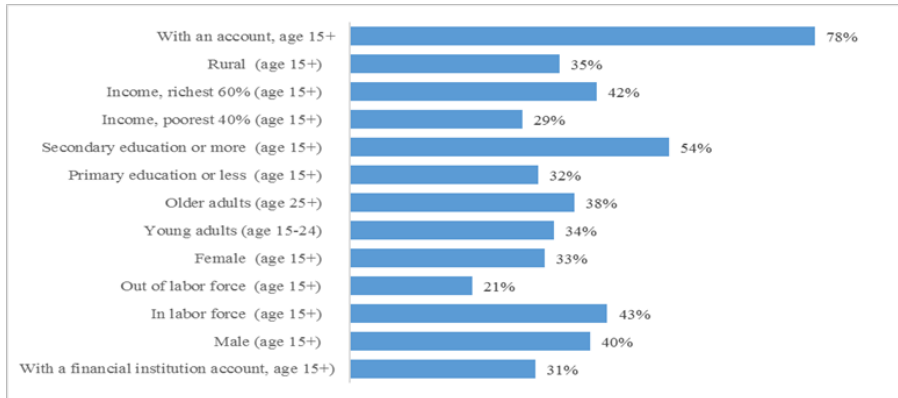
Source: World Bank (2017)

Government e-payment

Government e-payments, especially the mandatory ones have also bolstered the use of fintech solutions. The well-known Government Electronic Payment Gateway (GePG), launched in 2018, for example, has improved revenue collection efficiency and minimized fraud by enabling customers to pay for public services using cards, Internet banking and mobile money. Some of the use cases of the system are as illustrated below.

Use cases of GePG

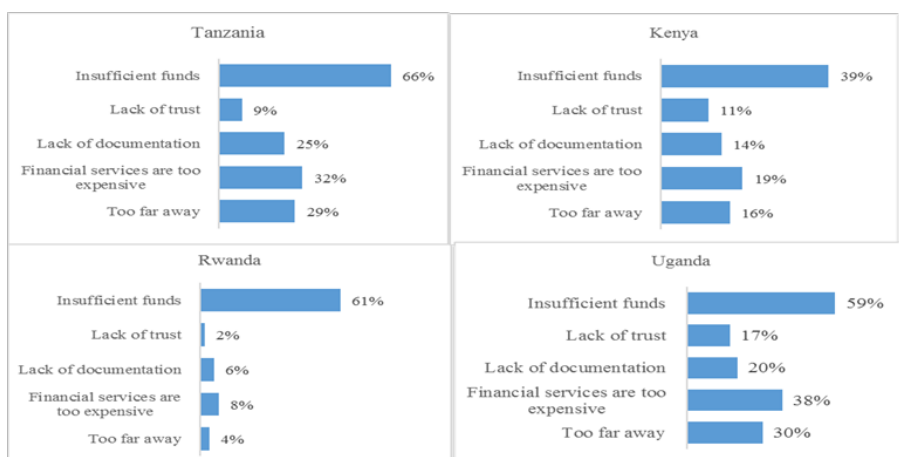| Nature of Payment	Payment Category	Examples
P2G	Mandatory Payments	Payment stipulated by law including tax, fees (motor vehicle, parking fees, registration fees in government universities/colleges) and penalties.
	Payment of services	Payment for services such as power, water, licences, vehicle registration, work permit, Visa and passport.
G2P	Payment of government benefits	Government benefits provided by the government through Tanzania Social Action Fund (TASAF) - beneficiaries receive payments through their mobile phones.

Source: Adopted and modified from Pillai (2016)

Challenges

As highlighted by key fintech players, several factors affect the use of fintech services and products in Tanzania. An in-depth analysis of these factors is as follows:

Low income: As noted earlier, low income firmly characterizes the first two quantiles, comprising women and rural residents, with 66% of the respondents indicating shortage of funds for the reason of not opening account in a financial institution (World Bank, 2017). The rate was the highest in the region (World Bank, 2017). This implies that fintech solutions interfaced with bank account holders have had limited outreach to the poor.

Reasons for not having a financial institution account (% of population 15+)

Tanzania		Kenya	
Insufficient funds	66%	Insufficient funds	39%
Lack of trust	9%	Lack of trust	11%
Lack of documentation	25%	Lack of documentation	14%
Financial services are too expensive	32%	Financial services are too expensive	19%
Too far away	29%	Too far away	16%
Rwanda		**Uganda**	
Insufficient funds	61%	Insufficient funds	59%
Lack of trust	2%	Lack of trust	17%
Lack of documentation	6%	Lack of documentation	20%
Financial services are too expensive	8%	Financial services are too expensive	38%
Too far away	4%	Too far away	30%

Source: World Bank (2017), Global Findex data

Affordability of fintech products and services: Much as fintech solutions aim at increasing outreach and reducing transaction costs of accessing financial services, the services are considered expensive. For example, sending a mobile transfer amounting to TZS 100,000 (equivalent to US$ 44) costs TZS 2,771 (equal to US$ 1.2) while in other countries such as Kenya, transferring equal amount costs about Ksh 55 (equivalent to US$ 50 cents)[29]. The costs are also high in accessing banking services through customer's mobile wallets. Charges inbuilt in network interfaces with bank data and other data providers, commissions and other charges, taxes and levies put by the government account for overall charges.

The introduction of a levy on mobile money transactions (sending and withdrawal) in July 2021 upto TZS 7,000[30] is one of the challenges considered to affect the unbanked poor. The value of transactions reduced by 31.2% between July and September 2021. Following challenges on implementation of the levy, the levy rates have been reduced by

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29   https://www.safaricom.co.ke/personal/m-pesa/m-pesa-rates

30   The initial rates were TZS 10 and TZS 10,000 before this review

43% to a maximum of TZS 4,000 effective from July 2022 and the levy has been extended to all electronic transactions, including those by banks, which were not in the loop. Electronic money levy is also gradually being introduced in other countries in Africa, though in a different fashion. Ghana, for example, launched electronic money levy in May 2022, targeting mobile money and bank transactions within Ghana, at a rate of 1.5% for transactions exceeding GHS 100.[31] The levy does not apply to foreign transactions and persons making transfers to their person accounts.

Government levy on mobile money transactions in Tanzania

Electronic mobile Money transfer and withdraw amount in TZS	Levy in TZS
1,000 - 1,999	10
2,000 - 2,999	11
3,000 - 3,999	29
4,000 - 4,999	39
5,000 - 6,999	70
7,000 - 9,999	88
10,000 - 14,999	224
15,000 - 19,999	427
20,000 - 29,999	672
30,000 - 39,999	770
40,000 - 49,999	1,050
50,000 - 99,999	1,435
100,000 - 199,999	1,771
200,000 - 299,999	2,058
300,000 - 399,999	2,450
400,000 - 499,999	2,870
500,000 - 599,999	3,640
600,000 - 699,999	4,480
700,000 - 799,999	4,970
800,000 - 899,999	5,264
900,000 - 1,000,000	6,230
1,000,001 - 3,000,000	6,580
3,000,001 and above	7,000

Source: Ministry of Finance and Planning

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31   https://www.worldremit.com/en/blog/money-transfer/what-is-the-new-ghanaian-electronic-transaction-tax/#:~:text=On%20the%201st%20May%202022,and%20bank%20transfers%20within%20Ghana.

Taxes and other charges on fintech products and services reduce the incentive to innovate (UNDF, 2021). The argument here is not taxing innovations or digital financial services, but rather tax rates/levies should be reasonable not to distort innovations and the market (See also Ndung'u, 2019).

Inappropriate fintech solutions in marketplaces: Interviewed informants indicate that most fintech innovations in the marketplace are generic or picked from other markets with conditions not suitable for Tanzania environment. This challenge is compounded by limited research to customize the solution in the local environment. A good example is when Tanzania Vodacom was introduced in the market. Different from Kenya's Safaricom,[32] Vodacom-Tanzania chose USSD system technology versus SIM application employed by Safaricom-Kenya[33] and invested little in market research and consumer education, leading to low uptake and penetration in the market (Cracknell, 2015; Argent et al, 2013). Relatedly, other fintech products including M-Pawa have fared poorly due to this challenge. There are, however, cases where innovations have been adopted from other markets and performed well—largely due to similar conditions. A good example is M-Mkoba: M-Pesa –Tanzania Commercial Bank (TCB) group savings platform. The performance of the solution is impressive, bolstering the bank savings from micro clients to a level never attained before in a span of a year.

Conversely, some emerging fintech innovations have developed solutions that better suit market needs, a good example being DMA – BizyTech initiative in Tanzania. The initiative looks at the whole fintech spectrum and financial sector and challenges and needs, including financial institution systems/data, mobile agents, agriculture marketplace and groups capacity to absorb credit and capacity building, among others, in developing a platform for farmers' group savings. Understanding customers' needs, building capacity of key players, close monitoring of the initiative and evaluating the outcomes are key for a successful performance of any fintech innovation.

Low financial and digital literacy: Low financial literacy translates into lower usage of financial services and adoption of solutions used in delivering financial services. These, coupled with low literacy and mathematical skills, obstruct people's ability to select suitable product mix, write correct figures, manage their finances, assess costs of loans (fees and charges) and adopt and use financial technological solutions. Though majority of adults in Tanzania can read and write Kiswahili (72%), add (71%) and subtract (59%); the population with no literacy and numeracy skills is worth attention (Finscope Tanzania, 2017). During interviews, there was incidence of customers sharing their pin codes or passwords when performing mobile wallet transactions due to low ability to do so by themselves, and in the process losing money to unscrupulous individuals.[34] In addressing the illiteracy and

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32   Tested the technology for 10 months.

33   Safaricom used SIM Application Toolkit, which is easier for customers to use as the programme is installed in SIM Card while Vodacom used USSD system, which requires a user to follow a series of instructions (Argent et al, 2013).

34   Observed in Yetu Microfinance Bank PLC.

numeracy challenge, some microfinance institutions have programmes to create awareness to their customers on regular basis to enable them to handle mobile money transactions (credit withdrawals and loan repayments). Initiatives such as My Oral Village are also worth replicating. My Oral Village has created financial tools including banking, mobile money and other financial tools for illiterate and innumerate people to enable them to access and use financial services.[35] The organization integrates savings groups and mobile wallets and currently operates in several developing countries, including Kenya.

Low adoption and use of smartphones: Overall, there is low adoption and use of smartphones in Tanzania. Smartphones extend electronic services beyond voice and messaging communication. Seventy-five out of 100 adults owned mobile phones in Tanzania in 2018 (13 out of 100 had smartphones; 62 out of 100 owned basic mobile phones)[36]. Elliot (2020) relates the outturn to low education, and affordability.

Smartphone ownership
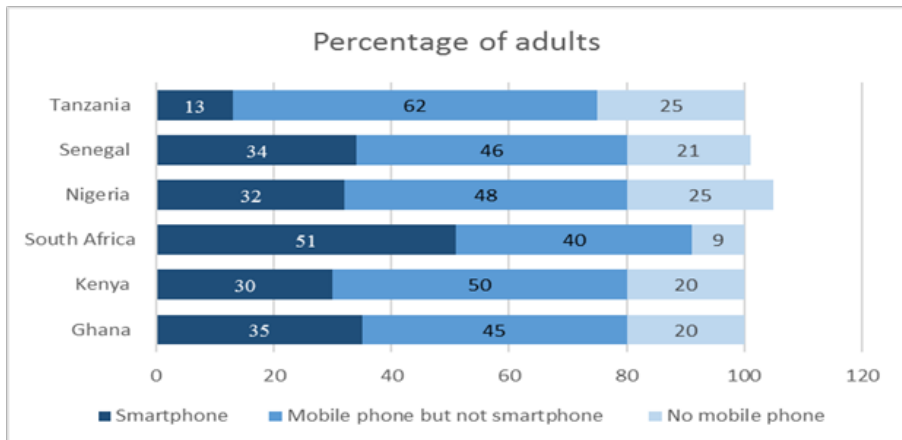
Source: Pew Research Centre (2018)

Growing usage of smartphones is envisaged to increase fintech and delivery of financial services, leading to a range of personal and commercial finance, particularly Internet banking and mobile banking. Internet usage as a percentage of total population stood at 20% in Tanzania in 2019, lower compared to other countries in the region (World Bank, 2019).[37] In an effort to improve Internet usage and by extension data usage amongst the population and with a view to achieve a target of 80% by 2025, the Government of Tanzania

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35   https://myoralvillage.org/

36   https://www.pewresearch.org/global/2018/06/19/2-smartphone-ownership-on-the-rise-in-emerging -economies.

37   World Bank (2019) World Development Indicators.

waived Value Added Tax (VAT) in 2021 on smartphones, tablets, and modems[38]. The effective of the change was, however, low, hence the waiver was abolished in June 2022 with a view to establishing other mechanisms to promote adoption and use of the devices.

Inadequate access to required KYC documentation and associated costs: The National ID is one of the main financial inclusion enablers in the National Financial Inclusion Framework of 2012-2016 and the follow-up one of 2018-2022. As at 2017, only 9.0% of adult population had a National ID, which is the recognized documentation for KYC process in financial institutions. Significant improvements have been made over the past four years, with adults having National ID card or number reaching 22 million in September 2021, about 70% of the adult population.[39] Despite this progress, low access to physical ID cards and low awareness of alternative usage of National ID numbers in opening and operating a bank account make use of banks and financial institutions services and products, including digital ones, low.

Banks and financial institutions that have integrated their systems with the National Identification Authority (NIDA) revealed to have performed better in increasing customer base, savings, and building customers' credit scores. This development is, however, constrained by conditions and costs on interfacing with the National ID system. The cost is considered high, especially for financial institutions with huge numbers of daily enquiries. A single enquiry of a personal ID information costs TZS 500 (equal US$. 22 cents). In other markets (such as Kenya), the interface to the national population registry is free[40]. Argument in this area is a need to lower the cost of interfacing with the National ID System in view of increasing usage of data systems to facilitate, *inter alia*, customers' assessments or credit rating recover operational costs of management of the database through other sources in the business ecosystem, e.g., a minimal percentage on a certain threshold of financial institutions' transactions a month.

Access to national ID in Tanzania (2017)

Source: FinScope Tanzania (2017)

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38   https://www.thecitizen.co.tz/tanzania/news.
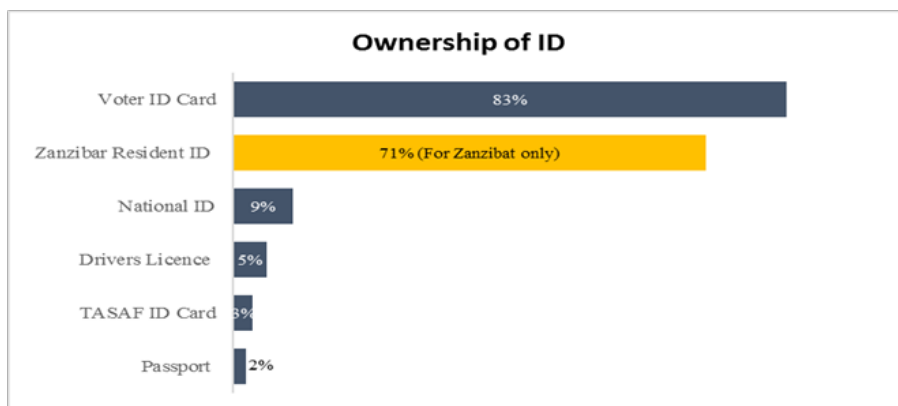
39   Majority of adults have ID number.

40   https://www.icao.int/Meetings/mrtd-symposium-2014/Documents/

Inadequate legal and regulatory framework for fintech startups: Much as the legal and regulatory environment in Tanzania has so far facilitated delivery of digital financial services and innovations, they are silent on the transaction and opportunity costs due to customers in delayed transaction or loss caused by the negligence of the issuer. A provision for refund of charges of a failed transaction is also missing.

The legal framework for protecting patent rights of the innovations is nascent and inadequate. There are several legislations in this area, including Patents Act 1987, The Business Names (Registration) Act, Cap 213), Copyrights and Neighboring Act Rights Act, 1999 and Trade and Service Mark Act, 1986. Nascent innovators mostly rely on trust, leading to loss of commercial benefits when the entity to whom the innovation is shared decides to scale-up and commercialize. Relatedly is the fees and other taxes and multiple steps of approvals that fintech must undergo before receiving clearance to operate. For MNOs fintech products, for example, both Tanzania Telecommunication Regulatory Authority and Bank of Tanzania approvals must be in place before operation. Much as authentication of systems is crucial, the costs and procedures involved are considered to suppress innovations.

Absence of sandbox framework: Sandboxes are developed to facilitate and test financial products, services and business models in a live controlled environment set in line with the agreed strategy and plan to inform financial policies and regulations. Tanzania is yet to develop a framework for sandboxes for fintech start-ups. The operating approach is "test and learn", which enables financial sector players develop and test products and services and at the same time provide space for regulation development. However, this approach is not yet institutionalized in the country and given this situation, players in the market argue that there is a low level of trust of innovations from the private sector, especially the ones outside banks and MMOs.

Notwithstanding, several financial institutions are setting up innovation labs to bolster and support innovations in their areas of interest. A good example so far is the National Microfinance Bank (NMB) that launched an innovation lab for local investors in late 2021 with a seed fund of TZS 1 billion (US$ 435,000), mostly targeting local innovators.[41] Successful fintechs are given opportunity to connect to NMB Bank platform to test their products.

Absence of fintech association: Fintech advocacy bodies, which besides protecting interest of members, provide a platform for information sharing, networking, education, and raising resources; they are important platforms for self-regulation and for advocating for policy change. In Tanzania, there is no fintech association to address these issues. Fintech associations in the region include the Kenyan Fintech Association (FINTAK), the Financial Technologies Service Providers Association (FITSPA) and Rwanda Fintech

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41   https://africaheroes.com/2021/10/nmb-bank-launches-new-seed-fund-for-sandbox-fintech-startups-in-tanzania/

Association. The absence of a fintech association in the country not only deprives fintech companies and start-ups of an opportunity to participate in policy and legal reforms, but also to protect the interest of new and small entrants in the market.[42]

8. Opportunities for up-scaling fintech

The opportunities for fintech growth are quite evident in Tanzania and the rest of the region given a number of factors ranging from customer base, income growth, existing infrastructure and support functions, evolving legal framework and knowledge and technical skills. The following is a summary of each of these areas.

Large customer base with access to mobile phones: 93% of adult population in Tanzania had access to mobile phones in 2017 where 63% own their mobile phone (FinScope Tanzania, 2017). In terms of mobile cellular subscription (per 100 people), growth is impressive, with the levels converging across the region. The rate was 85.7% in 2020 while for Kenya, Uganda, and Rwanda it was 114.2%, 60.5%, and 82.0%, respectively.[43] This coupled with an active labour force (15-64 years), averaging 55.4% of the total population in the region, provides a good customer base for fintech innovations.[44]

Mobile cellular subscription in East Africa (per 100 people)
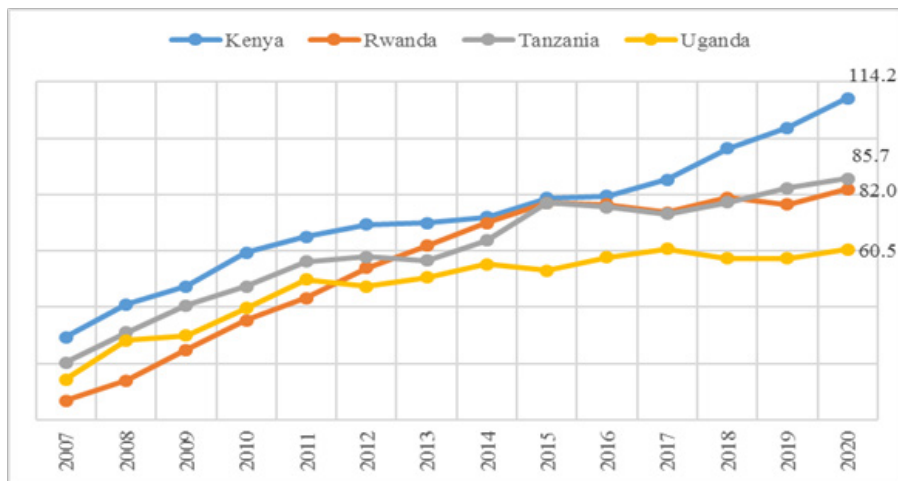
Source: World Bank (2020), World Development Indicators

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42   Tanzania Mobile Network Operators Association (TAMNOA) protects interest of MNOs and not the entire Fintech market.

43   https://data.worlbank.org//indicator/IT.CEL.SETS.P2

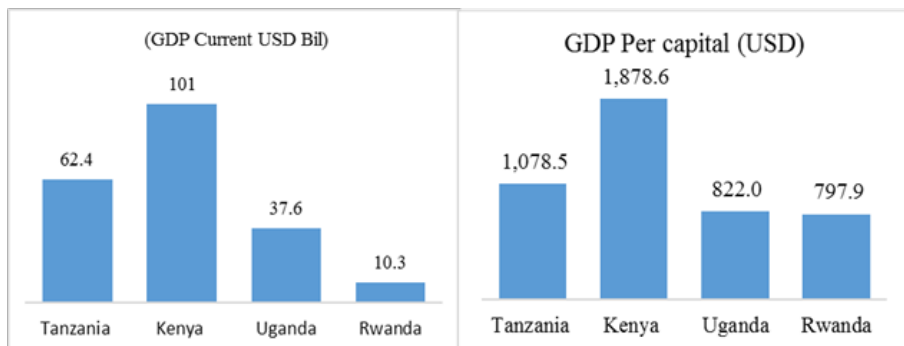44   World Bank Development Indicators

Weakness: Slow uptake of smartphones and low digital technologies skills.

Digital infrastructure and supportive technology: Digital infrastructure is a key driver in fintech innovation and development. Investment in the national fiber optic network (National Information and Communication Technology Broadband Backbone, NICTBB), which connects hinterland with a submersed cable increases Internet connectivity and speed. Faster connectivity is expected to increase adoption of more advanced fintech solutions. Studies elsewhere show that greater connectivity increases outreach of banking services and adoption of fintech innovations. D'Andrea and Limodio (2020), for example, established a positive relationship between high-speed Internet on real time gross system (RTGS) adoption, leading banks to increase interbank transactions and private sector lending. The aggregate effect of the submarine cable increased RTGS adoption by 14%, private sector lending by 17% and interbank loans by 15% and deposits by 50%.

Weakness: The submarine cable (fiber optic) is laid mostly up to regional headquarters, leaving most of the rural areas, where majority of the population live, not connected. Low access and adoption of smartphones able to process faster high volume of data remain a challenge. Analysis from the market indicates that most of the smartphones in Tanzania's market, and so in the rest of the region, are of 2G capacity, which are slower in data processing compared to 3G, 4G and 5G.

Growing GDP and per capital incomes: As indicated earlier, low income (poverty) is one of the attributes that characterize low adoption and use of fintech solutions and related services. Analysis, however, shows regional economies, which are between 30% and 50% informal, are growing. Informal economy is considered to account for 34% of Tanzania's economy (Becker, 2004; and Economic, Social Research Foundation - ESRF, 2011; and Aikaeli and Mkenda, 2014). For Kenya, the informal economy accounts for 34.4%,[45] while for Rwanda it is 46% and Uganda, 43% of GDP (Lloyd-Jones and Redin, 2017 and Rukundo, 2015). The size of GDP is also remarkable to totaling US$ 211.3 billion in 2020. Given the nature the economies in the region, solutions targeting the informal sector are likely to benefit more.

Gross domestic product and GDP per capita (US$, 2020)

Source: World Bank (2020)

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45 https://pesacheck.org/does-the-informal-sector-contribute-70-of-kenyas-gdp-be9c1411d28

Weakness: Gender inequality, poverty and unpredictable incomes, mostly generated from informal/subsistent activities. Literacy rate is also low.

Supporting Functions: These are the national ID systems and platforms that enhance interoperability of the payment systems. In respect to National ID, the region is converging to total coverage, making it possible for fintech innovations to integrate with financial or payment systems at ease, abiding to KYC requirements. Full integration of the National ID systems, Credit Reference Bureaus (CRB), banking and other financial and non-financial institutions would not only facilitate developing credit scores for extending credit to entrepreneurs in informal sector but also build savings and repayment culture by customers.

There is also improved spread of agent banking across the country, though these are concentrated in urban and peri-urban centres, partly due to low volume of business in rural areas. The number of bank agents grew from 10,689 in 2017 to 48,923 in 2021. The volume and value of transactions (deposits, withdrawals, transfers, and payments) have also grown. Deposit transactions rose to TZS 752,633 in 2021 from TZS 467,987 in 2017, suggesting that banking agents are mainly used by higher end customers as alternative to visiting bank branches.

Connected to the foregoing is the growing interoperability of payment systems, some developed by the private sector and others by public institutions, mainly central banks. These platforms facilitate customers, channels, and payment aggregation, thus reduce both operation and transaction costs. Interconnected systems already in the country include Automated Teller Machines (ATMs) namely Umoja Switch[46] and that of mobile money operators (MMOs), all enabling customers to perform transactions with convenience across bank branches and MMOs.

Weakness: One of the weaknesses is argued to be high costs including charges, fees and commissions associated with system connectivity/interfacing. The charges include those of accessing MNOs network (USSD codes) and National Identification Data System, adding up to investment costs of fintech start-ups and scaling up costs of incumbent companies, thus making market outreach slow.

9. Conclusion

This paper aimed to provide insights on existing fintech environment – focusing on growth and retarding drivers, and assessing opportunities for scaling up fintech products and services to the broad range of the population. The analysis was descriptive, based on information gathered from reports and datasets obtained from various sources, coupled with information gathered from key informants in the market. The analysis revealed that Tanzania is largely in the second generation of fintech growth that is extending use cases of nano credit and merchant payments.

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46   There are however challenges on using these systems arising from untimely clearing balances between banks in Umoja Switch.

Further, the analysis shows that most of the fintech innovations in Tanzania are in payments and lending, driven by MMOs, of which majority are integrated with banks and financial institutions to facilitate delivery of banking services. The gap established in the legal framework is in governing nano-credit (mostly offered by mobile network operators) and protection of fintech innovations in nascent stage. A 'test and learn' institutional set-up is also missing, making it challenging to nurture and/or support fintech innovations from initial stages. Although there is improvement in support infrastructure, there is slow adoption and use of smartphones capable of supporting most digital transactions. Observed from the analysis is also absence of a coordination platform for fintech players. Improved digital infrastructure (the submarine cables); growth of customer base with access to mobile phones and growing incomes are some of the opportunities for future fintech value added services. To be able to take advantage of these opportunities, however, there is a need to:

Further support for the fintech market. This entails review of the legal system to adequately protect fintech intellectual patent rights. Since the existing intellectual patent rights protection framework in Tanzania is general, not dealing with start-ups' initial ideas, there is a need for a framework to protect such ideas from being captured by big corporates. This would entail institutionalizing the 'test and learn' approach.

Institute a framework to accommodate and regulate innovations, including nano-credit: This is necessary to adequately safeguard the financial system from disruptive effects of the technology and further protect consumers from usury interest rates and other malpractices.

Establish a platform to coordinate players in the fintech ecosystem as is for Mauritius. Mauritius has developed a fintech hub (Mauritius Africa Fintech Hub), which brings together all players in fintech ecosystem to collaborate in building cutting-edge solutions for the market within and outside the country.[47]

Encourage fintech market players to establish an association: This body is instrumental for advocacy, capacity building, and advisory services, industry self-regulation and policy changes.

Attract more funding to fintech innovations: Funding is a prerequisite for growth and sustainability of fintech start-ups and fintech companies. Setting up a fintech innovation fund may be one of the options as is the case for Egypt. Three state banks in Egypt (Banque Misr, National Bank of Egypt and Bangue du Caire) have already set up an investment fund of US\$ 85 million with expectation of attracting other regional and international investors in future.[48] Banque Misr is an anchor investor in the programme and the other two are strategic investors. Establishing such a fund may go together with encouraging banks and non-bank financial institutions to establish fintech innovation labs.

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47   https://mauritiusfintech.org/blog/mauritius-africa-fintech-hub-hosted-the-africa-fintech-festival-2021/

48   https://www.reuters.com/world/middle-east/egypt-state-banks-setting-up-85-million-fintech-innovation-fund-2022-03-20/

Improve fintech-supporting infrastructure, including adoption and use of smartphones, and fintech transactions monitoring systems: This would entail fiscal measures to reduce the price of smartphones together with building capacity in usage of the phones. It also entails developing a system to capture and monitor fintech transactions. Absence of a vigorous system leads to difficulties in distinguishing the overall performance of the financial service provider and that of fintech solutions.

Review taxes and fees on fintech financial services: Taxes and fees on mobile money and other fintech products have had negative impact on the use of digital financial services. There is thus a need to carry out a thorough review of the market to establish consumers' behaviour and establish optimal tax rates.

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7

The Monetary Economics of e-Money in East Africa

Isaac Mbiti and *David N. Weil*[1]

Abstract

This paper updates and extends previous research that has looked at the roll-out of phone-based electronic money in East Africa. To the extent possible, we do parallel analyses for Kenya, Tanzania, Rwanda, and Uganda, although data limitations in the latter two countries severely limit our analysis. Where possible, we present data on the outstanding level of e-float, the magnitude of monthly customer-to-customer transfers, and the average size of person-to-person transfers. In addition, we construct two measures of particular interest to monetary economists: the velocity of e-money and length of the "cash loop."

Keywords: *e-money, M-Pesa, velocity*

Introduction

In this paper, we re-examine several of the questions about monetary economics of e-money that were addressed in previous research, including our own. Several considerations motivate this effort. The first is simply the passage of time. The data used in Mbiti and Weil (2016), for example, ran only through 2011. As with any new product or service, we would expect that, over time, as people become accustomed to e-money's functioning, their manner or interacting with the system would naturally change. Beyond this, e-money systems have themselves evolved considerably since their initial roll-out, with a host of new services being added. These included business payment services that allow merchants (including utilities) to easily accept e-money

payments, the ability to obtain short-term loans, and a simple bank account that operates in tandem with mobile money. We would expect that because of the addition of these services, there would be further changes in how customers interacted with e-cash. Finally, much of the initial research on the monetary economics of e-money used data from the period of ultra-rapid growth in these products. Studying these systems while they were expanding so quickly raised additional obstacles in terms of understanding their properties.

The second consideration motivating our current effort is access to better data. In our own previous work, we had only partial access to the information we needed to calculate several key magnitudes describing M-Pesa. We often had to draw together fragments of information from different sources and do our best to parse variable definitions. We have come to understand that several of the inferences that we made about magnitudes were in fact wrong (these are discussed in this paper). For the current paper, we have been granted far better access to aggregate information on e-money in several countries.

Our third consideration is the opportunity to establish a framework for studying e-money systematically for the group of East African countries taken together. East Africa remains at the forefront of the global expansion of e-money. Although at this point we do not have complete data for all of the relevant countries, we view the work in this paper as a step towards undertaking fully parallel analyses in all of the relevant countries.

1. The growth of e-money in East Africa

The first e-money mechanism in East Africa, M-Pesa, was introduced in Kenya in 2007. Similar programmes arrived in Tanzania in 2008, Uganda in 2009, and Rwanda in 2010. Our paper focuses on these four countries.

The appendix to this paper presents a detailed narrative pulling together information on the growth of e-money in the countries that we study. This includes whatever data we could find on market shares of mobile network operators (MNOs) and mobile money operators (and their dates of entry), the size of the mobile money market in terms of users (people or phones), transactions, and agents; the regulatory environment (including interoperability, taxes, policy with regard to MNO trust funds, and rules pertaining to agent exclusivity); changes in the fee structure over time; and changes in fees that were implemented in the face of the COVID-19 pandemic. This information was pulled from a very wide variety of sources, and while it is still incomplete, we think that it represents a useful resource for future investigators.

2. Framework

Among the topics on which we focus are the transactions' velocity of e-money (the number of times per month that average unit of e-money is transferred among customers); the length of the "e-money loop" (the number of transfer transactions that the average unit of e-money goes through between creation and being extinguished); average customer balances held in e-money accounts; the outstanding balance of e-float; and the total value of customer-to-customer transfers.

Velocity

The first monetary measure on which we focus is the velocity of e-money. In standard monetary economics, there are two different definitions of velocity that are used. "Income velocity" is the nominal Gross Domestic Product (GDP) divided by the relevant money stock. "Transactions velocity" is defined as the frequency with which the average unit of money is used in transactions. In some ways more fundamental than income velocity, transactions velocity is much harder to measure, because doing so requires being able to observe actual transactions. In the case of e-money, however, we have the advantage of being able to observe all transactions. Further, for our purposes, transactions velocity is the more relevant measure, since it bears directly on the role the e-money is playing in the economy. As discussed in Weil, Mbiti and Mwega (2011), at this point in time, the stock of e-money relative to other monetary aggregates is sufficiently small that we would not expect it to affect the price level, and thus its income velocity is of limited interest.

The potentially relevant transactions for measuring velocity in the case of e-money are "cash-in" transactions (the creation of a new unit of e-money), "cash-out" transactions (extinguishing a unit of e-money), and the transfer of e-money from one user to another. As our measure of e-money velocity, we focus only on transfers, which are the closest analogue to purchases using money in a simple monetary system.

One issue of nomenclature arises regarding these transactions. When e-money systems in Africa were first rolled out, all e-float that was not held on the phones of agents was held on the phones of individuals. Thus the transactions that we were interested in could all be classified as "person-to-person." However, as e-money has evolved, an increasing number of transactions take place among accounts held by businesses or other institutions, such as churches or government entities. These accounts typically operate through a separate, parallel "pay bill" system that is designed to help businesses (and other entities) easily collect mobile payments from customers. For a given transfer size, the transaction cost for customers using the pay bill system is typically lower than the cost associated with the person-to-person mobile money transfer. The e-money collected through this system can then be channelled to a bank account or to an M-Pesa account. For the purposes of measuring velocity (and also the length of the e-money loop, which we describe below) we consider all of the entities that are not agents simply as "customers", and correspondingly calculate the magnitudes in terms of "customer-to-customer" transfers. In the various data sources that we have access to, the different types of transfers (i.e. person to person, person to business, etc) are sometimes broken out separately, in which case we simply aggregate them. In other cases, we believe that what is described in the data as the total value of person-to-person transfers actually includes transfers among entities such as businesses and churches that are not actually people.

The measure of velocity is thus the total value of customer-to-customer transfers (per unit time) divided by the average outstanding balance of e-float. For example, if 100 units of e-float are created at the beginning of the month, transferred from person to person five times in the month, and extinguished at the end of the month, then monthly velocity will be five. Notice that having 100 units of e-float transferred from person to person five times in the month could happen either because the people receiving transfers then transferred the e-float to someone else or because each time a transfer was received, the recipient withdrew his cash and a new user deposited cash and received e-float. We discuss this issue in the next section.

The E-money loop

Irving Fisher (1911) defined the "cash loop" as the number of transactions that a unit of currency goes through between being withdrawn from a bank and returning to a bank. Analogously, we can think of the "e-money loop" as the number of transfer transactions that the average unit of e-money goes through between being transferred onto a customer phone or account and being transferred back from a customer to an M-Pesa agent.

As Mbiti and Weil (2016) discuss, the length of the e-money loop is not necessarily related to the velocity of e-money. For example, an e-money loop of any given length could be consistent with low velocity if the same unit of e-money was transferred from person to person only infrequently (without ever being transferred to or from an agent), or with high velocity if the same transfers took place quickly. Similarly, a given velocity could be consistent with different lengths of the e-money loop, depending on whether money was being transferred to and from agents in between customer-to-customer transfers.

For an e-money system that is fully stable, that is, it is not growing over time and transfers per month are constant, the length of the e-money loop is given by the following equation:

$$loop\ length = \frac{transfers}{cash\ in} \tag{1}$$

where transfers are customer-to-customer transfers per unit time and cash in represents the value of e-money created per unit time. Transfers made in a given month would be equal to transfers that would eventually be made with the e-money created in a given month.

The e-money systems that we examine have not reached this sort of steady state. The stock of e-money is growing over time, and there is a good deal of month-to-month variation in the creation and destruction of e-money. Although we cannot make any adjustment for trend growth, we modify the above formula slightly to deal with variability in money creation and destruction:

$$loop\ length = \frac{2 \times transfers}{cash\ in + cash\ out} \tag{2}$$

where cash out is the quantity of e-money extinguished per month. Having the sum of cash in and cash out transfers in the denominator of Equation 2 is also useful because in some cases we are only given this total, rather than its individual components.

Other measures

Beyond velocity and the length of the e-money loop, we look at several other measures of the development of electronic money system. These vary from country to country depending on data availability. For several countries, we can look at average

transaction sizes, which we take as an indicator of the extent to which e-money is being used for small transactions; that is to say, in a cash-like fashion. However, the average transaction size is a very imperfect indicator of this dimension of e-money's use. It would be far better to get data on the distribution of transaction sizes. We also look at the size of outstanding e-float balances and the volume of customer-to-customer transfers as indicators of the speed with which e-money systems are growing.

3. Data

For this project, we were given access to aggregate data from the central banks of Kenya and Tanzania. Central bank staff were also able to help us by clarifying the definitions of several items. With these data, we are able to paint a relatively detailed picture of how the system is functioning in these two countries. In the case of other East African countries, we were able to find fragmentary data on the Internet, and we report some scattered results from this. However, the publicly available data has several ambiguities in definitions that we would need to clarify before putting much stock in these results.

4. Country-by-country application

As mentioned above, our eventual goal is to be able to do parallel analyses in the countries of East Africa. At this point, however, we do not have sufficient data to reach this goal. Our best data are for Kenya and Tanzania, with less data from Uganda and Rwanda. Our hope is that the analysis here can serve as a template for future work.

Kenya

The calculation of e-money velocity requires information on outstanding e-float and monthly customer-to-customer transactions.

The data analysed by Mbiti and Weil (2016) was drawn from a period in which corresponding to each outstanding shilling of e-float, there was a corresponding shilling in a trust account, with the entirety of the trust account held in the form of deposits in commercial banks. Thus, knowing the size of these bank deposits gave a perfect measure of the amount of e-float in existence. Since that time, however, the regulation of e-money in Kenya has changed, such that trust account balances can be held in either commercial bank accounts or in the form of short-term government debt. To know the value of outstanding e-float, then, we have to know both of these balances.

We have access to data on the balance in commercial bank accounts from January, 2013 through August 2021. However, we only have data on holdings of t-bills from February 2019 onward. The figure below shows the two balances and their sum for the period in which we have complete data.

Outstanding e-float and components in Kenya
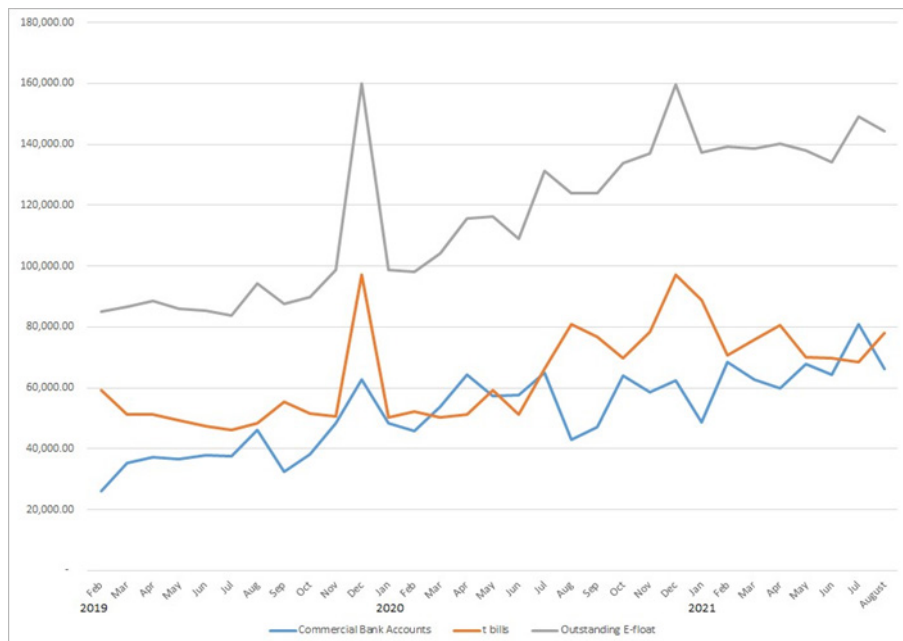
Holdings in the two asset classes are of roughly equal in magnitude. Clearly, there are large movements in the commercial bank account balance that are offset by movements in value of T-bills, representing purchases or redemptions of t-bills. The total of the two series is more stable than either one separately. This indicates to us that it would be unwise to do any calculations for the period in which data for both series are not available. We thus restrict our analysis of velocity in Kenya to the period February 2019 to August of 2021. The figure above also shows evidence of a strong seasonal in the demand for e-float: there is a large spike associated with holdings in December 2019 and a smaller one associated with December 2020, which was during the COVID-19 pandemic. Our presumption is that with a longer time series, we would reliably see this seasonal pattern, but at this point we do not have sufficient data to pursue the issue.

A second complication in calculating outstanding e-float is how to think about balances held in the accounts of agents (including super-agents). Conceptually, since our interest is in how customers (that is, individuals, businesses, and institutions) are behaving, our measure of outstanding e-float should subtract from the total derived balances held by non-customers; that is, by agents.
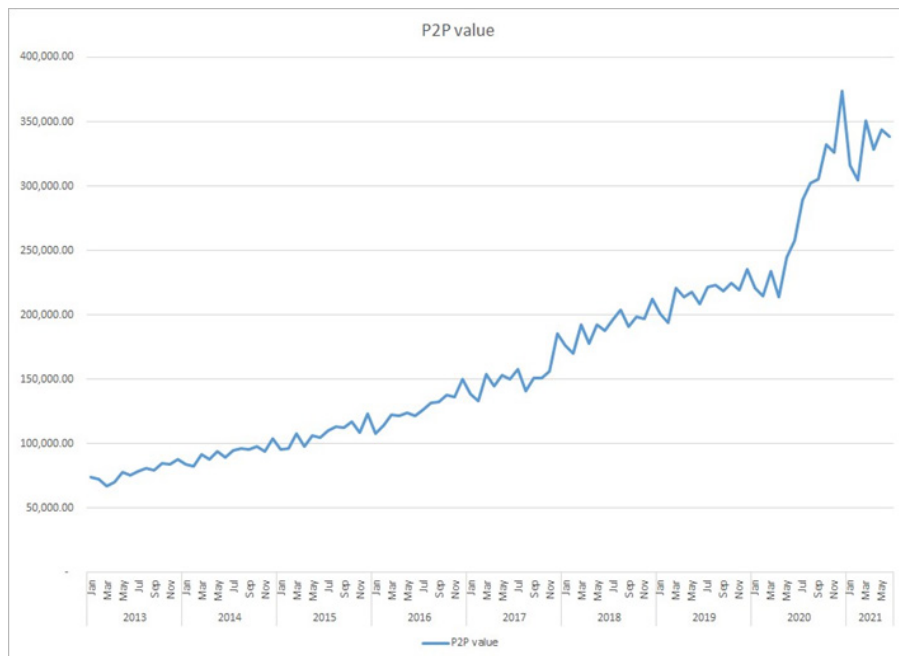
Mbiti and Weil (2016) attempted to estimate the fraction of outstanding e-float held by agents. The starting point for these calculations was data from Eijkman, Kendall and Mas (2010) that reported end of day e-float for different types of M-Pesa outlets. Mbiti and Weil (2016) estimated that average holdings of e-float were Ksh 50,000 per agent around 2010. Combining this estimate with information on the number of agents and the level of outstanding e-float, Mbiti and Weil (2016) concluded that the fraction of e-float held on agent phones was in the range of 10%-12%, with no discernible trend.

Even at the time, the above calculation was worryingly imprecise, in part because the information on e-float held by agents was an extremely rough approximation. At this point, we do not think that the estimate is useful. Unfortunately, we do not have any alternative data for Kenya on the fraction of e-float that is held on agent phones. However, we have such data for Tanzania. Specifically, our data from that country breaks down the end-of-year value of e-float outstanding into the amounts held on customer phones, agent phones, and "other", which includes businesses and institutions. For the period 2013-2020, the fraction held on agent phones ranges from 14.5% to 16.7%, with no discernible time trend. In the calculations that follow, we apply the figure 14.9%, which is the value for the end of 2020. We also have publicly available data from the Bank of Uganda which, like the Tanzanian data, breaks down the total escrow balance into the balance on customer phones, the balance on agent phones, and an "other" category.[2] This breakdown is only available from August 2018 to December 2019. In the last month of the data, e-float on agent phones constituted 28% of the total escrow balance.

The data on customer-to-customer transfers comes from the Central Bank of Kenya. In the data we received, it is labelled as "P2P value (Ksh millions)," and it is available for the period January 2013 to June 2021. The following figure shows that there was a fairly linear rise in the value of transfers from the beginning of the data up through early 2020, followed with person-to-person transfers rising sharply, presumably as a result of the COVID-19 pandemic.

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2   https://www.bou.or.ug/bou/bouwebsite/bouwebsitecontent/PaymentSystems/ DataStatistics-/Mobile-Money -Statistics-2021.xlsx accessed 11 Oct. 2021.

Monthly P2P value in Kenya

Source: author's compilation from various sources

Looking at the period before the pandemic, the value of P2P transfers grew at a rate of 16.9% per year between January 2013 and January 2020, while the annual rate of inflation in Kenya over this period was approximately 5.5% per year, and relatively stable. This indicates that the real value of transfers was growing at a bit more than 10% per year. There is modest seasonality in the value of P2P transfers, with a small peak in December, but this peak is much smaller than the peak in the value of outstanding e-float that we see in the short time series that is available.

The figure below shows the average size of customer-to-customer transfers, calculated using data provided on the value and volume of such transfers (labelled "person to person" in the dataset).

Average value of customer-to-customer transfers in Kenya
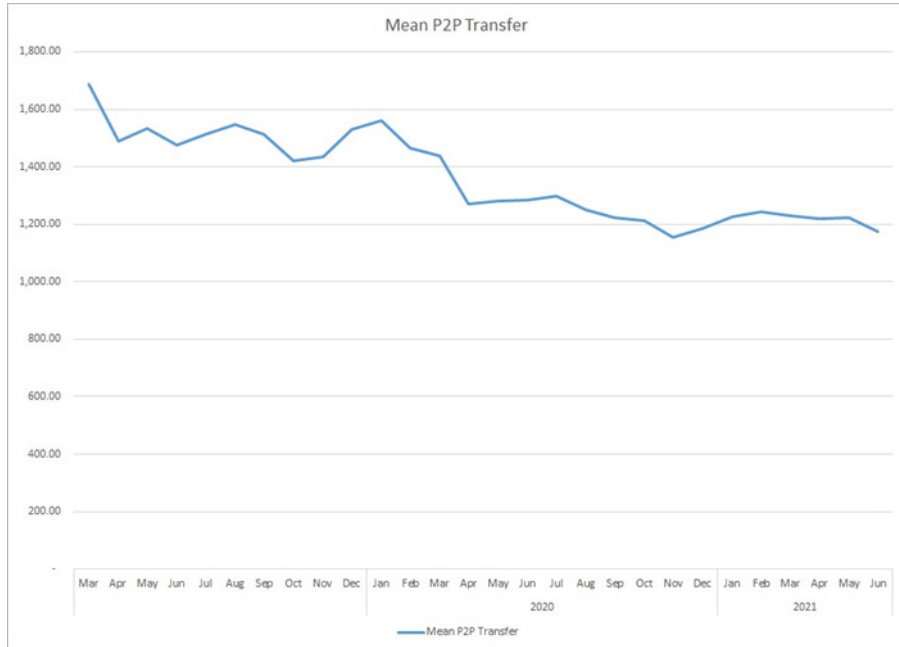
Source: Author's compilation from various sources

Although we only have data for 27 months, there is a pronounced downward trend, with the average size of transfers falling by almost a quarter. There is no evidence of a trend break due to COVID-19. As of June 2021, the average transfer size was Ksh 1,175, corresponding to US$ 10.57, using the market exchange rate. The decline in the average size of transfers suggests that e-money was moving closer to being a medium of exchange during this period, but of course such evidence has to be viewed as extremely tentative. The following figure shows our calculation of monthly e-money velocity for Kenya. For the most part, velocity stays in a narrow window between 2.5 and 3.0. The biggest exception is the large decline in velocity (to 1.73) in December of 2020, corresponding to the large increase in outstanding e-float in that month, as shown in under the figure labelled "Outstanding e-float and components in Kenya." We do not have any explanation for this outlier; it is too early to reflect the effects of COVID-19, and unfortunately we do not have any other observations of December velocity before this one. It would be useful to get more data from the pre-pandemic period to see if there is indeed a seasonal in velocity.

Monthly e-money velocity in Kenya
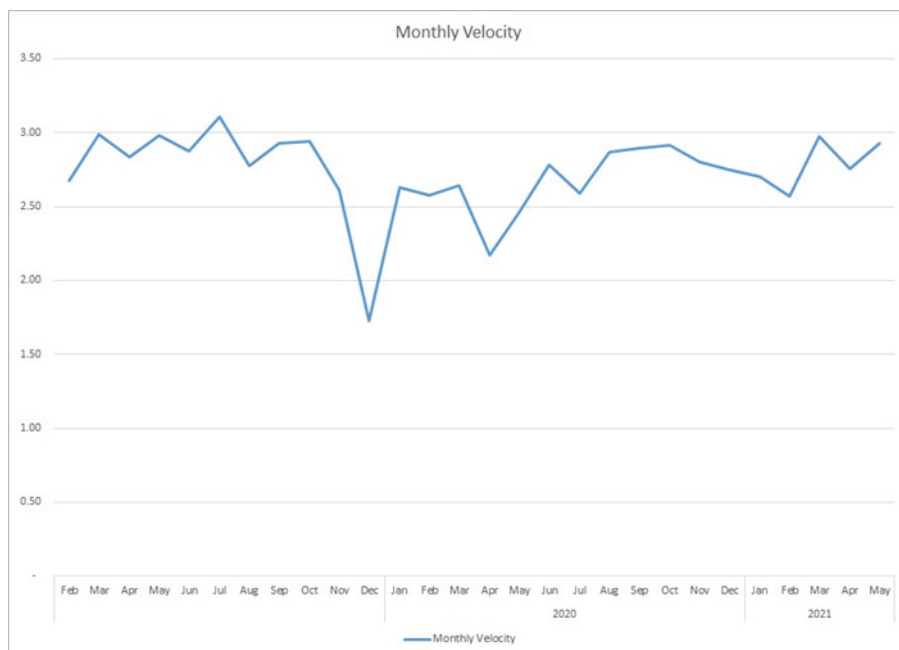
Source: Author's compilation from various sources

The estimate of velocity being in the range of 2.5-3.0 transactions per month compares to our earlier estimate of 4.0 in the last month of our sample, which was April 2010. Specifically, the velocity of 4.0 was what we called "adjusted velocity" in that paper, which reflected the adjustment of outstanding e-float to subtract the amount held on agent phones. Our earlier calculation showed a significant upward trend between 2007 and 2011, while the one presented here has no such trend, although it is for a shorter period.

While our current estimate of velocity is not far from our old one, we consider the current one to be far more credible, since we have much more confidence in the quality of the underlying data. The conclusion that we drew regarding how e-money was functioning in Kenya previously seems to be unchanged; that it is functioning as a hybrid of a money transfer system, and a means for storing value. We discuss this point more extensively below.

Turning to the length of the e-money loop, the data that we were provided with has an entry for the total value of agent cash-in plus cash-out transactions monthly at mobile payment service providers (Safaricom, Airtel and Telkom) going back all the way to late 2006. However, starting in March of 2019, there is also data on the monthly value of bank account to e-wallet and e-wallet to bank account transfers. In the first month for which data are available, the sum of transfers to and from bank accounts was Ksh 119 billion, while the value of cash-in and cash-out via agents was Ksh 368 billion. In the last month

for which we have data, June of 2021, the sum of transfers to and from bank accounts was Ksh 455 billion, while the value of cash-in and cash-out transfers at agents was Ksh 533 billion. In other words, the two channels were of roughly similar size. The relative importance of transfer into and out of bank accounts thus grew rapidly in the period for which we have data.

In applying Equation 2, we use the sum of cash-in and cash-out transfers via agents and banks. The other data required for calculating the loop length is the value of customer-to-customer transfers per unit time. In the data that we received from Kenya, there is an entry for the monthly value of person-to-person transfers. We assume that this includes transfers among all non-agent entities (i.e. businesses and institutions) as well.

The following figure shows our calculation of the e-money loop length for the period in which we have all the necessary data. The value of the loop length is stable between 0.85 and 0.90 through May of 2020, after which it falls precipitously, reaching a low of 0.59 in April 2021. This decline presumably reflects the effects of the COVID-19 pandemic, a period in which the system was not anywhere close to matching the steady state conditions under which Equation 2 was derived. We thus rely on the earlier data to assess how e-money was being used in Kenya.

Length of the e-money loop in Kenya
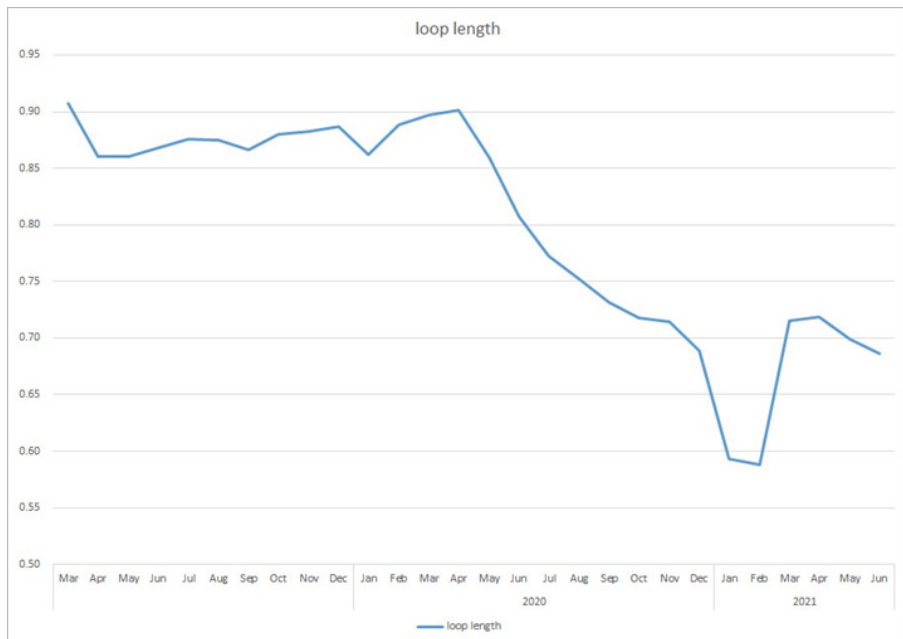
Source: Author's compilation from various sources

The loop length estimate of 0.85-0.90 is surprisingly consistent with Mbiti and Weil's (2016) estimate that the loop length was 1.0 in their data, which went up through July of 2009.

As Mbiti and Weil (2016) argue, the average loop length reflects the extent to which e-money is being used in different modalities. To the extent that units of e-money are created (via a cash-in transaction) and then passed from customer to customer many times before being extinguished, the loop length would be greater than one. Mbiti and Weil (2016) report anecdotal evidence that some people use their phones to store money without transferring it. E-money used this way has a loop length of zero. Finally, if all use of e-money was in a context where it was created in a cash-in transaction, transferred from customer to customer once, and then extinguished, that would lead to a loop length of exactly one. Presumably all three of these things happen to at least some extent, but our belief is that the fact that the loop length is so close to one primarily reflects the deposit-transfer-withdraw modality as being the dominant way in which e-money is used.

Tanzania

The data from Tanzania are annual, running from 2013 to 2020. Stock values refer to the end of the year, while flow values are annual averages.

Over the seven-year period, the quantity of outstanding e-float increased by a factor of 3.6, an annual growth rate of 20%. The value of customer-to-customer transfers, which grew by a factor of 1.76 over these seven years (8.4% per year). It is notable that the growth of transfers is so much lower than the growth of e-float, with the one showing rapid expansion of the e-money system and the other showing only modest growth. We do not have a good explanation for this discrepancy. Over these seven years, the annual rate of inflation averaged roughly 4.5%.

E-float in customer accounts in Tanzania
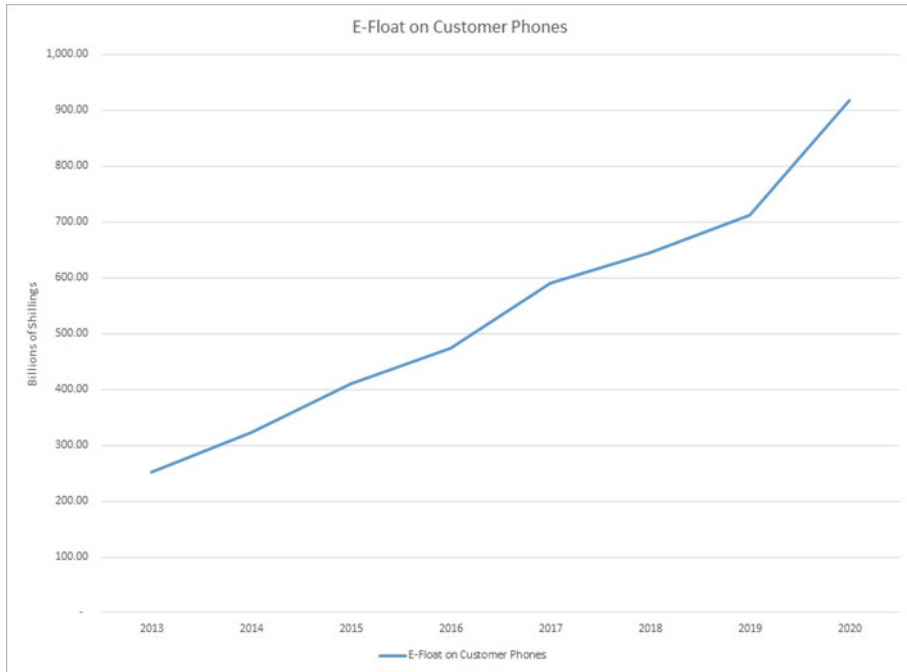
Source: Author's compilation from various sources

Total value of customer-to-customer transfers in Tanzania
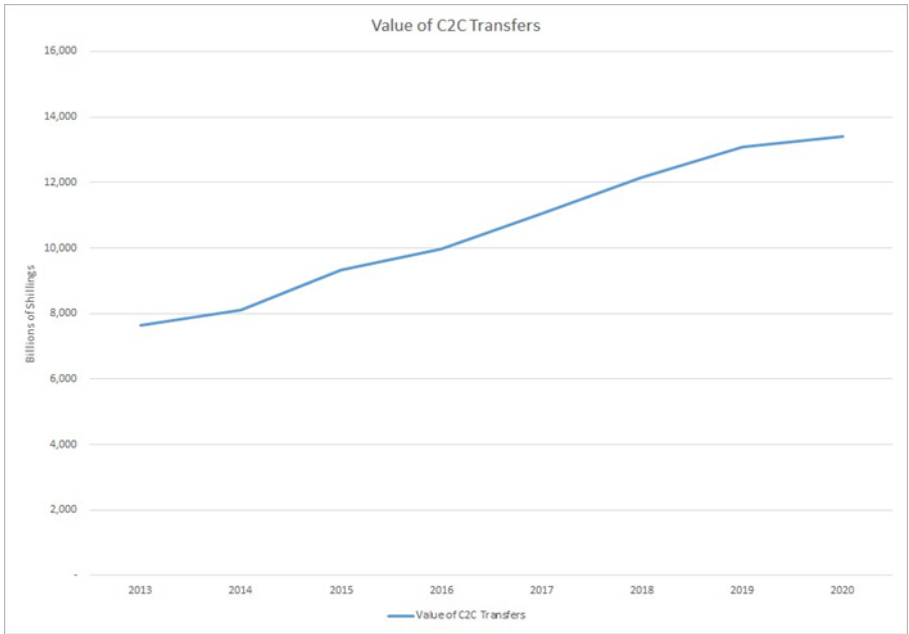
Source: Author's compilation from various sources

The shows the average size of customer-to-customer transfers. As in Kenya, there is a downward trend in the second part of the time series, with the average value of transfers falling by 30% between their peak in 2015 and the last data point in 2020. However, as the Tanzanian data cover a longer period than the Kenyan data, the speed of decline in Tanzania is not as great as in Kenya. The mean transfer size in 2020 is Tsh 38,809, which translated into dollars using the market exchange rate from the middle of 2020 comes to US$ 16.76. This is about 50% larger than the average transfer in Kenya.

Average customer to customer transfers in Tanzania
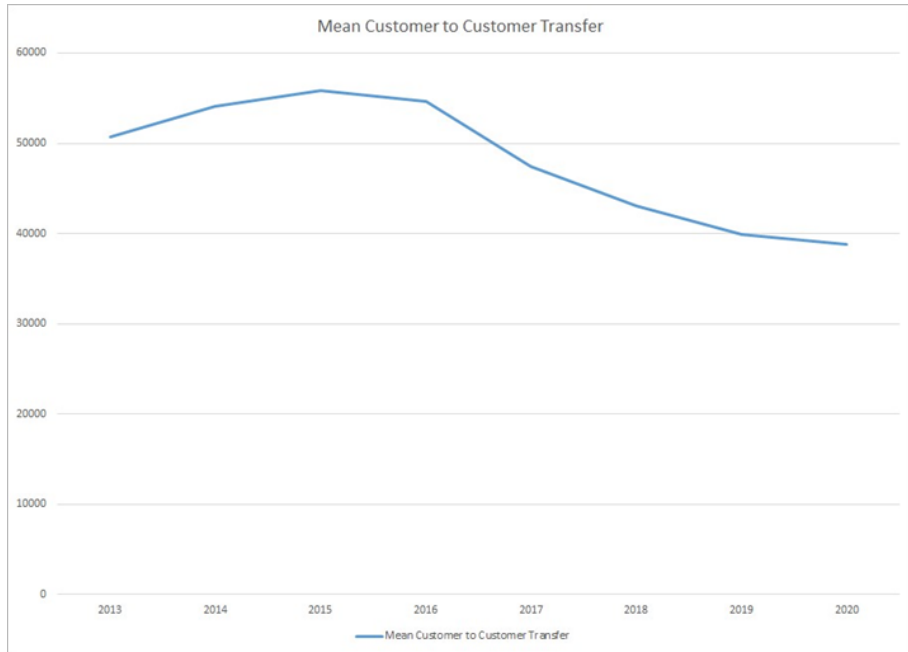
Source: Author's compilation from various sources

Calculation of velocity is made slightly more complicated because our data are annual and because the outstanding stock of e-money is growing at an appreciable rate. Since the figures for outstanding e-money are for the last day of the year, we use the average of the values for years t-1 and t as the denominator, where the total flow of transfers in year t is the numerator. Further, we divide the resulting annual velocity by 12 to convert it to a monthly number. The figure below shows the resulting series for monthly velocity in Tanzania. Unlike the data for Kenya, there is a notable trend decline over the period 2014-2020. Further, the calculated level of velocity in 2020, 1.4 transactions per month, is a little less than half the corresponding value for Kenya. It is possible that this result is due to a data problem: specifically that we are not getting data on all transactions among customers. This issue should be pursued in future work.

Velocity of e-money in Tanzania
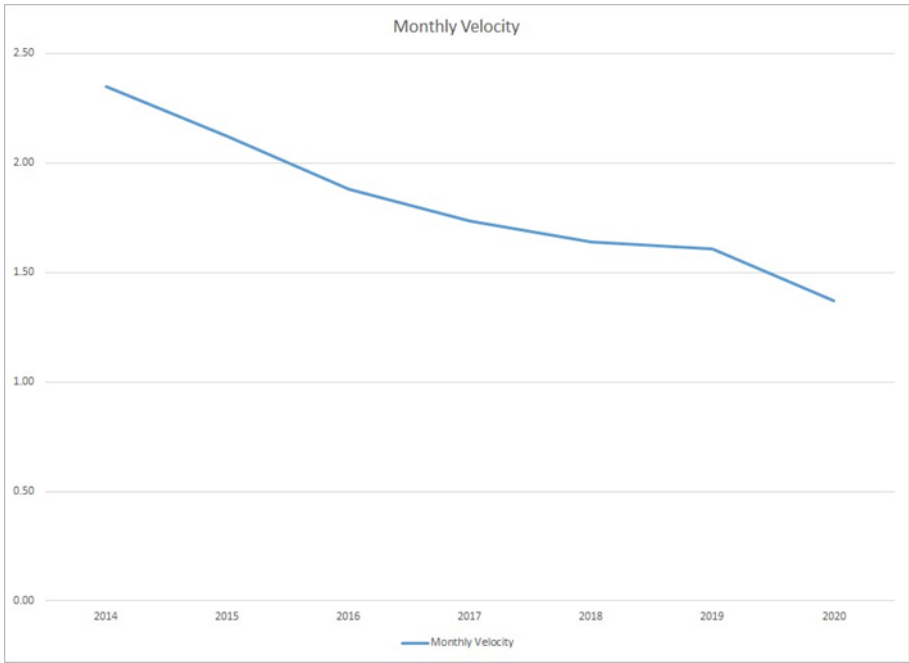
Source: Author's compilation from various sources

The next figure shows our calculation of the length of the e-money loop in Tanzania. The annual data that we obtained has an item for the sum of cash-in and cash-out transfers, but does not record totals for these items separately. In contrast to the case of Kenya, there is a marked trend in the loop length in Tanzania in the period preceding the COVID-19 pandemic. The loop length starts at 1.36 in 2013, and trends down in fairly linear fashion to reach 0.75 in 2020. As with the anomalous finding of declining velocity in Tanzania, a possibility is that not all customer-to-customer transactions that took place in Tanzania were recorded in the dataset. Again, this issue should be pursued in future work.

Length of the e-money loop in Tanzania
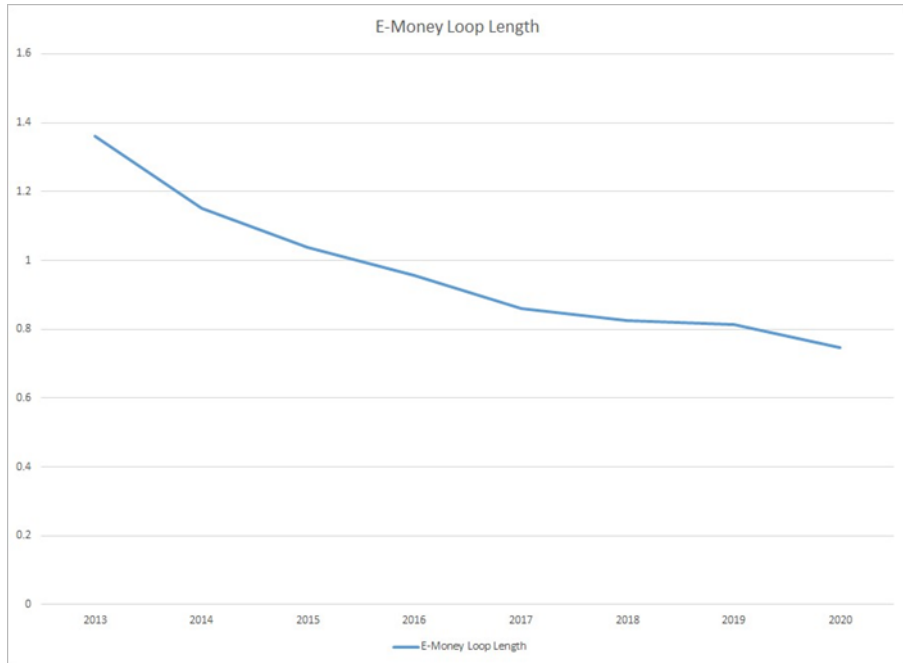
Source: Author's compilation from various sources

Uganda

The primary source of information for Uganda is a spreadsheet entitled "Mobile Money Statistics 2021" that can be downloaded from the Bank of Uganda.[3] The sheet has both annual data and separate tabs of monthly data, with information on some aggregates going back as far as 2009.

Unfortunately, there are some large ambiguities in this data that have to be resolved before it can be used for further analysis.

The spreadsheet has categories for "number of transactions" and "value of transactions" going all the way back to 2009. However, it is not clear if these transactions are solely customer-to-customer transfers, or if they also include cash-in and cash-out transactions.

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3   https://www.bou.or.ug/bou/bouwebsite/bouwebsitecontent/PaymentSystems/
     DataStatistics-/Mobile-Money-Statistics-2021.xlsx

In data for Kenya and Tanzania, the volume and value of cash-in and cash-out transactions are reported separately. Our preliminary analysis of the data suggests that all the different types of transactions are included in this single category in Uganda.[4]

The spreadsheet has data on "balance on customer accounts" going back to 2009. Starting in January of 2018, there is also data on "agent balances." However, there is a large decline in the data series for "balance on customer accounts" in that same month, and so it appears that prior to January 2018, data may have included agent balances. This would have to be confirmed, however. Starting in August of 2018, there is also a category for "other balances." This series starts off with small values, so it is reasonable to conclude that it represents a new feature of the mobile money system rather than an aggregate that previously existed but was unmeasured.

For December 2019, the last month with full data, the total of balances held by customers and "other" was Ush 546 billion.

Rwanda

The only data that we have for the stock of e-money in Rwanda is from the database of the IMF FinAccess survey, specifically an entry for "Outstanding Balances on Active Mobile Money Accounts, Domestic Currency." For Rwanda, the figure given is Rwf 67.2 billion in 2020.

Two other East African countries have data for this item in the database. For Uganda the entry is Ush 571.4 billion in 2020. This matches relatively closely the figure of Ush 546 billion shillings that we have from the spreadsheet downloaded from the Bank of Uganda. For Tanzania, the latest entry is for 2015, and is Tsh 583.8 billion. This is not a great match to the data we have from the Central Bank of Tanzania which gives outstanding e-float at the end of 2015 as Tsh 487 billion, of which 411 billion was held by non-agents (customers or "other").

The FinAccess database also has information on the value of e-money transactions. For Rwanda, the figure given for 2020 is Rwf 7.18 trillion. However, it is not clear what this refers to. For Uganda, the figure of Ush 93.7 trillion for 2020 in the IMF data exactly

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4 Our reasoning in drawing this tentative conclusion is as follows: we attempted to calculate e-money velocity in Uganda under the assumption that the reported transactions were only customer-to-customer, but the number we came up with was roughly three times as high as the velocity that we observe in Kenya. Given a length of the e-money loop that is near one (as we observe in Kenya), a measure of total transactions that included cash-in and cash-out transfers would be three times as high as a measure that included only customer-to-customer transfers. Thus, it seems likely to us that properly measured velocity in Uganda is roughly the same as in Kenya, and that the measure of transactions that we have included cash-in and cash-out transfers.

matches the data in the spreadsheet downloaded from the Ugandan central bank. However, as we noted above, we are not sure whether this is customer-to-customer transactions, or whether it also includes cash-in and cash-out. For Kenya, the figure for 2020 in the IMF data is Ksh 5.21 trillion. This exactly corresponds to the total of cash-in and cash-out transfers in Kenya in 2020 in the data that was supplied to us by the Central Bank of Kenya (there is no data in the IMF database for Burundi or Tanzania) . It is thus possible, and maybe even likely, that the IMF number for Rwanda is the value of cash-in plus cash-out transfers. In any case, we certainly cannot assume that it is the value of customer-to-customer transfers, which is what we were looking for.

5. Discussion

In our previous work, we concluded that M-Pesa mixed components of a low-cost money transfer system, a nascent transaction medium that shares characteristics with cash, and a savings vehicle.

To assess the role that e-money plays today, we start by pulling together information on the size of e-money operations relative to Gross Domestic Product (GDP). The information is presented in the table labelled " Aggregate data on the size of e-money".[5] We use two different measures of size: E-float held on customer phones and the value of monthly customer-to-customer transactions. In both cases, we look at both the absolute magnitude and this magnitude scaled by GDP

Aggregate data on the size of e-Money

	GDP in local currency units (trillions)	E-float held on customer phones (billions)	E-float as a percentage of GDP (billions)	Monthly customer-to-customer transactions	Transactions as percentage of GDP
Kenya	2.76	135.9	4.9	374.1	13.6
Tanzania	155	918.4	0.59	1,118	0.72
Uganda	129	546	0.42		
Rwanda	10.4	67.2	0.64		

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5 Data on GDP in local currency units is from the World Bank. Information in Column (2) is as follows: Kenya: e-float not held on agent phones for December 2020; Tanzania: money held in customer accounts at the end of 2020; Uganda: total of balances held by customers and "other" in December 2019; Rwanda: e-money on customer phones from IMF data. Data in Column (4) are as follows: Kenya: person-to-person transfers for December 2020; Tanzania: annual customer to customer transfers for 2020 divided by 12. We do not present data from Uganda or Rwanda because we think that the measures of transactions that we have available to us may include cash-in and cash-out transfers.

These two exercises paint a somewhat similar picture, in that they show that by either measure, e-money is far less developed in Tanzania than in Kenya. For the stock of e-money outstanding relative to GDP, the difference is a factor of 8.3, while for the number of transfers, it is a factor of 19. The difference between these two ratios is a result of velocity in Tanzania being notably lower than in Kenya, as we noted above. Although we have less data for Rwanda and Uganda, their levels of e-money relative to GDP look quite similar to that in Tanzania.

In principle, we could compare the development of e-money in the other EAC countries to levels of development in Kenya in the past. Unfortunately, our data on the stock of e-money in Kenya only goes back to 2018, so this is not feasible.

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Appendix: Detailed information by country

Kenya

As one of the first African countries to develop nationwide mobile money services and corresponding regulation, Kenya has become one of Africa's largest markets and networks for mobile money operations. This has been in part due to the high level of cellphone ownership in the country. A study conducted by the Kenyan government's Communication Authority in June 2020, where mobile phone ownership was defined as owning a SIM card, found a 119.9% mobile phone ownership rate. Researchers have attributed this value to individuals owning multiple SIM cards to take advantage of the most cost-effective mobile subscription options offered by providers (Kibuacha, 2021). Other studies have counted the number of unique subscribers and proportion of individuals who own a physical mobile phone, figures that stood at 59% and 80% in 2017.[6] Kenya has five mobile network operators with two dominant companies. In March 2020, Safaricom PLC and Airtel Networks Limited controlled 64.5% and 26.6% of the market, respectively. Other operators are Telkom Kenya Limited with 5.8% of subscriptions, Equitel with 3.1% of subscriptions, and Mobile Pay Limited with a

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[6]   "The Mobile Money Economy: Sub-Saharan Africa 2017" (GSMA, 2017), https://www.gsma.com/subsaharanafrica/wp-content/uploads/2018/11/2017-07-11-7bf3592e6d750144e58d9dcfac6a dfab.pdf.

negligible number of subscribers.[7] Kenya has maintained high levels of mobile phone ownership and accessibility compared to other African countries, allowing for a robust mobile money network.

Mobile money began in Kenya in March 2007 with Safaricom's M-Pesa, the dominant mobile money service in 2021 boasting 98.8% of mobile money subscriptions in the country.[8] Other mobile money services in Kenya are Airtel Money, which launched in Kenya in 2009 and claims 1.1% of subscriptions, and T-Cash, which launched in 2018 and claims 0.05% of subscriptions. Tangaza Pesa, which launched in 2011, and Equitel, which launched in 2014, hold a negligible amount of subscriptions in Kenya. M-Pesa became the dominant mobile money service soon after its creation by providing traditional banking services to people all over the country, especially in more rural areas. M-Pesa created a fast and convenient money transfer service with low fees, adequate consumer protection, and a network that was accessible anywhere from a cell phone (Barry, 2015). M-Pesa has continued to expand in Kenya, as evidenced by an increasing number and overall value of transactions, due to a large network of agents. M-Pesa had 40,000 agents in 2015. The total number of mobile money agents increased to 295,105 as of October 2021, according to the Central Bank of Kenya, with the vast majority working for M-Pesa.[9] For reference, the service controlled about 86% of agents in July 2020 (Connecting Africa, 2020). As of October 2021, Kenya had 66.8 million registered mobile money accounts, compared to 58 million at the beginning of 2020. The volume of mobile money payments reached Ksh 1.86 trillion in 2020, compared to Ksh 1.83 trillion in 2019. The value of mobile money transactions in the first six months of 2021 reached Ksh 3.26 trillion compared to Ksh 3.06 trillion from July to December of 2021 (Oluwole, 2021). Monthly transactions reached Ksh 532.63 billion in June of 2021 with Safaricom continuing its dominance over the market, processing 90% of transactions during the first half of 2021. Kenya has proven to be an important example of how mobile money services can reach people across the country and facilitate the movement of money between urban and rural areas while providing banking and financial services to individuals who formerly did not have access to the traditional banking system.

Kenya established robust regulation of mobile money services only a few years after networks were launched, allowing for the government to aid growth by ensuring consumer confidence in the service. The National Payment Systems Act, passed in 2011, gave monitoring and regulatory power over mobile money services to the Central Bank of Kenya, with the goal of increasing efficiency and security on payment systems.[10]

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7   "M-Pesa Has Almost 99% Market Share in Kenya," Connecting Africa, July 6, 2020, http://www.connectingafrica.com/author.asp?section_id=761&doc_id=762180.

8   M-Pesa has almost 99% market share in Kenya, ibid.

9   "Mobile Payments | CBK," Central Bank of Kenya, accessed February 17, 2022, https://www.centralbank.go.ke/national-payments-system/mobile-payments/.

10   "The National Payment System Act, 2011" (2011), https://www.centralbank.go.ke/images/docs/legislation/NATIONAL%20PAYMENT%20SYSTEM%20ACT%20(No %20 39%20of%202011)%20(2).pdf.

Kenya passed additional e-money regulations in 2013, explicitly addressing government oversight in the industry. These regulations stipulated that only banks and financial institutions may issue e-money unless authorized by the Central Bank of Kenya to ensure that issuers have the security and financial capital to support operations.[11] In addition, regulations require that all e-money issuers have maximum monthly transaction limits on individuals, maintain accurate records of accounts and account owners, and provide adequate security for held funds, which includes that issuers may not engage in lending or investing (other than what is needed to reach the amount of liquid assets equal to all outstanding e-money issued). Regulations also sought to monitor agent operations and improve consumer protection. E-money issuers are liable for agent conduct and must report information about agent activity to the Central Bank of Kenya. In addition, adequate notice to the consumer about fees and procedures to file a complaint or receive customer service are required among other services, aiding consumer security and confidence. Relevant statistics about e-money operations, including the number of e-money accounts, the value and volume of transactions, the total amount of outstanding/issued e-money, and incidents of fraud and customer complaints, must all be reported to the Central Bank of Kenya each month.

Most recently, Kenya passed the 2018 General Data Protection Regulations and the 2019 Data Protection Act. The 2018 Act identified the Communications Authority of Kenya (CA), Competition Authority of Kenya (CAK), and the Central Bank of Kenya as the major enforcers of privacy regulations. The 2019 Act prompted Safaricom to create the Office of the Data Commissioner to review how the company handles consumer data and create an internal data protection officer position. These sets of regulations significantly improved the Kenyan Government's ability to support security and consumer confidence in e-money services as the industry rapidly expanded.

Like many other countries around the world, the Central Bank of Kenya instituted a waiver on transfer fees for transactions below Ksh 1,000 in March 2020 in response to the COVID-19 pandemic. Transfer fees returned at the beginning of 2021, later than many other countries in the region. Large increases in the number of mobile money accounts and value/volume of transactions in Kenya through 2020 have related to the fee waiver as mobile money accounts now outnumber the country's population (Wangui, 2021). Mobile money is now widely accepted at most businesses across the country as a form of payment, incentivizing individuals to use mobile money services. In addition to fees, Kenya includes a 12% excise duty on fees collected by operators on mobile money transactions. This value increased from 10% to 12% in 2018 (Silue, 2021).

Another important regulation to consider in Kenya is agent exclusivity, a policy that many companies historically included in agent contracts that required agents to exclusively work for one mobile money service provider. In 2014, the Competition Authority of

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11   "E-Money Regulation" (Central Bank of Kenya, 2013), https://www.centralbank.go.ke/images/docs/NPS/Regulations%20and%20Guidelines/Regulations%20-%20E-%20Money%20regulations%202013.pdf.

Kenya ruled that Safaricom could no longer require agents to exclusively work for the company. Safaricom argued that significant investments in agent hiring, training, and connectivity meant that the company should not be required to "share agents." Airtel, a competitor to Safaricom in Kenya, argued that agent exclusivity proved a barrier to entry in Kenya essentially maintaining Safaricom's control of the market. After the 2014 ruling, the percentage of agents working for one company has steadily decreased from a high of 96% in 2013. A ban on exclusivity agreements in agent contracts was also passed by the Central Bank of Kenya in 2014 (Mazer et al, 2022).

Tanzania

As in other East African countries, the number of people accessing financial services through mobile phones in Tanzania has increased consistently since the launch of mobile money services. According to the Bank of Tanzania, the percentage of adults in Tanzania accessing financial services through a mobile device reached a high of 78.4% in March 2020, up 4.1% from March 2019.[12] The number of registered SIM cards reached 43.75 million in June 2019.[13] The market for mobile phone operators in Tanzania is more competitive than other countries in Africa, with three major operators and several smaller companies. In March 2016, Tanzania had a little over 39.5 million mobile phone subscriptions, of which Vodacom controlled 31%, Tigo controlled 29%, Airtel controlled 27%, Zantel controlled 5%, Halotel controlled 4.5%, Smart controlled 3%, and TTCL control less than 1%.[14] These companies were allowed to launch mobile money services in 2007-2008 after receiving approval from the Bank of Tanzania under the Converged Licensing Framework (Nyka, 2019). Mobile money services in Tanzania have benefitted from a close connection to mobile network operators, with mobile money accounts expanding along with mobile network subscriptions.

Because of the large number of competitive mobile network operators, Tanzania has several large mobile money services. Vodacom's M-Pesa and Zantel's Z-Pesa (now Ezy Money) both launched between 2008 and 2009. Tigo Pesa launched soon after in 2010, followed by Airtel Money in 2012, HaloPesa in 2016, and TTCL's T Pesa in 2017. As of March 2019, M-Pesa controlled 40% of mobile money subscriptions. Other major competitors such as Tigo Pesa and Airtel money controlled 30% and 18%, respectively

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12   "Annual Report 2019/20" (Bank of Tanzania, December 2020), https://www.bot.go.tz/ Publications/Regular/Annual%20Report/en/2020123112264444.pdf.

13   Victor Nyka, "Regulatory Collaboration in Ensuring Digital Financial Inclusion in Tanzania" (Tanzania Communications Regulatory Authority (TCRA), n.d.), https:// www.itu.int/en/ITU-D/Regulatory-Market/Documents/Events2019/Togo/Ses3.1_%20 Nkya_collaboration.pdf

14   Tanzania Communications Regulatory Authority, "Quarterly Communications Statistics Report," Wayback Machine, March 2016, https://web.archive.org/ web/20190104145402/http://www.tcra.go.tz/images/documents/telecommunication/ CommSt atMarch16.pdf.

(Anderson-Manjang, 2021).[15] Smaller firms included HaloPesa, which controlled 7% of subscriptions, Ezy Pesa with 2% of subscriptions, and TTCL with 2%. With high levels of competition, the volume and value of mobile money transactions has continued to grow in Tanzania. The country reached 27.2 million active mobile money subscriptions in June 2020, up from 22.3 million at the end of June 2019.[16] The Bank of Tanzania also reported a 21.8% annual growth rate in the number of transactions, and a 8.9% growth rate in the value of transactions between 2018 and 2019. This growth led to 1.5 trillion transactions in the first six months of 2019 with a value of Tsh 74.90 trillion. The most up-to-date information on the breakdown of mobile money transactions by company is from March 2020, which had a monthly total of almost 257 million transactions.[17] In that month, M-Pesa made up 41% of transactions, Tigo Pesa 29% of transactions, Airtel Money 22% of transactions, HaloPesa 5.7% of transactions, and Ezy Money along with TTCL made up about a percentage of transactions. The volume of transactions was slightly higher than of February 2020, but the breakdown by company was roughly the same. The large number of active mobile money services in Tanzania has also led to many agents around the country. According to the Bank of Tanzania, the number of agents in June 2020 was 623,867.[18] Tanzania remains an important case study for mobile money services as its timeline of growth and regulation differs slightly from its neighbour, Kenya.

The Bank of Tanzania (BoT) and the Tanzania Communications Regulatory Authority (TCRA) are the primary regulators of the banking and mobile money industries in the country. Mobile money operators are required to obtain an Unstructured Supplementary Service Data Code from the TCRA that identifies the operator, registered businesses using the service, and a service's agents. Tanzania passed its National Payment System Act in 2015, seeking to increase consumer protection on mobile money service platforms and govern agent training and conduct by giving more concrete authority to the Bank of Tanzania. The Act outlined that mobile money services are liable for agent behaviour, mandated to provide adequate training for agents and maintain accurate records of agents and their transactions, and required to take steps to prevent money laundering and financing of terrorism. The Act also barred services from requiring that an agent exclusively work with one company. This non-exclusivity rule arose after legal challenges in Kenya and Uganda arose in 2014 in response to contracts specifying that agents were required to exclusively work with one service provider.[19] All of these rules sought to improve consumer security and trust in mobile money services. The Tanzania

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15   https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2021/03/GSMA_State-of-the-Industry-Report-on -Mobile-Money-2021_Full-report.pdf.

16   "Annual Report 2019/20."

17   "Tanzania Mobile Money Transactions by Operator 2020," Statista, September 22, 2021, https://www.statista.com/statistics/1081846/tanzania-mobile-money-transactions-by-operator/.

18   "Annual Report 2019/20."

19   Mazer, Pillai, and Staschen, "Agents for Everyone."

Communications Regulatory Authority (TCRA) also established the Computer Emergency Response Teams (CERTS) in 2010 to alert the government and companies of cyber-attacks in a timely manner, allowing for adequate and swift corrective action.[20] The Financial Consumer Protection Regulations passed in 2019 also outlined rules governing personal data handling and privacy that are enforced by the Bank of Tanzania.[21] Tanzania regulators have worked to increase confidence and trust in mobile money services to support growth and greater access to financial services.

Tanzania was one of the first countries in Africa to invest and move towards interoperability between mobile money platforms. In 2013, the Bank of Tanzania began facilitating discussions around account-to-account interoperability between mobile money providers. Subsequently, Tigo and Airtel signed a bilateral agreement in September 2014 that launched compatibility in February 2015. In December 2014, Tigo connected with Zantel, and in February 2016, Vodacom announced interoperability with Airtel and Tigo. Services only began to publicly advertise interoperability between services in 2016 (Gilman, 2016). In 2016, person-to-person transfers between providers only made up 6-8% of transactions, but this amount was expected to grow in subsequent years as more consumers engaged with newly offered services. Most recently in June 2020, the Tanzanian government sought to address limitations on current interoperability with the Tanzania Instant Payments System (TIPS) allowing for convenient, low cost transfers regardless of service provider, sector, or bank or non-banking institution.

Tanzania mobile money regulatory agencies also took significant steps at the beginning of the COVID-19 pandemic to encourage the use of mobile money platforms and sustain economic activity. In May 2020, the Bank of Tanzania increased mobile money operators' daily transaction limit to customers from Tsh 3 million to Tsh 5 million. The daily balance limit was also increased from Tsh 5 million to Tsh 10 million in an effort to encourage e-money activity and decrease physical use of banks during the pandemic.[22]

On 15th July 2021, the Tanzanian government imposed a tax on all mobile money transactions to raise US$ 2.1 billion over the next five years to fund rural development and infrastructure efforts (Burkitt-Gray, 2021). The original tax on transfers was set to range from Tsh 10 to Tsh 10,000 (US$ 0.0043 to US$ 4.31) per transaction. But the tax was reduced by 30% to Tsh 7 to Tsh 7,000 per transaction at the beginning of September 2021 following widespread protests around the country. This reduction is displayed in the chart below. For example, on transfers ranging from Tsh 5,000 to Tsh 6,999, the tax amount was reduced from Tsh 100 to Tsh 70. In addition to the reduction in government tax rate, the Tanzanian government also secured a 10% reduction in mobile operator

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20   "TZ-CERT Profile – Tanzania Computer Emergency Response Team," n.d., https://www.tzcert.go.tz/about-us/tz-cert-profile/.

21   Tanzania Communications Regulatory Authority, "Quarterly Communications Statistics Report."

22   "Annual Report 2019/20."

fees on money transfers.[23] Many analysts saw these tax increases as impediments to the growing mobile money service market in Tanzania, especially as the COVID-19 pandemic continues to be a serious problem.

Revised rates

A comparison between the previous rates and revised rates is seen below.

S/N	Electronic Mobile Money transfer and withdrawal amount in TZS	Revised Rate in TZS	Previous rates in TZS	Difference (Reduction)	% of the lowest amount of the revised rate	% of the highest amount of the revised rates	% of the lowest amount of the previous rates	% of the highest amount of the previous rates
1.	1 to 999	NIL	NIL	-	0.00%	0.00%	0.00%	0.00%
2.	1,000 to 1,999	10	10	-	1.00%	0.50%	1.00%	0.50%
3.	2,000 to 2,999	11	16	5	0.55%	0.37%	0.80%	0.53%
4.	3,000 to 3,999	19	27	8	0.63%	0.48%	0.90%	0.68%
5.	4,000 to 4,999	39	56	17	0.98%	0.78%	1.40%	1.12%
6.	5,000 to 6,999	70	100	30	1.40%	1.00%	2.00%	1.43%
7.	7,000 to 9,999	88	125	37	1.26%	0.88%	1.79%	1.25%
8.	10,000 to 14,999	224	320	96	2.24%	1.49%	3.20%	2.13%
9.	15,000 to 19,999	427	610	183	2.85%	2.14%	4.07%	3.05%
10.	20,000 to 29,999	672	960	288	0.34%	2.24%	4.80%	3.20%
11.	30,000 to 39,999	770	1,100	330	2.57%	1.93%	3.67%	2.75%
12.	40,000 to 49,999	1,050	1,500	450	2.63%	2.10%	3.75%	3.00%
13.	50,000 to 99,999	1,435	2,050	615	2.87%	1.44%	4.10%	2.05%
14.	100,000 to 199,999	1,771	2,530	759	1.77%	0.89%	2.53%	1.27%
15.	200,000 to 299,999	2,058	2,940	882	1.03%	0.69%	1.47%	0.98%
16.	300,000 to 399,999	2,450	3,500	1,050	0.82%	0.61%	1.17%	0.88%
17.	400,000 to 499,999	2,870	4,100	1,230	0.72%	0.57%	1.03%	0.82%
18.	500,000 to 599,999	3,640	5,200	1,560	0.73%	0.61%	1.04%	0.87%
19.	600,000 to 699,999	4,480	6,400	1,920	0.75%	0.64%	1.07%	0.91%
20.	700,000 to 799,999	4,970	7,100	2,130	0.71%	0.62%	1.01%	0.89%
21.	800,000 to 899,999	5,264	7,520	2,256	0.66%	0.58%	0.94%	0.84%
22.	900,000 to 1,000,000	6,230	8,900	2,670	0.69%	0.62%	0.99%	0.89%
23.	1,000,001 to 3,000,000	6,580	9,400	2,820	0.66%	0.22%	0.94%	0.31%
24.	3,000,001 and above	7,000	10,000	3,000	0.23%		0.33%	

Source: https://www2.deloitte.com/content/dam/Deloitte/tz/Documents/tax/Deloitte%20 Tanzania%20Tax

Uganda

Mobile money services began operating in Uganda in 2009. As of quarter 1 of 2021, five telecom firms (MTN, Airtel, Africell, Lycamobile, and UTL) had a combined 28.3 million subscribers, roughly 62% of the total population. Large and small telecom firms operate in the country. MTN has 15 million customers (53% of total subscribers), Airtel has 10 million subscribers (35.3% of total subscribers), Africell holds 1.2 million

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23   "Tanzania Finally Reduces Mobile Money Transaction Levy after Public Outcry," The Citizen, August 31, 2021, https://www.thecitizen.co.tz/tanzania/news/tanzania-finally-reduces-mobile-money-transaction-levy-after-public-out cry-3533212.

subscribers (4.2% of total subscribers), while the remaining 7.4% are shared between Lycamobile and UTL. Africell had announced its exit from the market effective 7th October 2021.[24]

Seven e-money licences have been issued in Uganda, but two MNOs, MTN Uganda and Airtel Uganda (formerly Zain), created and currently dominate the Ugandan sector due in part to their pre-existing infrastructure which allowed them to quickly scale up operations.[25] MTN, launched in Uganda in October 2009, has a total of 10 million mobile money accounts, covering 66% of the mobile money market with a total of 20,000 agents nationwide as of 2016.[26] Airtel, launched in January 2009, has a total of eight million mobile money accounts, covering 33% of the mobile money market with 47,000 agents as of 2016. Lastly, M-Sente, launched in February 2010, has 1.2 million mobile money accounts, covering only 1% of the mobile money market with 5,000 agents as of 2016. Cumulative data from 2020 shows 3,526,972,165 transactions valued at 93,728,611,507,775 Ugandan shillings (UGX) (26,152,693,339.79 US$). As of February 2021, 30,735,167 mobile money accounts had been registered.[27] The Bank of Uganda has reported 292,210 active agents as of September 2021. The active account to agent ratio as of September 2021 is 73 accounts per agent.

In 2020, Uganda passed the National Payments System Act in response to business integration of mobile money platforms into operations and expansion of electronic financial services in banks. The Act introduced stricter regulation and monitoring of mobile money services to protect users and ensure the effectiveness of platforms. The Act applies to operators of payment systems, payment service providers, and issuers of payment instruments in addition to all technology that allows for electronic transferring of money. The Bank of Uganda is empowered to operate, supervise, and regulate payment systems and can create a licensing system for payment system providers and e-money issuers. Several other vested powers relate to monitoring and investigating include gathering information, conducting site visits, appointing external auditors, overseeing insolvency proceedings, and creating regulation to combat fraud. In addition, the Act creates a regulatory sandbox framework where new technologies can be tested under adequate consumer protection.[28]

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24   "Fears over MTN, Airtel Dominance in Uganda's Telecom Sector," The Independent Uganda, October 6, 2021, https://www.independent.co.ug/fears-over-mtn-airtel-dominance-in-ugandas-telecom-sector/.

25   "Mobile Money Metrics," GSMA, https://www.gsma.com/mobilemoneymetrics/.

26   Margarete Biallas and Alana Fook, "IFC Mobile Money Scoping Country Report: Uganda" (International Finance Corporation, World Bank Group, n.d.), https://www.ifc.org/wps/wcm/connect/b708e5e8-25e6-49cd-98d3-9dc8a313781a/Uganda+Market+Scoping+Report. pdf?MOD=AJPERES&CVID=mk1-VKv.

27   "Bank of Uganda | Data and Statistics," Bank of Uganda: Payment System, n.d., https://www.bou.or.ug/bou/bouwebsite/PaymentSystems/dataandstat.html.

28   ENSafrica-Donald Nyakairu and Tracy Kakongi, "Key Features of Uganda's National Payment Systems Act," Lexology, September 15, 2020, https://www.lexology.com/

In May 2018, Uganda proposed a 1% government tax on the value of all mobile money transactions, which included mobile money deposits, withdrawals, and exchanges.[29] The tax was introduced in July leading to a large decrease in mobile money transfers. Many businesses with access to bank accounts began to transfer money to banks to withdraw money and thus avoid taxes on cash-out mobile money transactions. The tax was amended to 0.5% in November of 2018 following public outcry that taxes would disproportionately hurt low income and rural Ugandans (Clifford, 2020). In addition to this tax, the Ugandan government also levies a 10% excise duty tax on the fees mobile money services charge on exchanges and withdrawals. This government excise duty was increased to 15% in July 2018, but this tax is also levied on many banking services, therefore not targeting the mobile money industry.[30]

MTN and Airtel established interoperability between the two services in 2018 following a recommendation by the Central Bank of Uganda. Resources for the connection were not provided by the government, leading to only this two-way connection and continued dominance in the mobile money market by these two services. A 0.6% fee is paid by customers who receive money from another platform. The Ugandan government implemented a tax on these exchanges in July 2018, which many argued would drive consumers to use banking services to avoid taxes. Even with interoperability, exchanges between platforms make up only 0.21% of transactions each year.[31]

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library/detail.aspx?g=30e9b2e1-755f-4527-b28e-41d20a5171d1.

29   Francis Kamulegeya, "New Tax on Mobile Money Transactions," PwC Uganda, n.d., https://www.pwc.com/ug/en/press-room/new-tax-on-mobile-money-transactions.html.

30   "New Tax on Mobile Money Transactions."

31   "Tracking the Journey towards Mobile Money Interoperability: Emerging Evidence from Six Markets: Tanzania, Pakistan, Madagascar, Ghana, Jordan and Uganda," GSMA, Mobile for Development (blog), June 12, 2020, https://www.gsma.com/mobilefordevelopment/resources/tracking-the-journey-towards-mobile-money-interoperability-emerging-evidence-from-six-markets-tanzania-pakistan-madagascar-ghana-jordan-and-uganda/.

Uganda mobile money transactions 2018-19
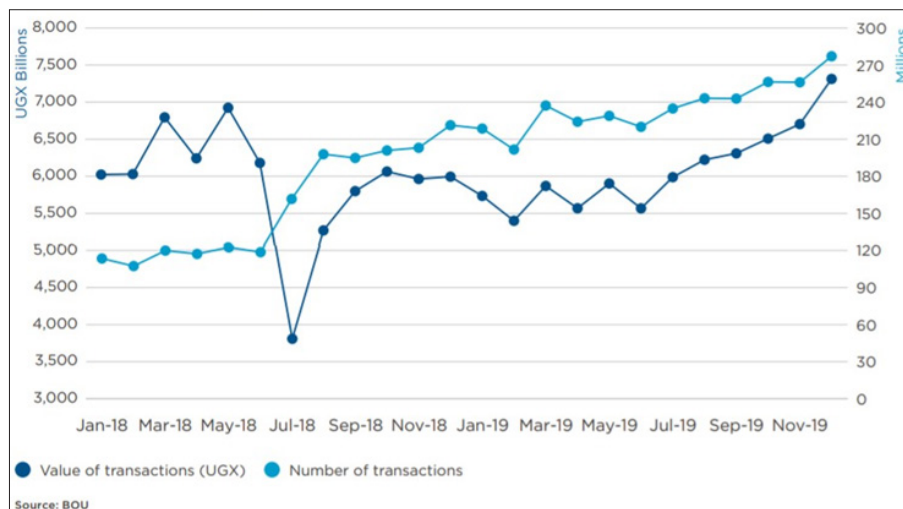
Source:https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/06/GSMA_The-causesand-consequences-of-mobile-money-taxation.pdf

Rwanda

Mobile money arrived in Rwanda in 2010, later than many countries in the East Africa region such as Kenya and Tanzania. Mobile money services MTN arrived in 2010 followed by Tigo in 2011 and Airtel in 2013. Since its arrival, mobile phone ownership rates have increased significantly, allowing for mobile money services to spread around the country. Rwanda has two mobile network operators: MTN (on behalf of Ubank Limited), which operates 54% of active mobile phone subscriptions and Airtel-Tigo Money (Airtel Mobile Commerce - Ghana), which operates 46%. An active mobile phone subscription is defined as a SIM card that generates revenue for an operator. As of June 2019, the number of mobile phone subscriptions had reached 9,040,327, which represented 74.8% of the population. Mobile money platforms have aided in extending financial services to individuals in rural areas disconnected from banking institutions.

Prior to COVID-19, the most prevalent use of mobile money services was to purchase airtime for phone calls. Very few users were sending or receiving money through mobile money platforms. The COVID-19 lockdown and pandemic led to more users relying on mobile money services to send and receive money and users began using mobile money services to pay for goods, services, and bills. Prior to the COVID-19 pandemic, transaction costs deterred mobile money usage, especially among poorer residents, but

the removal of transaction fees during the lockdown increased the number of mobile money transactions by 100%. Fees were reintroduced but had no significant effect on mobile money transaction numbers with their return.[32]

MTN Rwanda P2P fees

Min	Max	Fees
	<1,000	20
1,001	10,000	100
10,001	150,000	250
150,001	2,000,000	1,50042

(1 Rwf = 0.0097 US$ as of January 2022)

According to the National Bank of Rwanda (BNR), there were 16,111,250 registered mobile money subscribers as of the second quarter of 2021 and 6,129,624 active subscribers during the same time.[33] BNR also tracks the number of agents at a specific time, the number of transactions in a financial quarter, and the value of transactions in a specific quarter. These respective statistics for the second quarter of 2021 are 144,250 agents, 227,107,908 transactions, and 2,728,916 Rwandan Franc (Rwf). The value of mobile money transactions has increased from a total of 2.349 billion Rwf in 2019 to 7.177 billion Rwf for 2020, a 206% increase (BNR). The largest service provider is MTN mobile money services, which is operated by MTN. As of December 2020, it controlled 62% of the mobile money market in Rwanda, growing from a base of 2.8 million users to 3.2 million over the course of the year.[34]

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32   "Exploring the Use of Mobile Money Services among Tea SACCOs in Rwanda: Challenges and Opportunities (RESEARCH REPORT) | Digital Development | U.S. Agency for International Development," January 26, 2021, https://www.usaid.gov/digital-development/rwanda-mobile-money-report. 42 "MoMo Tariffs," MTN Rwanda (blog), accessed January 20, 2022, https://www.mtn.co.rw/momo/personal/momo-tariffs/.

33   "Rwanda 2021 Mobile Payment Statistics" (National Bank of Rwanda, July 1, 2021), https://www.bnr.rw/browse-in/statistics/payment-system-statistics/mobile-payment/.

34   "Rwanda: Mobile Payment Transactions Grow By 206%," MFW4A - Making Finance Work for Africa, February 23, 2021, https://www.mfw4a.org/news/rwanda-mobile-payment-transactions-grow-206. 45

Mobile money platforms are monitored by the BNR under the Payment Systems Law of 2010.[35] Over the past few years, regulations have continued to change in Rwanda to expand access and use of mobile money services. In 2019, national interoperability was fully functional, allowing for users to send money to users on other platforms.[36]

Geographical distance between users and agents has been cited as a hindrance to mobile money use. The lack of "float" (e-money balance, physical money, or bank account balance an agent has immediate access to for cash withdrawal or cash in demands) has caused challenges for agents dealing with higher rates of withdrawals and lower rates of deposits.[37] A concern is that mobile money platform users only use their accounts to receive money to immediately withdraw in cash. BNR requires non-exclusivity for agents, meaning agents may serve multiple mobile money platform operators simultaneously. Training and recruitment may then be enjoyed by competitors at no cost, thus creating incentives against large agent networks, which was an important factor in the success of M-Pesa in Kenya. Non-exclusivity has also created difficulty in monitoring fraud and agent misconduct. MNOs are responsible for agent training and agent liability.[38] The increase in mobile money platform usage has resulted in increased fraud attempts. The Director-General of Financial Stability at BNR, Peace Uwase, has declared that mobile money platforms must enhance security and increase customer awareness and recognition of fraud attempts to protect mobile money users and grow the use of mobile money services.[39]

35   "Exploring the Use of Mobile Money Services among Tea SACCOs in Rwanda."

36   "Rwanda: National Interoperability System To Be Launched Soon," Mobile Money Africa, July 28, 2019, https://mobilemoneyafrica.com/blog/rwanda-national-interoperability-system-to-be-launched-soon.

37   "Exploring the Use of Mobile Money Services among Tea SACCOs in Rwanda."

38   "Exploring the Use of Mobile Money Services among Tea SACCOs in Rwanda."

39   "Rwanda," February 23, 2021.

8

Expanding Digital Financial Services in the East African Community with a Gender Lens

Flora Myamba

Abstract

The uptake of mobile money is on the rise around the globe, in Sub-Saharan Africa, and notably in East African countries. The digitization of government to person (G2P) payments is rising, governments are using electronic payments to pay public sector salaries, pensions and other social benefits. Social protection beneficiaries tend to be poor, are often women, and carry a legacy of financial exclusion. It is thus difficult to achieve a significant expansion of digital financial inclusion in these countries without gender consideration. Despite the outstanding achievements in the digital world, women in East Africa face more significant challenges in gaining access to digital financial services than men. This paper discusses more general and specific barriers, including women's lack of technical know-how to make transactions, low levels of mobile phone ownership, unavailability of agents, high transaction fees, and poor network coverage. The paper further discusses potential strategies for expanding digital financial inclusion for women, including those in the agriculture sector.

Keywords: *Digital financial services, Eastern Africa, Gender lens, gender equality, women's economic empowerment*

1. Introduction and context

Given the rapid spread of mobile phones and more robust identification (ID) systems, many countries are now moving towards using digital technology to strengthen State capacity to deliver a wide range of transfers, subsidies, and services. As mobile technology has

found its way into the hands of those excluded from the formal financial system, about 1.7 billion people worldwide have leveraged mobile money to gain access to financial services (Demirgüç-Kunt et al, 2018). As of 2011, when the Global Findex was launched, only 51% of the world's adult population owned a financial account as seen in the Global Financial Inclusion (Global Findex) Database 2011. Subsequently, the 2017 Global Findex indicated that 1.2 billion adults globally had an account, taking the portion of financially included adults to 69% (Demirgüç-Kunt et al, 2020). The number of registered accounts in 2020 was reported to have grown by 13% globally to 1.21 billion (Global System for Mobile Communications Association - GSMA, 2021a). Active accounts (within 30 days) grew by 17% to 300 million; transaction volume grew by 15% to 41 billion; transaction value in US$ grew by 22% to US$ 767 billion; there were 9.1 million registered agents, an increase of 14%; and 4.8 million active mobile money accounts, an increase of 18% (GSMA, 2021a). The same report attributes this critical change resulting from changes in consumer behaviour, regulators implementing a more flexible Know Your Customer (KYC) process, and more relaxed on-boarding requirements for opening accounts.

Similar trends have been recorded for Sub-Saharan Africa despite the considerable difference in numbers across regions. In 2020, the GSMA (2021a) noted the following increases for Sub-Saharan Africa: registered mobile accounts (+12%), active-30 accounts (+18%), transaction volume (+15%), and transaction value (+23%). More moderate increases were noted in Central Africa and East Africa. East Africa, for example, grew its registered accounts to 293 million (+9%), active mobile accounts to 94 million (+16%), transaction volume to 18.6 billion (+10%), and transaction value to US$ 273 billion (+11%) accordingly, as illustrated below.

Digital expansion in 2020

Region	Registered Accounts	Active Accounts	Transaction Volume	Transaction Value	
Global	1.21 billion (13%)	300 million (17%)	41 billion (15%)	US$ 767 billion (22%)	
Sub-Saharan Africa	548 million (12%)	159 million (18%)	27.4 billion (15%)	US$ 490 billion (23%)	↑
East Africa	293 million (9%)	94 million (16%)	18.6 billion (10%)	US$ 273 billion (11%)	

Source: Author (numbers adopted from GSMA (2021a))

Since 2014, the share of adults with a mobile money account in East Africa has grown roughly twice as fast (9%) as the share of adults with an account at a formal financial institution (4%), according to Okello et al (2018). Kenya, for example, has demonstrated an impressive rapid expansion of the mobile market, marking an increase of 30% between 2009 and 2019, with anticipation for further growth to 58% by 2025 (GSMA 2020). Mobile account ownership has increased steadily compared to the other East African countries. In 2011, Kenya had 42% financial inclusion, which grew to 75% in 2014 and 82% by 2017 (Demirguc-Kunt et al, 2018). As for all countries in East Africa, most of these mobile accounts are owned by men. More discussion on the gendered nature of expansion in digital financial services is presented later in this paper.

The measures taken to promote digitalization, particularly by the Central Bank of Kenya (CBK), and to mitigate the effects of COVID-19 have contributed to expansion of mobile money. The CBK encouraged usage by reducing transaction fee. Through CBK mediation, mobile money providers, the government, and other service providers agreed to reduce fees for low-value transactions lower than Ksh 1,000 (approximately US$ 10) (Central Bank of Kenya, 2021; Zeidy, 2020). Fees for transferring funds between mobile money wallets and bank accounts were also waived to allow seamless money transfer. These temporary measures were taken to encourage mobile money, and to mitigate the impacts of COVID-19. However, it is doubtful they would have been taken except for COVID-19 given that nearly 90% of mobile money income is derived from transaction fees.

This expansion in digital technology is an opportunity for socio-economic growth in East Africa and beyond. There is already evidence of market-led developments in interoperability in East Africa. For example, eight mobile money operators (MMOs) in Tanzania interoperate; these are Airtel, Smart, Smile, Halotel, Tigo, TTCL, Vodacom, and Zantel. In 2015, the MMOs voluntarily agreed to interoperate, making Tanzania the first digital financial services market in a world where this had happened (CGAP, 2017). Also, in 2015, Vodafone and MTN announced that they were working to interoperate MTN Mobile Money and M-Pesa in East Africa. Ultimately, they aimed for Vodacom and Safaricom users in Kenya, Tanzania, the Democratic Republic of Congo, and Mozambique to make international transfers with MTN users in Uganda, Rwanda, Zambia, and vice versa (Techcentral, 2015).

The expansion in digital technology necessitates robust interoperability. Interoperability allows customers to transact conveniently and across networks, ideally at no extra cost. Two levels of interoperability are relevant: interoperability between mobile network operators (MNOs) payment systems and banks (i.e., transfers between mobile money accounts and bank accounts) and interoperability across the payment systems of different MMOs (i.e., transfers from a mobile money account with one MMO to a mobile money account with another MMO) (Argent et al, 2013). Inadequate infrastructure (electricity, mobile towers, etc) is one of the interoperability challenges. GSMA (2018) reports that 3.8 billion people remain offline out of which 1.2 billion are not covered by a broadband-capable network – majority of this uncovered population lives in the rural areas in developing countries.

While we document all these outstanding achievements in digital technology, women in East Africa face more significant challenges in gaining access to digital financial services than men. This paper discusses general barriers to women's financial inclusion, such as limited access to assets, resources, and services such as education and formal credit. Women's literacy levels are low; lower for rural women and poorer women (vs non-poor women) than urban women. Women's autonomy in making decisions over income and expenditures is constrained. Their ownership and control of long-term assets, including land, is limited and contributes to their continued disempowerment. Specific barriers are also discussed, including women's lack of technical know-how for making transactions, low levels of mobile phone ownership, unavailability of agents, high transaction fees, and poor network coverage, among several others. Cultural

practices and patriarchy largely contribute to the barriers. The paper further highlights potential strategies for expanding digital financial inclusion for women, including those in the agriculture sector. The author argues that a significant expansion of digital financial inclusion in East Africa can only be achieved if we look at the situation from a gender lens.

Defining digital financial inclusion

Financial inclusion aims to ensure all access to and usage of financial services. Borrowing from World Bank (2021), financial inclusion means that individuals and businesses can access valuable and affordable financial products and services that meet their needs. With fast-expanding technologies, millions of formerly excluded and underserved poor customers around the globe are moving from exclusively cash-based transactions to formal financial services—payments, transfers, savings, credit, insurance, and even securities—using a mobile phone or other digital technology to access these services (World Bank, 2021). Digital financial inclusion (DFI) involves deploying the cost-saving digital means to reach currently financially excluded and underserved populations with the above named formal (and informal) financial services suited to their needs that are responsibly delivered at a cost affordable to customers and profitable for providers.

Digitizing government to people (G2P) payments

Government payments made to its people, mainly through social assistance programmes, are tools for digital financial inclusion. According to the World Bank (2020a), the digitalization of government to person (G2P) payments is also rising. Governments increasingly use electronic payments (e-payments), particularly for public sector salaries, pensions, transfer payments, cash transfers, and social benefits. Tanzania piloted e-payments in 2016 at the national level through the Productive Social Safety Net (PSSN) programme and has recently scaled up, aiming to reach all beneficiaries (about 1.3 million households). G2P payments provide an important multifaceted initiative, particularly given that about 83% of the programme cash is paid to women who manage it on behalf of the household. Social protection beneficiaries tend to be poor and are often women carrying a legacy of financial exclusion. Digitizing G2P payments to beneficiaries of social protection programmes, particularly social assistance, has the potential to improve financial inclusion, gender equality (GE), and women's economic empowerment (WEE). Digitizing G2P social protection payments, which aim to create efficiency gains for the government, is also crucial in overcoming changes in technology and responding to shocks such as the COVID-19 crisis, where face-to-face interactions through cash payments must be minimized. Women are primary actors in the informal sector, and often victims as discussed later under section two.

This paper highlights G2P as one of the critical examples of government initiatives that address GE and WEE through provision of social assistance benefits to women, thus promoting their economic empowerment and well-being. The G2P initiative is, of course, only one part of a broader trend towards the use of digital technology,

whether for private payments (M-Pesa in Kenya) or to improve tax administration (ongoing efforts in India to link tax IDs to the unique identification number and to place a ceiling on large cash transactions) or (as in Bangladesh) to monitor the outreach of health workers to their patients. Furthermore, while the initiative may not be the government's primary objective, it is proper not to ignore its potential positive developmental outcomes.

Addressing gender-based inequalities and barriers to digital financial inclusion similarly becomes essential for more inclusive sharing of this opportunity (digital technology expansion) if we are to grow socially and economically as individuals, communities, and nations in the East Africa sub-region, Africa, and beyond.

This framing paper is developed entirely from a review of literature and documents relevant to the topic. Available literature was primarily on Tanzania, Kenya, and Uganda and relatively limited to Rwanda and other countries as such. Most of the examples and data presented lean towards these countries. It is also important to note that there is an asymmetry of information from these countries, hence the inconsistent/limited uniformity of certain information presented in the paper. The following section discusses several barriers to gender-inclusive financial services in East Africa.

2. Barriers to gender inclusive financial services

Despite important progress, the global gender gap remained at 9% for developing countries (Demirguc-Kunt et al, 2018). About 75% of the population in Sub-Saharan Africa lives in rural areas (World Bank, 2017), making financial inclusion much more challenging. Holloway et al (2017) note that 30% of females aged 15+ have bank accounts against 39% of males. Women in East Africa face challenges in gaining access to digital financial services than men, thus limiting their economic opportunities.

Generally, women have more limited access to assets, resources, and services such as education, credit, and technology than men. Their literacy levels are far from universal; the situation is worse for rural and poorer women (vs non-poor, or urban women). Women's autonomy in making decisions over income and expenditure is constrained. Cultural practices and patriarchy largely contribute to this situation. Their ownership and control of long-term assets, including land, are limited and this contributes to their continued disempowerment.

The specific barriers to women's limited digital financial inclusion in these countries include lack of technical know-how in making transactions, low levels of mobile phone ownership, unavailability of agents, high transaction fees, and poor network coverage. Women face more significant challenges than men in gaining access to financial services in several ways. The gender gap in usage of digital financial services (DFS) is higher and worsens faster than the gender gaps in mobile phone ownership, account opening, and individual capabilities (e.g. literacy). For example, in Tanzania, men and women use mobile money agents, insurance services, savings groups, and banks as service providers. However, mobile money is more common among men than women; 63% versus 50%, respectively (FSD Tanzania, 2017).

Highlight of women-specific constraints in East Africa

What are some of the specific barriers to GE and WEE? This section deep dives into a select number of general and DFS-specific barriers to GE and WEE in East Africa.

General barriers to gender equality and women's economic empowerment

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General situation: Summary

- Gender Inequality Index is high

- Illiteracy levels are high

- Rural-agricultural poverty is high

- Informality/labour market exclusion is high

- Ownership/control of assets/land is low

- Time poverty (unpaid care burden) is high

- Access to health/insurance/ devices is low

- Disaggregated data on gender equality is low

- Stigma and discriminatory cultural norms are high

The Gender Inequality Index (GII) is one of the critical expressions of existing gender-based inadequacies that need addressing. It is a composite measure reflecting inequality in achievement between women and men in three dimensions: reproductive health, empowerment, and the labour market. Overall, the Gender Inequality Indexes for East African countries represented by Tanzania, Kenya, Uganda, and Rwanda are high, as presented below. Of the four East African countries, Kenya (126/189) is better off as it falls under the Medium Human Development category (preceded by "Very High" and "High" categories). In contrast, the rest fall under the Low Human Development category. Tanzania is the worst of the four (140/189), and the Gender Inequality Index is reported to have worsened in 2020 to 163/189 (UNDP, 2020).

Female labour force participation rates are generally lower compared to male participation. The gap is generally wider among those with higher levels of education. In Tanzania, for example, women participate less with rising education levels (widening the gender gap); by 2014, 67.1% of females with university education were active in the labour market compared to 83.2% of university-educated males (Idris, 2018; ILFS, 2014).

UNDP Gender Inequality Index for 2019

	Gender Inequality Index Value/Rank 189 countries		Adolescent birth rate) (births per 1,000 women aged 15-19)	At least has secondary education (% ages 25 and older)		Labour force participation	
Year	2019		2015-2020	2015-2019		2019	
				Female	Male	Female	Male
Tanzania	0.556	140	118.4	12	16.9	79.6	87.3
Kenya	0.518	126	75.1	29.8	37.3	72.1	77.3
Uganda	0.535	131	118.8	27.5	35.1	67	73.9
Rwanda	0.402	92	39.1	10.9	15.8	83.9	83.4

Source: Author (Numbers adopted from UNDP 2020: Gender Inequality Index: Human Development Report

Limited access to and ownership of assets
According to Kusimba (2018), gender norms are barriers to women's use of finance. Digital finance offers women increased control over money, shifting restrictive gender norms. However, there is still much work to achieve gender equality in financial services. Many women do not have formal financial services due to barriers to accessing digital skills, financial capability, mobile phones, and identification documents.

In Tanzania, women have limited ownership and control of long-term assets, including land, contributing to their continued disempowerment. Women's land and house ownership is still low; with only 24% of women owning land either alone or jointly with someone, and a mere 9% of women having sole ownership of a house or land as of National Bureau Statistics 2018 (NBS, 2018) as argued by Madaha (2020). Men own 18 times more livestock, and women have particularly low ownership of more lucrative livestock assets. Men still make most decisions; only 35% of women aged 15-49 had decision-making power over their health care, visiting family and friends, and significant household purchases (NBS, 2017). Women independently make only 12% of decisions over when and what to sell. The prevailing cultural and social norms play a significant role in determining bargaining power within households and control over resources and assets.

Although much has been done to remove legal barriers, women are still subject to discrimination based on customary law or cultural practices (Ngunjiri, 2018). Similarly, in Kenya, religion and cultural norms hinder women from effectively accessing formal financial services (Abdu et al, 2018). Currently, some cultures force women to re-marry in the family of their deceased husband following the death of the husband. This is purposely enforced to limit women's right to own/inherent properties such as land (Ngunjiri, 2018); likewise, these practices limit women's ownership of collateral for loans as one means of financial inclusion. However, the use of DFS has minimized the need for collateral for small loans, since the credit history is available to the digital service providers. Thus, promoting gender inclusive DFS will contribute to addressing this challenge.

Unpaid care work

A study by Oxfam in Nairobi finds that women in Sub-Saharan Africa (SSA) countries such as Kenya spend around five hours a day on care activities, whereas men spend just one hour a day (Oxfam, 2019). Women in Tanzania are crowded into unpaid domestic work—and spend much more time (87%) than men (47%) on this work as more men focus on market work providing services for income (33%) than women (21%) (ILFS, 2014). Most poor women (53%) are employed as unpaid family helpers, followed by those working on their farms (37%), suggesting that poor women have more limited economic opportunities (NBS, 2016).

Digitized access, usage, and quality of formal financial services

Most financial institutions lend money to women who have collateral, have shown their business experience, and have a credit record as key to credit supply decisions (Bouffay and Shallal, 2013). Koch et al (2014) observed that women's lack of documentation and inability to own the assets they can use as collateral had been the central obstruction to financial inclusion (Fletschner and Kenney, 2011; Deere et al, 2013). According to Klapper and Dutt (2015), some women try to create a credit history through digital transactions where they pay their bills and other utilities to become eligible to access loans from financial institutions. One example of such a model is M-Shwari in Kenya, which offers savings and loans (Cook and McKay, 2015). Tanzania has a similar product, M-Pawa. According to Aduda and Kalunda (2012), informal access to and usage of financial services complements each other, including them in the financial inclusion framework.

The GSMA (2018(b)) report, which is Tanzania Rural Coverage Pilots Performance Report, shows that credit, payment, and digital savings services can offer women in low- and middle-income countries a critical link to the formal economy and access to greater economic security and personal empowerment. This shows when they can pay dividends for their families in better health and education. In Kenya, for example, poverty dropped, savings rose, and most women left agricultural jobs for more responsible, higher-paying positions in business or retail for women-headed households as a result of mobile money account ownership.

Kenya has demonstrated a rapid expansion of the mobile money market, showing an increase in account ownership over time compared to the other East African countries. As for all countries in East Africa, most of these accounts are owned by men. For example, whereas the ownership of mobile phones for males in Kenya was 46% (2011), 79% (2014), and 86% (2017), the numbers were lower for women with 39% (2011), 71% (2014) and 78% (2017) (Demirguc-Kunt et al, 2018). FinAccess (FSD Kenya, 2021) reports a lower growth rate in the uptake of formal financial inclusion among the female and male population between 2019 and 2021 compared to between 2016 and 2019. Even when slow growth rates have been experienced, the gap between males and females improved to 4.2% in 2021 from 5.2% in 2019, implying rising equality among men and women.

For Uganda, the 2018 Finscope study (FSD Uganda, 2018) showed that 78% of the adult population is financially included, with 78% male and 77% female. The same source reports that financial inclusion in Uganda is significantly skewed towards adults from urban areas – 86% (3.8 million) of urban adults are financially included versus 75% (10.6

million) of those residing in rural areas. In Uganda, the gender gap in mobile phones is similar to other East African countries. The DFS enabling women's access to digital financial services is a great success for the private sector to get involved in gender equality.

About 52% of adults (9.7 million) have mobile phones and 10% (1.9 million) have access to the Internet; of these numbers, male adults are significantly more likely to have mobile phones (58%) than female adults (46%). Male adults are more likely to have access to the Internet (13%) than female adults (8%) (FSD Uganda, 2018). The uptake and usage of formal service providers in Uganda are skewed towards men, where 63% of males and 54% of females are formally served (FSD Uganda, 2018).

The Alliance for Financial Inclusion (2012) highlights that digital financial services are essential to determining financial inclusion in Uganda; this will be achieved through appropriate regulatory frameworks that promote innovation and the committee to support and harmonize other regulatory bodies. As an example, Pitcaithly et al (2016) report that Airtel-Uganda has collaborated with the Grameen Foundation to design a digital solution for women's savings groups. This aims to improve accessibility and protection of funds where three different people in the group must enter their personal identification numbers (PINs) before withdrawals can be made. This model could be adopted to provide extra protection to women and save them from being abused by other members.

Karlan et al (2016) argue that mobile money providers do not have the business models to include these groups in Uganda or have incentives to address crucial social barriers. Rollouts of products such as Automated Teller Machine (ATM) cards may not expressly increase access for women. They can even have obstinate effects given the other factors such as convenience to own and access the existing bank account. Bruce and Beinomugisha (2018) insist that women encounter problems related to accessing and using financial services due to lack of collateral and low literacy rates, which discourages rural women from accessing and using financial services since they cannot read and write. Matthews and Mnyasenga (2016) exploratory study on oral financial literacy and numeracy in Tanzania and Cambodia found evidence of relative deficits in several skills essential to financial inclusion, including decoding multi-digit number strings, savings, and planning for the future in cash. The study also finds evidence that oral strengths offer cognitive scaffolding for learning new skills, and suggest that it should be leveraged on in future, in smartphones and financial inclusion more widely.

A common factor across all countries contributing to the limited ownership of accounts is lack of funds. In addition, some countries charge a premium for maintaining an account, making accounts unaffordable, or offer limited access to financial services, which affects the account ownership patterns. In other cases, lack of documentation to meet Know Your Customer (KYC) requirements affects account opening. A more important barrier linked to lack of trust in financial services is where a woman relies on an agent or relative for help in making transactions, thereby exposing their secret passwords, the phone, and the cash itself.

In Tanzania, both men and women use a range of financial services, although mobile money is more common among men than women – 63% versus 50%, respectively. The share of adult females who own a cell phone is 73%, 9% less than male ownership (GSMA, 2018(b)). Fewer than 70% of poor women live in households with a cell phone, compared to 90% of non-poor women.

Access to and use of bank accounts and necessary identification

According to Finscope (FSD Tanzania, 2017), men are more likely than women to save in Tanzania: 51% of men saved in the most recent year versus 42% of women. Furthermore, more men (86%) than women (77%) owned mobile phones. Over the years, financial inclusion in Tanzania has been enhanced. This has made much progress in the application of mobile financial services and has moved women from the traditional way of keeping money to the digital financial platform. Through the digital platform, it has been easiest for them as now they do not need to go to the bank and make long queues. A transaction can be done where one is. An account holder can ask for account balance, make a utility payment, transfer money, and purchase airtime without physical presence in the bank. Although there is a digitalized financial platform, gender gaps exist on how to use and access the financial services as women are less likely to use financial services (Were, Odongo and Israel, 2021). Only 16% of women are saving formally, only 15% of women have access to insurance, and only 7% borrow from financial services providers. Only 5% of poor women have a bank account compared to 31% of non-poor women. Almost 70% of poor women live in households with a cell phone, compared to 90% of non-poor women (NBS, 2016).

Kenya achieved significant growth in ownership and registration of digital accounts in 2019 compared to 2016, reflecting high adoption of digital accounts. The 2019 FinAccess study shows that the gap in mobile money usage between the two genders narrowed to 7% in 2019 from 8% in 2016 (FSD Kenya, 2019). Although the financial access gap between males and females is closing, imbalances persist as the data shows that access to financial services by males is higher than their female counterparts. The number of individuals who can access formal financial services has risen from 26.7% in 2006 to 82.9% in 2019 (FSD Kenya, 2019). Despite this growth in financial access, usage of banks is still low, with only 29.6% being actively engaged in traditional banking whereas 25.3% are engaged in mobile banking (FSD Kenya, 2019). Literature also points out that two-thirds of unbanked adults in the country are women (Demirgüç-Kunt et al, 2018).

FinScope Uganda (FSD Uganda, 2018) shows that for Uganda, 54% (10 million) of adults reported to have saved in 2017-2018. About 50% of savers saved informally through savings group/ Village Savings and Loans Association (VSLAs) or giving it to someone in the community to keep safe, and 34% of savers saved with formal financial institutions, on their mobile phones, with commercial banks, saving and credit cooperative societies (SACCOs), or micro finance institutions. The same source reports that more males (22%) than women (15%) saved with formal service providers, with females significantly more likely to rely on informal mechanisms than males 26% (3 million) versus 17% (1.5 million).

Onboarding new accounts require individuals to provide documentation to meet Know Your Customer requirements. These requirements are much easier to meet where individuals have a secure form of national identity. A particular challenge in Tanzania has been low penetration of national identity documentation. In 2016, FSDT supported the National Identification Authority (NIDA) to disseminate national identification numbers to the entire adult population. NIDA raised the number of issued identity card numbers from 2.7 million in 2016 to 18.9 million (11.9 million females and 7 million male) as of July 2021. The Tanzania National Audit Report (2021) reports an increase in registration from 8% in 2013 to 75% in 2019/20. Despite this success, the issue of national identity cards is lagging, with only 19% of citizens having been issued identity cards, which creates challenges for account opening.

General literacy/education status

Female illiteracy in Tanzania is higher in rural areas (35%) and among the poor (42%) (NBS, 2016). On average, poor women have about one year less of education, 6.3 versus 7.3 years, a difference similar to that seen between poor and non-poor men (NBS, 2016). The situation is worse for rural women who lag urban women in educational attainment. However, the gender gap in literacy shrank by 5% between 2002 and 2015 (World Bank, 2018).

Access to financial services in Kenya involves numerical and writing skills. Therefore, participating individuals need to have basic education to access both the traditional banking system and digital financial services. FinAccess shows that 98.6% of those with access to formal financial services by households have a member who attained a tertiary level of education compared to 60.7% without education (FSD Kenya, 2019). Only 55% of the total population of Uganda has attained primary education, with 23% secondary education and 1% tertiary education (FSDU, 2018).

Digital literacy

The uptake of mobile phones is generally low in rural areas. In Tanzania, for example, the uptake is lower in rural (53%) than in urban areas (81%) (FinScope Tanzania, 2017). In 2016-2017, only 30% of mobile money recipients for the national level Productive Social Safety Net (PSSN) programme could withdraw the money themselves. Close to half relied on mobile money agents while 27% relied on others, including household members, friends, and neighbours) (IPSOS, 2018). Limited capability or know-how was the main barrier to mobile phone uptake and high transaction fees and distance to pay points. Currently, mobile phone uptake is at 49%, on average 50% for female beneficiaries, leaving 51% of beneficiaries as e-payment recipients (FSDT-unpublished documents).

In Kenya, 39.6% of those surveyed in the 2019 FinAccess Survey relied on their knowledge, and 34.7% relied on family and friends for financial advice (FSD Kenya, 2019). Financial advice by gender data indicates that 40.5% of males and 38.7% of females relied on their knowledge, whereas 37% of females and 32.3% of males receive financial advice from friends or family. The survey suggests that 42.2% of the rural population depends on their knowledge in decision-making on financial matters compared to 35.8% in urban areas. More males (63.7%) than females (52.2%) read and interpreted transaction costs correctly in a short messaging service (SMS).

Gender differentiated effects of COVID-19

Women have been disproportionately affected by the COVID-19 pandemic economically and health-wise due to the type and nature of employment they engage in:

- Women are over-represented in vulnerable forms of employment, particularly in informal employment, making them even more vulnerable due to business slow down and income uncertainties.

- The pandemic has adversely affected the informal sector (laid off business uncertainties).

- Women dominate in client-facing jobs, including domestic work, retail, and hospitality, which could be most challenged by social distancing restrictions while exposing them to health risks and infections.

According to Koehler (2021), women are less likely than men to access social protection benefits, such as unemployment insurance or health coverage (UNDESA, 2020). Women's and girls' care burdens have increased due to the pandemic, as they care for sick family members and children affected by school closures (UNDESA, 2020). The COVID-19 crisis could push additional people below the national poverty line (FSDT, 2021–unpublished).

Overall, mobile money operators (MMOs) in Sub-Saharan Africa (SSA) have engaged with businesses and governments on initiatives to alleviate the impact of the COVID-19 pandemic on citizens. MNOs have provided mobile money transaction fee waivers (as noted in Kenya), discounts on data tariffs for educational and health sites, and provided cash and equipment donations to support the most vulnerable in society during the pandemic and further contributed to economic recovery efforts (GSMA, 2021(a)). The same source reports that the mobile industry supported almost 3.8 million jobs (directly and indirectly) while making a substantial contribution to the funding of the public sector, with US$ 17 billion raised through taxation.

Digital skills should be enhanced to improve business and savings. Therefore, it is crucial to support basic digital technology skills on livelihoods, market information, linkages, and digital savings. They are essential when distancing is required, considering women's digital capability challenges.

Overall, women with access to DFS may better control their incomes and undertake their productive expenditure (Islam et al, 2014; Alam, 2012; Ashraf et al, 2010). According to Panda (2014), DFS may also help them have freedom facilitating stepping out of abusive relationships. Inadequate access to DFS will continue to exacerbate the gender gap despite the large number of people surrounding them using the financial services. Greater gender inclusion in DFS may unlock the potential for enterprises to develop in communities where individuals have access to financial services and are more able to plan and control their income (Ruiz, 2013). Households are managing to save what they earn and invest their savings for other developmental issues (Schaner, 2016b).

Summary of key constraints for women's DFIs

Before discussing potential strategies for expanding digital financial inclusion for women in East Africa, it is important to summarize critical individual and structural barriers to digital financial inclusion. Constraints exclude people who do not have the means to access digital financial services. Digitally excluded populations lose the opportunity to benefit from customized financial services and are less able to improve livelihoods, manage risks better, and enhance their living conditions. The key constraints that contribute to the widening of the digital financial exclusion gap are summarized below. All in all, financial products and services should be appropriate and match the client's needs. The client should also know what is available, affordable, and accessible.

Summary of key constraints in digital financial inclusion

Challenge/fact	Solution/Intervention
Low levels of education for women	Design simplified digital technology models to suit illiteracy and numeracy levels
Limited technical know-how of making transactions, hence over-reliance on MNO agents to make transactions (from government or other sources)	Develop digital applications and build capacity for financial literacy and entrepreneurship skills
Value proposition for digital financial services among beneficiaries: Fintech providers have made little effort to tailor use-cases for the low-income market. Much focus has been on the easier to reach and more profitable market populations first	Design and roll out multiple digital products and use cases particularly relevant to female through active participation in product design
Low levels of phone ownership: Among poor households (including urban ones), there are few smartphones, and even the feature phones are largely owned by men	Encourage phone purchase through negotiated deals with MNOs
High transaction fees; For example, Tanzania has the highest fees with recent increase verses. In 2020, Kenya negotiated-reduced rates	Financial capability training - eAwareness. Design a product that has zero cash out charges. Central Bank of Kenya, service providers and MMOs led by Safaricom, agreed to waive some transaction fees for low value transactions
Weak regulatory environment and consumer protection: To date, the regulatory environment and consumer protection provisions remain too weak to provide security to the poor (and indeed many of the not-so-poor)	Gender responsive policies and laws. Note Kenya's recommendations in the "Gender Review of Financial Sector Laws in Kenya" in Wambua and Ndolo (2021)

3. Potential strategies for expanding digital financial inclusion for women

The strategies for expanding digital financial inclusion must be gender-responsive to minimize the risk of excluding women, particularly in the largely poor and agricultural East African countries. Similarly, the current African Economic Research Consortium (AERC) intervention research should consider exploring women's DFS constraints and addressing them if women are to achieve more positive development outcomes, both short-term and long-term, and ultimately contribute to the growth of their countries, the region, and beyond. Gender considerations should cut across all the research segments of this (and other) AERC projects. The following sections highlight key strategies for expanding digital financial inclusion for women in East Africa in line with the discussed constraints. The list is not exhaustive.

3.1 Fintech innovations and use cases

Mas and Almazan (2014) argued that for mobile money to deliver on its promise, it needs to prove that it can support a wide variety of products and use cases. More use cases drive broader appeal to more customer segments, generate more transactional volume and, in turn, justifies the required heavy investments and sustains denser cash merchant networks. More products and services with differentiated pricing present opportunities for providers to create more customer value. Exploring and investing in a broader range of essential socio-economic activities in a country will enable mobile money providers to gain a much higher level of durable impacts. The authors presented an ideal high-level product valuable typology for addressing the digital exclusion of the most marginalized due to limited fintech innovations.

Monetary transactions			
Real time transfers		*Inter-temporal financial obligations*	
P2P One-to-one	B2P Bulk payments One-to-many	Credit	Insurance
C2B		*Savings*	
In store	Remote	Individual	Group-based
Merchant Cash Payment in/out	Online Bill payment Purchases Many-to-one		
Key: B=business; G=Government; P=Peer (it can be an individual or a business); C=Consumer (representing individual persons)			

> The authors separated financial transactions (more typically associated with banking) from non-financial transactions (typically thought of as payments), arguing that financial transactions fit into an institutionalized, self-contained, inter-temporal pattern of purely financial obligations, and can be split by the direction of the obligation (savings and insurance vs credit), whether the obligation is fixed or contingent (savings vs insurance), or whether the obligation is held on an individual or group basis. Non-financial transactions are generally a real-time discharge of a business or personal obligation. They can be classified by the nature and relationship of the parties (P2P, B2C, or C2B), the number of parties involved (1:1, 1 to many, or many to 1), where the transaction takes place (in or out of store), and the nature of the underlying business transactions (products, digital content or cash). Of course, product definitions may not reflect such sharp boundaries, and the customer uses those products even less. However, it is helpful to define broad product categories along these lines. p.2.

High level-product typology
Source: Adapted from Mas and Almazan (2014)

The design and rollout of these digital products and use cases should address women's constraints and ensure relevance through active participation of both men and women in product design. Use cases should be contextualized and based on understanding the specific needs of the digitally excluded population.

A simple consideration of the basic human needs of food, shelter, and clothing, for example, can be a good starting point to determine how the different groups of the population (potential customers) are spending to meet these requirements. Therefore, one key question should be: how can financial service providers partner with entities in these sectors to create value-added products and services and make them relevant to specific groups? Essential also will be to differentiate the needs of the rural poor and vulnerable as women from other higher-income segments; what extras beyond the basic requirements do those groups spend on? What other value-added services can be created? What can other use cases be relevant and explored? Who are the potential partners?

Digital financial inclusion in agricultural value chains

Developing necessary digital finance for agriculture are key use cases for improving the sector, particularly given that agriculture is the largest employment sector for all East African countries. More women than men (around 49 million smallholder producers) are employed in the sector (around 79% more women are employed than men in Kenya, 84% in Uganda, and 63% in Tanzania (World Bank, 2020(a)). Nevertheless, this sector faces the critical constraints discussed in the paper. Lately, there have been efforts to expand digital financial services in agriculture (m-agri). Achieving m-agri and related use cases facilitates subsequent growth of other components of financial services. One such component is access to credit, fundamental to agriculture value chains. Innovations are building programmes such as m-agri, m-health, m-water, m-power, etc. However, so much is yet to be scaled up due to lack of data-sharing and analytics that could confirm the relevance and impact of the initiatives and make the services relevant to their customers' everyday lives (Nanjero et al, 2017).

Umati Capital (UCAP) in Kenya is one good example of an m-agri initiative. This non-bank financial intermediary focuses on providing supply chain finance across various value chains, weighing in on technology to provide financing to small and micro enterprises (SMEs) that supply to their corporate trading partners. In the dairy sector in Kenya, UCAP developed mobile applications and used them to make faster lending decisions, capture data, and inform their disbursal of smallholder farmer loans via mobile wallets for each stage of the value chain. The pilot phase results with dairy farmers were promising for a scale-up (Nanjero et al, 2017). However, evidence for impact is unavailable.

Several agricultural initiatives have the potential and opportunity for expanding digital financial inclusion for majority of poor women and youth. Aiming at unlocking access to finance and better financial management tools for female farmers and youth farmers in Tanzania, FSDT has, over the past few years, coordinated and supported both agricultural and financial sectors in delivering financial services for farmers' agriculture value chains in Tanzania. Examples of potential agricultural use cases for smallholder farmers in Tanzania that are being tested mainly in collaboration and support of FSDT (according to FSDT 2021 internal reports) and have the potential for expanding digital financial inclusion are:

- Agricultural inputs (with digital financial product/tool); at subsidized or lower cost with payment plan, e.g., M-Koba in Tanzania; digital agri-wallets and commitment to savings systems, e.g., M-Koba in Tanzania; likewise, smallholder farmer payment solutions facilitating agri-business payments to farmers, government to the farmer, farmer to inputs suppliers.

- Purchase and sales, green finance, blue economy, renewable energy loans, regular gas loans, etc are also potential models. Fit4AG provides a financial and agriculture sector partnership focused on value chain analysis, investment case business development, and capital mobilization for short, mid, and long-term financing in high impact value chains. Increased research and insights on agricultural value chain financing were completed, such as a study on the soya value chain, and an investment business case was developed. The investment business case is used to mobilize capital to unlock the soya value chain.

- Smallholder farm products insurance (e.g., digitally enabled index weather, precipitation, pest insurance). Agriculture Insurance in Tanzania, for example, is a partnership that facilitated the design of a crop insurance product/solution. This was developed through FSDT, supporting the National Insurance Company (NIC) in the mapping, development and launch of the product in 2019.

- Affordable/subsidized health insurance plans, e.g., Ushirika Afya (Cooperative Health) in Tanzania, which provides farmers with insurance, is a model potential for further exploration and could be compounded with other forms of digitalized productive livelihoods.

- The model provides agro inputs through agro dealers

- Digital wallet (M-Shwari-Kenya, M-Pawa, Tanzania, etc)

- Potential to replicate to other agricultural crops (cotton, coffee, etc)

- Brings MNOs to have them take/use opportunity

- Mfumo Jumuishi, a rural agriculture financial model in Tanzania, addresses the challenges of financial inclusion of rural farmers by linking smallholder farmers and financial service providers through agricultural marketing cooperative societies. Mfumo Jumuishi reached 801,228 farmers to access financial services through four value chains (cotton, coffee, edible oils, and cashew nuts).

- Approximately 10,000 farmers have taken up health insurance. Ushirika Afya, and the National Health Insurance Fund (NHIF) are partnering with many banks to deliver the solution to more farmers.

- The Tanzania Mercantile Exchange (TMX) enables farmers in the cotton value chain to market their produce. Farmers are able to see an increase of 1,000 Tanzania shillings per kilogramme of cotton.

These solutions were deployed in the market in the past three years, but their impact is yet to be measured.

Generally, for all agri-models to unlock barriers in DFI, funds should be injected, and the models compounded with other well-being interventions such as health and education, while linking to increased productive livelihoods. Most of these models are yet to be thoroughly studied/piloted and brought to scale. It is also essential to link the smallholder farmers to local and international markets and build a coalition and platform to improve regional trade and agri-marketing for women and other producers. It is also critical to improve access to accurate and timely information and data, build/strengthen valuable business/stakeholder networks for smallholder producers and SMEs, and digitize critical trade-related processes, including those related to compliance, quality assessments and certification.

Potential partners for research and coalition building include FSDs, agri-CSOs, agri-banks, TradeMark East Africa, MasterCard/Visa, IFC, UNCDF, MMOs, Fundación Capital, business associations such as horticulture associations, and chambers of commerce.

Expand digitization of VSLAs and savings groups

Expanding digitization of Village Savings and Loans Associations (VSLAs), Village Community Banks (VICOBA), and other savings groups and associations is crucial. This can be achieved by developing digital financial capabilities among potential beneficiaries by providing knowledge and skills and ensuring they practice them. It is helpful to integrate training and awareness about risks associated with digital transactions in digitization. In the past decade, Fundación Capital, for example, conducted a few pilots on digital savings in the region while linking with livelihoods enhancement. In Tanzania, Fundación Capital notably conducted a pilot through the Productive Social Safety Net (PSSN) programme, of which 83% of the programme cash benefit is paid to women. Evidence of impact is unavailable for this paper.

A study by Ng'weno et al (2018) in Rwanda documents that microfinance and loan groups effectively increase women's savings and income generation. Their effects lie in the short transformation of livelihoods and removing households from poverty. Businesses owned by women are practiced in a more complex location, which even when generating more income sell cheaper products. On the contrary, men sell their products in higher-value sales locations, which are situated near banks and other businesses.

We should not leave men behind in VSLAs and other savings groups. It is argued that gender cannot leave behind financial inclusion regarding money borrowing and saving. Men tend to have much more access to financial services than women because of their income and asset ownership. Being a woman limits the possibility of getting financial services due to the inferiority complex of low income and lack of business experience, lack of financial education, and low income. Practitioners should explore means to complement the digital skills and borrowing capabilities and behaviours of men to narrow the gap being experienced by women.

Improving digital capability

Technology can be used to improve digital capability; for example, it is possible to develop digital financial applications and use technology-enabled solutions to help digitally excluded populations better understand their financial options. As Matthews (2016) argued, oral learning models are strong, particularly for attaining new skills. Given women's accounts of illiteracy presented throughout this paper, we can suggest that oral models be applied more widely for learning smartphones and financial inclusion skills.

Digital technology know-how is the primary source of the problem. Technology can encourage affordable products (and assets) more effectively and efficiently, promote self-esteem and confidence among users, and transition from reactive to proactive decisions. According to Roessler et al (2021), the initiation and use of mobile phone money services have significantly improved access to formal financial services. Women who are married are less likely to access banking services and mobile money services than men. Women instead save their money at home or in savings groups.

Increasing mobile phone ownership

Low mobile phone ownership among women and poor digital and financial literacy can complicate women's adoption of digital payment methods over manual cash transfers. Explicit design choices through Human-Centred Design (HCD) approaches can address various challenges and adaptations to social protection payments for vulnerable groups. Collaborations are being explored/expanded in the region and are making a difference. Examples include M-Kopa in Kenya, which partnered with Safaricom and Samsung to launch a smartphone pay-as-you-go solution. The offering appears to have been successful and spurred the company's entrance into Nigeria. Safaricom partnered with Google to launch an affordable 4G-enabled smartphone that customers can pay for in installments.

Easy purchase options can improve choices for women; however, they should not distort household decision-making and compromise with intra-household relationships, e.g. whether to buy a mobile phone or other household needs, including meals, health, and education.

Weak regulatory environment and consumer protection

Regulatory environments and consumer protection provisions are too weak to provide security to the poor (and, indeed, many of the not-so-poor). There are no clear accountability procedures and grievance mechanisms. For example, many have lost money when making transactions. In many markets, abusive lending issues are common, with no clear accountability or redress procedures. Limited knowledge and awareness among most women, compounded with digital illiteracy, already guarantees vulnerability and demand for legal protection.

A recent review of gender in the financial sector laws of Kenya by Wambua and Ndolo (2021) argues that the rapid uptake of mobile technologies and innovations, in line with government initiatives and policies, has contributed to increased financial inclusivity and narrowing of the gap. However, legal and non-legal constraints towards women's financial inclusion remain. For example, Kenya has made impressive strides in reducing financial exclusion for women through gender mainstreaming in its finance and finance-related laws, but gender equality is not fully achieved. The authors call for more gender-responsive formulation and implementation of policies and laws if women's empowerment and economic growth are to be achieved.

Expanding the D3 (Digitize, Direct, Design) framework

Digitization of G2P payments presents an opportunity to accelerate the closure of the gender gap in digital financial inclusion and amplify women's economic empowerment outcomes through active usage of digital financial services. According to the Bill & Melinda Gates Foundation's D3 Criteria (Chamberlin et al, 2019), women's economic empowerment can lead to better outcomes for children and the community, more significant investment in women's human capital, and more outstanding women's social capital.

The D3 Criteria or D3 Framework highlights crucial elements needed to boost women's financial inclusion and realize the vision of women's economic empowerment by designing, digitizing, and directing programme (cash) benefits to women. A D3 assessment can be used to flag areas expected to enhance the results for GE and women's economic empowerment and those that may be barriers to change unless effectively addressed.

Digitize criteria

Digitization refers to a payment system whereby payments are received electronically. Digitization offers the possibility of scale-up of cash transfer payments at low cost, especially to people who are located remotely, and technical tweaks, behavioural nudges and interface upgrades. It provides new possibilities in terms of two-way communication and recourse. A digitized Productive Social Safety Net (PSSN) that promotes women's economic empowerment (WEE) should be:

- Reliable: Payment reliability (amount, frequency, and timing), systems reliability, and communications (customer can count on regular communications that notify them of any changes/updates to payment terms).

- Accessible: Accessing the payment should not be burdensome in terms of time, convenience, and/or cost for programme participants.

- Flexible: The payment options should provide choice and control of when and how participants receive the payment. These should allow space for trial and error, so that recipients can learn the system and their options.

- Secure: Data privacy, security and fraud protection are all components of security, which mitigate consumer risks and ensure safe provision of digital payments to women.

Accountable: The women are aware of their rights; they are respected by the programme, they can access well-functioning recourse, and ultimately have agency. All participants have the right to be treated in dignity and respect.

Direct criteria

The principle here is simple: "one woman, one account." Direct payments into an account held by the beneficiary, who has control over the account, which are registered in their names and to which they have direct access. The Direct principle is designed to enhance women's prospects for control and to mitigate the risks of having funds appropriated by other family members.

We aim to learn what types of accounts allow for full realization of the digitization and design principles. Questions we expect to test include:

- Can we achieve our objectives with limited functionality accounts or are full purpose accounts required? What are the tradeoffs when considering limited mandate and fully functional accounts?

Does it make an impact difference if women receive government transfers and /or social protection payments and receive them into their account?

> **Design criteria**
>
> The programme should be designed in ways that enhance prospects for economic empowerment of programme participants. What is appropriate and feasible will depend on the specific context, but dimensions and aspects that should be explored would be expected to include the elements below. Three broad categories of design questions are relevant: ensuring appropriate coverage, maximizing benefits through complementary services and linkages, and avoiding adverse effects.
>
> Generally, e-payments can be made more gender responsive by:
>
> - Offering simplified, low-cost accounts to reduce women's barriers to accessing payments and increase bank account ownership among women.
>
> - Allowing more flexibility in the requirements for official documents (e.g., birth and marriage certificates) required to open bank accounts. Social protection schemes can link beneficiaries to complementary registration programmes and/or subsidize the costs of obtaining documents.
>
> - Adapting e-payment administrative procedures to the financial and technical literacy levels of rural women and providing women with training support to ensure their effective use of new technologies. In some cases, programmes can provide women with free mobile phones to reduce technological and cost-related constraints.
>
> - Ensuring that new female customers are treated fairly by banking institutions and have sufficient financial skills to be able to understand and trust digital financial services enough to adopt them.

The criteria are guides that need to be adapted to the local context as appropriate. Each of the three areas of D3 has a set of criteria therein and is accompanied by elements ("core enablers") and cross-cutting issues that impact the ability of a programme to achieve its goals.

Digital transfers of social protection payments are potent tools for enhanced women's economic empowerment. Increasing women's ownership and usage of accounts through G2P programmes could be transformational. It can provide women with independent access to predictable income streams. Digital payment can give women greater control over how the money will be used, mainly if linked to a stored-value product such as an e-wallet. Baur and Zimmerman (2016) argue that at least five common consumer risks in digital payments can impede their chances at financial inclusion: inability to transact due to network downtime or service unreliability; insufficient agent or ATM liquidity; complex user interfaces and payment processes; poor or no recourse mechanism; and fraud that targets the recipient. These risks need to be mitigated through legal/policy and programme interventions to build people's trust, confidence, and value in digital payments and essential financial services (Baur and Zimmerman, 2016).

4. Recommended questions

To summarize, a country-specific situation analysis of women's access to digital financial services and its contribution to their economic empowerment should consider the following questions:

1. What strategies can facilitate affordability and accessibility, including reducing transaction fees and device prices? Can governments negotiate fees with MMOs to reduce costs to the end-user, who always carries the increasing cost burdens? Are there affordable payment plans through MMOs so that once ownership of mobile phones is achieved, these women can practically utilize the devices for their benefit?

2. How can we enhance women's productive livelihoods through digital financial technology? Can we test/pilot digital products, e.g. use case designs and value propositions? What are the specific needs of rural agricultural women in adopting and using DFS? What are the needs for non-agricultural livelihoods? How can we promote the use of simple, practical, and visual digital technology training to accommodate the more significant numbers of illiterate women (verses men), most of whom reside in rural agricultural areas? Can we bundle m-agri with other initiatives, including m-health, m-power, m-water, etc?

3. What are the innovative strategies to improve women's access to ownership and control over productive assets and resources (addressing normative barriers) and support women's productive livelihoods? Are there proven opportunities through digital savings, including VSLAs, VICOBA, etc? What else is in the package? Is it skills development? Is it access to capital for business? Is it digital access to and linkages to markets for their livelihoods?

4. What innovative strategies can promote mobile phone uptake interventions for poor women in East Africa? Can we test strategies geared towards addressing the specific barriers faced, limiting the potential benefits of enhanced interoperability and leading to their continued digital financial exclusion?

5. Who else do we need to focus on and address their barriers as a preventive measure for similar barriers in the future? Youth (boys and girls)? Children? Policy makers? Consider addressing women and girls growing unemployment rates. How can we tap into youth's natural behaviour of responding fast to technology adoption?

6. How can East African countries promote gender intentional lens in designing and expanding policies and intervention programmes? e.g., MMOs (facilitated by government technology-related policies) should focus on issues of accessibility and technological reach in terms of extension of agency services, proximity (at least within a radius of five kilometres), ownership of mobile phones, primary financial education, etc; particularly among the most considerable population, and particularly the left-behind-women, again the majority in rural areas.

7. Can we address women and girls' time poverty/unpaid care and work overburdens through technological innovations to free up time for productivity? Can we innovate use cases to achieve time reduced/redistributed unpaid care work, e.g., digital credit incentives, m-power, etc? What are the opportunities for strengthening women-owned businesses' participation/win in procurement, market links, and access to microfinance institutions (MFIs)?

8. How can we address both country-specific and East African shared barriers, including women's mobile phone use and ownership, and ensure government and other money payments, particularly social cash transfers, are delivered digitally and directly into an account owned and operated by a woman (majority recipients)? A well-designed programme can increase women's control over personal financial decisions and enhance their prospects for economic empowerment by increasing the share of household income, which she controls and by increasing their bargaining power within the household.

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Mission

To strengthen local capacity for conducting independent,
rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is
sustained sound management of the economy, and that such management is more likely to happen
where there is an active, well-informed group of locally based professional economists to conduct
policy-relevant research.

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