DIGITAL FINANCIAL SERVICES MODEL FOR HIGHER EDUCATION INSTITUTIONS IN ZAMBIA

BY

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Declaration

I, the undersigned hereby declare that this thesis is my work and has not been submitted for any assessment in any other institution. All sources that I have used or quoted have been quoted and acknowledged by complete references.

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Abstract

Digital financial services (DFS) have become pivotal for the low income people and poor communities because they can be rolled out easily as opposed to commercial banks that need brick and mortar. Zambia has a number of DFS like Zoona which are serving low income people and poor communities. Higher Education Institutions (HEI) in Zambia are faced with a number of challenges related to the collection and management of students fees due to their dependence on few recommended commercial banks. Initially, HEI in Zambia used to receive student's payments through their cashier by cash, check or electronic cards. However, there was a challenge with this mode of payment such that a number of accounts personnel were implicated in cases related to fraud and pilferages. The other alternative was to force students to pay through the bank by depositing directly into the HEI bank account for all tuition and non-tuition fees. On the contrary, this comes with its own challenges which include high bank charges and accessibility to the banking institutions. This work proposed mobile phone application based on the unstructured supplementary service data technology (USSD) in order to provide convenience to student mobile phone users. The study carried out a baseline study with the banks, student population and general users from Kaoma, Chongwe and Lusaka. The results showed that HEI in Zambia have made it mandatory for all students to pay all tuition and non-tuition fees through the commercial banks. The study results also revealed several challenges in the existing payment system of commercial banks and Higher education institutions in Zambia. From the study results, it was evident that students from Zambia's HEI are usually inconvenienced in the current payment system. Based on these results, an optional mobile phone payment system model for students' payment for non-tuition fees was proposed. The mobile phone payment system will provide convienience to users by providing bank services through the mobile phone application, real time information to principal users and the system host will generate income for HEI in Zambia.

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Acronyms

AML	Anti-Money Laundering
ATM	Automated Teller Machine
BOU	Bank of Uganda
BOZ	Bank of Zambia
CA	Communication Authority of Kenya
CDs	Communication Diagrams
CBK	Central Bank of Kenya
CICO	Cash-in and Cash-out
CSP	Customer Service Points
DB	Database
DC	Developing Countries
DFS	Digital Financial Services
EAC	East African Communities
GIS	Geographic Information System
GSM	Global System for Mobile
G2P	Group-to-person
HLR	Home Location Register
HMRC	Her Majesty's Revenue & Customs
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
IP	Internet Protocol
ITU	International Telecommunication Union
KYC	Know Your Customer
MFI	Microfinance Institution
MNOs	Mobile Network Operators

M-Pesa	(M for Mobile, Pesa is Swahili for Money)
MPIN	Mobile Personal Identification Number
MSC	Mobile Service Centre
MS	Mobile Station
NCC	Nigeria Communication Commission
NFC	Near Field Communication
NRC	National Registration Card
NW	Network Initiated
OTA	Over-the-Air
OTC	Over-the-Counter
OOSD	Object-oriented system development
OOSDLC	Object-oriented system development life cycle
OOSDM	Object-oriented systems development methodology
PBOC	People's Bank of China
PIN	Personal identification number
POS	Point of Sale
PSL	Pledged Supplementary Lending
PSPP	Public Social Private Partnership
P2P	Person-to-person transfer
RBA	Rural Bankers Association
SBP	State Bank of Pakistan
SDs	Sequence Diagrams
SIM	Subscriber identity/identification module

SMS	Short Message Service
STK	Sim application toolkit
STP	Spanning Tree Protocol
UCC	Uganda Communications Commission
UI	User interface
UIA	Unique Identification Authority
UIS	UNESCO institute for Statistics
UML	Unified modeling language
URL	Uniform Resource Locator
USA	United States of America
USSD	Unstructured Supplementary Service Data
UNCTAD	United Nations Conference on Trade and Development
UNZA	University of Zambia
WAP	Wired Application Protocol
ZABS	Zambia Bureau of Standards
ZICTA	Zambia Information and Communications Technology Authority

CHAPTER ONE

INTRODUCTION

The following chapter is an introduction of the research study. The subtopics contained in this chapter are: Introduction to research study, statement of the problem, aim of the study, objectives, research questions and significance of the study prior to the summary of the entire chapter.

1.1 Introduction to the research study

Digital financial services (DFS) have become an important driver for poverty reduction in a growing number of countries due to financial inclusion of the unbanked [1]. As such, the sub-Saharan Africa has achieved the broadest success in mobile money driven by mobile money services [2]. DFS has a number of extensive technologies such as: e-money, mobile money, card payments and electronic fund transfers etc. [2] [3].

As a matter of fact, DFS provide an array of benefits which include: safety and security, speed and transparency, increased flexibility, savings incentives and credit histories [4]. Subsequently, continuous uptake of DFS has provided a platform for carrying out formal transactions in the many financially excluded adults and low income communities [5]. In fact, financial exclusion is as a result of commercial banks barriers like: inflexible documentation requirements, limited infrastructure, costly operations and travel distances [5].

The subsequent chapter has elaborated on: digital financial services; digital financial services ecosystem; digital financial services regulation; categories of regulating digital financial services; challenges of higher education institutions and related works.

This study is the proposal for the optional mobile phone payment system to be used in higher learning education institutions of Zambia in order to mitigate challenges of financial exclusion for the unbanked and low income people like students.

1.2 Statement of the problem

Commercial banks have struggled to find a business case for the low income people (e.g. students), financially excluded people (i.e. people without bank accounts) and poor communities [5].

1.3 Aim of the study

To assess the current payment methods used in Zambia's higher learning institutions and develop a mobile phone application to mitigate the drawbacks presented in the existing payment system.

1.4 Objectives

1) To investigate the methods and types of payment systems students use in higher learning institutions of Zambia.
2) To establish the major challenges faced by higher institutions of learning in the current student payment systems.
3) To develop a mobile payment application model based on digital financial services.
4) To develop a prototype based on the model in (3).

1.5 Research questions

1) What type of payment systems are used by students in higher institutions of learning in Zambia?
2) Are there any major challenges that higher institutions of learning face in the current student payment systems?
3) How can we come up with a mobile payment application model based on digital financial services?
4) Is it possible to develop a mobile payment system for higher institutions of learning based on the model in (3)?

1.6 Significance of the study

The study has a number of significances. It will offer valuable contribution to theory and practice. Moreover, the study offers a premise of providing an alternative payment model for use in higher education institutions of Zambia. Additionally, the study will contribute knowledge in academia.

1.7 Summary

The contents of this chapter focused on dissertation introduction. The chapter highlighted some of the successes and benefits of utilizing DFS. Commercial banks Know Your Customer (KYC) rigid requirements have contributed to the number of unbanked many adults. The chapter had indicated the type of literature to be elaborated in the subsequent chapter. Last but not the least; the premise of proposing a mobile phone application model to be used in higher education institutions of Zambia was explained in the foregoing chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section contains different literature reviewed from various sources like: journals, conference papers, reports, text books, government documents coupled with selected items from the internet. The subtopics contained in the reviewed literature are: digital financial services, digital financial services ecosystem, digital financial services regulation, categories of regulating digital financial services, challenges of higher education institutions and related works.

2.1.1 Digital financial services

2.1.1.1 Introduction

Digital Financial Services (DFS) is the use of an electronic device or mobile phone application system to access financial services [6]. DFS includes: storing funds, making and receiving payments etc. [6]. DFS has become a viable way for the unbanked to access formal financial services for the financially excluded [6]. Most compelling evidence indicates that increasing access to formal financial services does not only reduce financial exclusion but it has also become an important development goal for stimulating economic growth, increasing welfare and reducing poverty [6]. As such, the recent growth of mobile money has allowed millions of people who were financially excluded from the formal financial system to carry out financial transactions relatively cheaply, securely and reliably [7]. Subsequently, Sub-Saharan Africa has achieved the broadest success in mobile money due to mobile money services that has integrated many adults [7]. See Figure 1 for illustrations. The financially excluded adults are now able to carry out various transactions like: paying bills or sending or receiving money using their mobile phones [7].

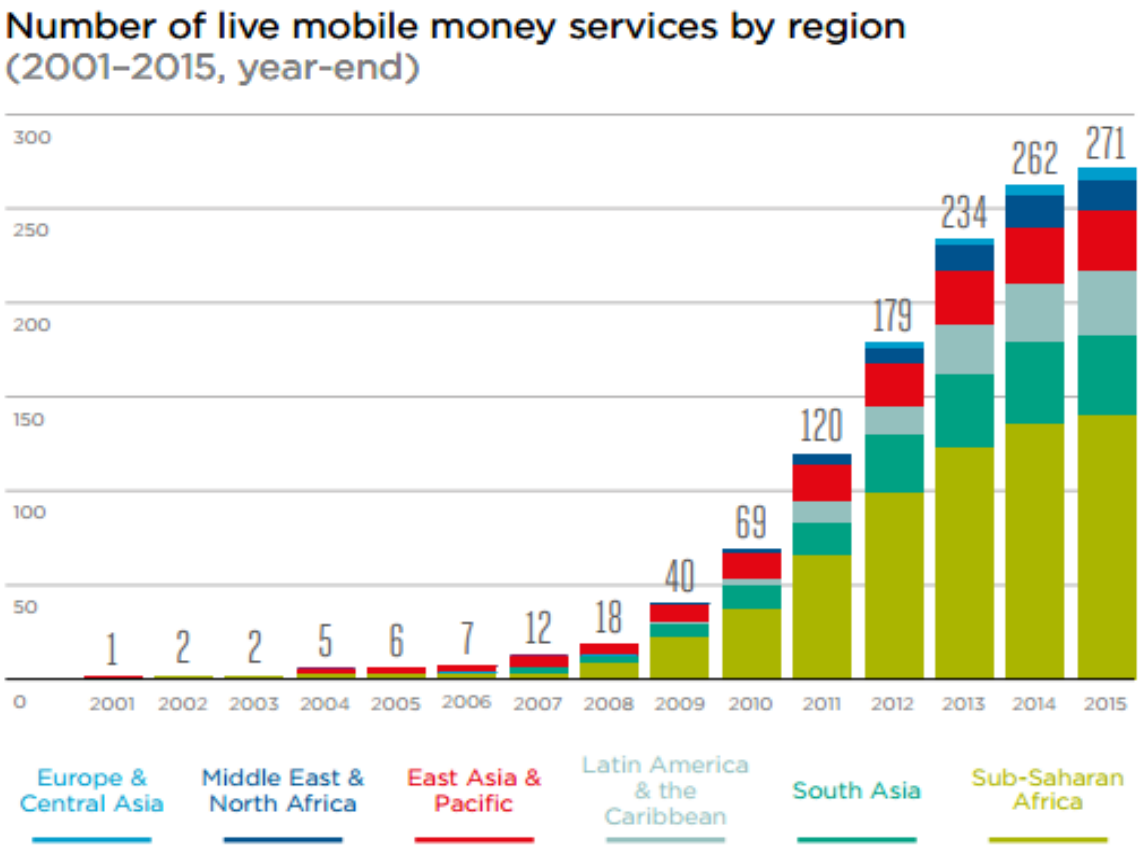


Figure 1: Growth in the number of digital financial services by region[1]

DFS don't need many of the prudential regulations applicable to banks but they need market conduct regulations which do not only protect consumers but also support trust in service delivery [1]. Market conduct regulations contained in DFS include transparency and disclosure requirements, standards for informing customers of the balances held and transactions carried out coupled with audit requirements just to mention a few [1]. As a matter of fact, the rapid growth of mobile networks in the world which has resulted in total mobile subscriptions of over 7 billion by end of 2015 is a greater premise for DFS mobile phone applications [1].

DFS have unprecedented benefits. DFS users not only use the platform for sending and receiving money but they also save through the platform while accessing other services provided by the platform [2]. Additionally, DFS are pivotal to income generation [2]. For example, M-pesa in Kenya exceeds USD 375 million each month such that users save up to USD 3 on each transaction [2].

[1] Source: GSMA, 2015 State of the industry report; mobile money

2.1.1.2 Security flaws in digital financial services

Mobile money transfer applications use various communication channels such as Short Message Service (SMS), Unstructured Supplementary Service Data (USSD) and Internet Protocol (IP) based communications which can encounter security flaws and eventually result in compromising the system [2]. The prominent security flaws associated with digital financial services are: fraudulent transactions, request/response manipulations, weak encryption and insecure message communications which can impact negatively on the mobile payment service providers [2].

2.1.1.3 International quality standards for digital financial services

The Indian service providers have attained greater strides due to usage of international quality certificates [7]. For instance, EKO's m-banking in India, which utilizes international quality certificates like: ISO 27001:2005 to prevent security flaws [7]. Subsequently, the strength of DFS in Pakistan is based on three factors called: non-repudiation and subscriber accountability, central control of accounts/transactions and ISO 27001:2005 certification [8].

2.1.1.4 Common technologies used in digital financial services

The main technologies used for mobile money mobile money transfers are: SMS, Sim application toolkit (STK), USSD and Wired Application Protocol (WAP) [2]. As a matter of fact, these technologies have their own security issues [2]. SMS is not only the most commonly used application in mobile money transfers in developing countries due to low-value payments but it is also simple to use and compatible with a variety of phones which includes low-end devices [2]. The SMS technology is mostly applicable in rural areas where the literacy rate may not be high, for many people to understand how to use it [2]. In essence, SMS technology has default data format of plaintext [2]. The only encryption used during transmission in SMS technology encryption between the base transceiver station and the mobile station [2]. As such, the

encryption algorithm used is A5 which has proven to be vulnerable [2]. As a result, the SMS is not the ideal platform for making payments because of security issues [2].

STK has been used to secure mobile phone applications especially for mobile banking and privacy since 1998 [2]. The STK technology has a passcode or personal identification number (PIN) which needs to be utilized in order to access the application and is stored on the subscriber identity/identification module (SIM) card [2]. The SIM card also accommodates the keys to encrypt the session between the mobile device and the wireless gateway of the mobile network operator (MNO) [2]. In fact, the wireless gateway has functionalities of decrypting and encrypting for every transmission of financial services institution [2]. Notably, M-pesa utilizes STK to secure the application, as such the UMTS Subscriber Identify Module (USIM) application toolkit in the 3G mobile devices is the equivalent of the STK which in essence is used to secure the application [2].

USSD is a session-oriented technology and has the advantage of informing the user whether a message has reached the recipient or not [2]. Subsequently, USSD has no session information stored on the mobile device although the message is still sent in plain text as in SMS [2]. Moreover, the other usage of USSD includes transferring money to the user's balance on the SIM and delivers One Time Passwords or PIN codes [2]. WIZZIT is an example of the mobile transfer service in South Africa which uses USSD [2].

WAP-based implementations do not only provide better security but also allow data to be encrypted between the customer and merchant/bank [2]. For this reason, WAP implementations are commonly used in banks [2].

2.1.2 Digital financial services ecosystem

2.1.2.1 Introduction

Digital financial services ecosystem illustrates the overall ecosystem for DFS, by identifying the players within the ecosystem [9]. DFS ecosystem also identifies the key element which makes it necessary for the ecosystem to develop in a manner which does not only encourage but also enable financial inclusion policies [9].

2.1.2.2 Composition of digital financial services ecosystem

DFS ecosystem is composed of:

a) Users (i.e. consumers, businesses, government agencies and non-profit groups) who utilize digital and interoperable financial products and services;
b) The providers (i.e. banks, other licensed financial institutions, and non-banks) suppliers of products and services through digital means;
c) The financial, technical, coupled with other infrastructures that make them possible;
d) And the governmental policies, laws and regulations which enable them to be delivered in an accessible, affordable, and safe manner [10]. See Figure 2 for illustration.

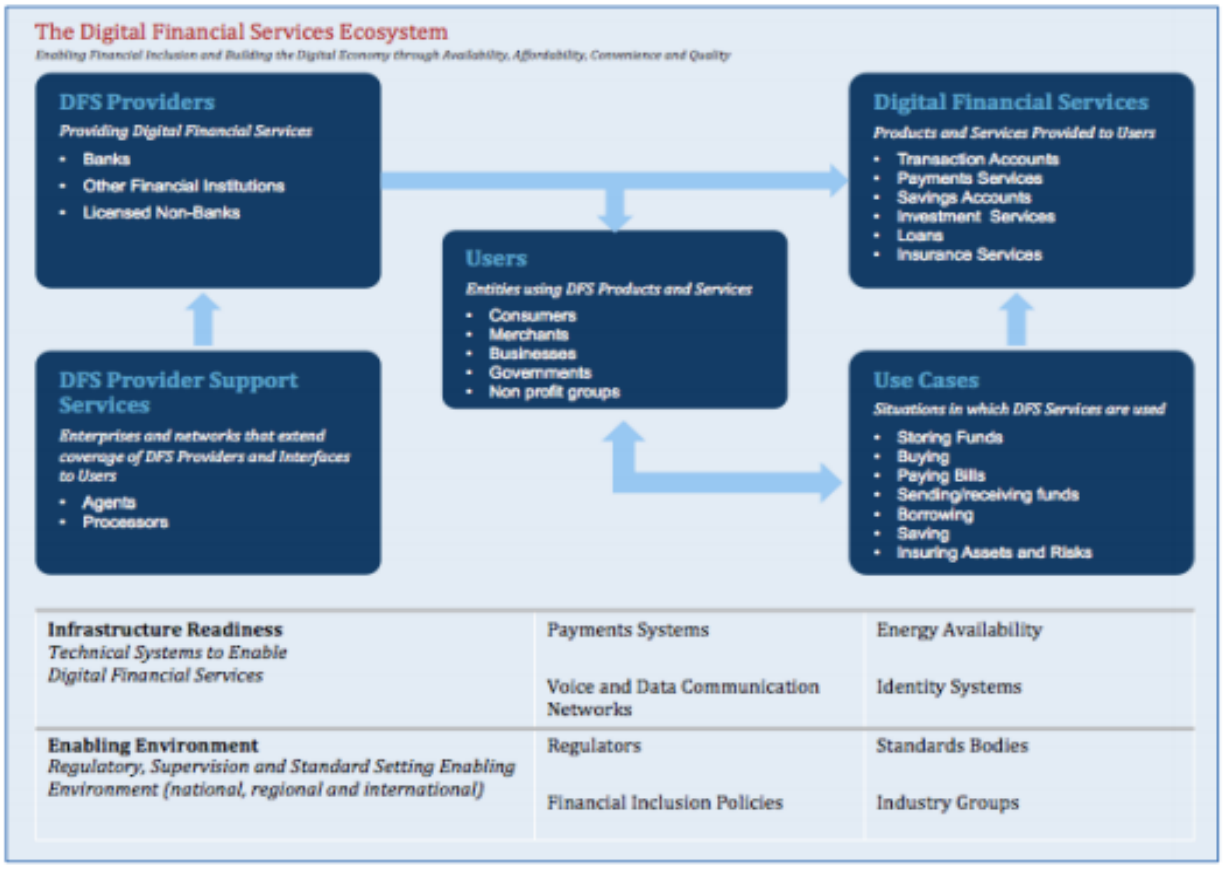


Figure 2: Digital services ecosystem[2]

[2] C. C. Benson *et al*, "The Digital financial services ecosystem, 2016

2.1.2.3 Goal of digital financial services ecosystem

The DFS ecosystem has a primary aim of supporting all people and enterprises within a country [10] Likewise, DFS ecosystem supports national goals by focusing on financial inclusion, economic health and the stability and integrity of the financial systems [10]. In other words, the goal of financial services delivered through digital means contributes to poverty reduction by delivering the recognized benefits of financial inclusion in developing countries [9]. As a matter of fact, financial inclusion implies the sustainable provision of affordable financial services in order to bring the poor into the formal economy [9]. As a result, an inclusive system encompasses a range of financial services that provide various opportunities such as: accessing and moving funds, growing capital coupled with risk reduction [9]. Digital financial services ecosystem hinges on two fundamental support structures called: an enabling environment and a solid level of infrastructure readiness [10].

2.1.3 Digital financial services Regulation

Regulation for DFS is very important because mobile money transactions present regulatory challenges that could negatively impact on maximum development benefits [11]. In fact, mobile money blurs the traditionally distinct and independent sectors of regulation (i.e. telecommunications and financial banking sectors) by involving an overlap of multiple ministries and Government agencies which enhances the complexity of oversight needed [11]. Regulators have a duty of articulating a clear policy position on DFS regulation [12]. As such, the regulatory frameworks coupled with the necessary supervisory resources that should accompany any new regulations are supposed to be consistent with regulatory capacity [12].

According to the 2015 study, based on an empirical examination of why mobile money schemes ignite in some Developing Countries (DC) but flounder in other countries found that regulation plays a key role in the success of DFS [13]. The findings of the study revealed that most countries where the sector ignited and grew explosively did not require a bank to be involved for anything other than to hold funds [13]. While countries that were by far failed to ignite had relatively bank-led model of regulation as opposed to non-bank model regulation in their leading role [13].

2.1.3.1 Categories of regulating digital financial services

The International Telecommunication Union (ITU) has echoed the importance of regulating DFS by stressing the six key categories of regulation in the DFS ecosystem namely: agents, consumer protection, market access, payment systems, risk management and other related issues [14].

The following section will therefore elaborate on the six key categories of regulation as stated by ITU.

2.1.3.2 Agents

2.1.3.2.1 Background information

The term agent applies to any third party acting on behalf of a bank or other principal in pursuant to an agency agreement, service agreement, or other similar arrangement to deal directly with customers [14]. A broad definition of an agent can be chosen by regulators which can go further than what is commonly accepted in law [15]. The legal definition is used to make it clear that the principal is responsible for the actions of its agents, so long as the agent is acting within the authority given to it by the principal [15].

Digital financial services (DFS) provided by banks, nonbanks, or other third parties through agents not only help in advancing financial inclusion, but they also overcome barriers prevalent in traditional bank branches especially in developing countries [9]. Agents are responsible for more than 90% of cash-in and cash-out transactions (i.e. ATMs and bank branches make up the remainder) which illustrates how indispensable they are to mobile money services [1]. In other words, agents compete with bank branches and ATMs for cash-in, cash-out and other transactions even though they do not have the same capital investment costs [1]. In fact, agents provide a variety of services besides to cash-in and cash-out like: account opening, bill payments, assistance with remittances, group-to-person (G2P) payments, insurance, airtime top-up and credit [1]. As such, innovation at the agent level is very important because it helps to develop the variety of services to the available population [1]. The importance of agents can be seen by the number of agent networks, like in Pakistan which had approximately 17,500 bank

agents, in 2011 [1]. As the result, agents in Pakistan handled 15.88 million transactions totalling Rs 58,710 (US$ 674 million) in the month of September, 2011 [1].

As a matter of fact, DFS are two-sided platforms which bring together users and agents in order to create value for each group [1]. Agents are a direct human interface of mobile money with the customer while agent networks are the backbone of the service for cash-in and cash-out transactions, as well as often assisting with transfers and payments [1]. Ultimately, an extensive agent network is not only, centrally important to mobile financial services, but also, for prepaid telecommunications services [1]. Moreover, another key point is that agents present by far the largest operating cost of a typical mobile money provider because of: agent recruitment and training and an estimated average cost of 54.4% of revenues in agent commissions for customer registrations and cash-in and cash-out transactions [1]. Likewise, commissions for customer registrations in the first year or two can even exceed 350% of revenue given the need to sign up customers [1]. However, in order to achieve the necessary scale to enable network effects to take off, DFS providers must rely on third party agents like: shops, airtime resellers and others to deal with their customers coupled with trusting them with the customers' money [1]. For example, according to Helix Institute, which is involved in efforts to develop agent networks in many countries, it was revealed that 22% of agents were also mobile money agents, but 86% were shop owners [1].

It is important to realize that branchless banking require agent networks generally to enable the DFS provider to operate with far greater coverage than, and without the capital and operating costs of, bricks and mortar bank branches [1].

2.1.3.2.2 Regulatory issues concerning agents

Regulators would generally request DFS providers to carry out due diligence on their agents when selecting them [1]. As such, the financial regulator should be notified of their appointed agents, train them (e.g., not only to provide agent services but also to spot fraud and abuse) coupled with supervising their activities [1]. Similarly, the DFS provider plays the role of being an intermediary between the regulator and the customer interface [1].

To put it in another way, a sound legal and regulatory framework for governing agent and principal liability is important because regulations deters agent wrongdoing which could

eventually curtail prospective agents [8]. As an illustration, if there are no specific guidelines for DFS agents, then they may be held contractually liable for operational risks that arise as the result of: loss of cash in transit, fraud or theft [9]. Vulnerability of agents is high, given the critical role of which they play in providing the cash-in/cash-out services that DFS customers are heavily dependent upon [9]. Likewise, agents do present some risks to consumers using cash-in and cash-out services like: fraud, lack of liquidity, poor explanation of the service and also errors [1]. As such, risks of such a magnitude might be mitigated through a separate licensing arrangement other than requesting DFS providers to be liable for agent behaviour [1]. Consequently, development of independent agent networks might not only ensue, with greater flexibility in their delivery of cash-in and cash-out services for a number of DFS providers, but this also enhance competition among service providers themselves [1].

It is important to realize that regulation of agents may differ from one country to another, although, for most countries the common ground is that a principal is liable under law for the actions of its agents, whether such actions are explicitly or implicitly authorized [15]. As a matter of fact, in Fiji, the Agent Banking Guideline stipulates that a commercial bank shall be liable for the actions and omissions of its Agents Banking services or matters connected therewith, as agreed to in their contracts with agents [12]. Similarly, Kenya's Guideline on Agent Banking requires that a bank principal will be wholly responsible and liable for all actions or omissions of its agent and this responsibility shall extend to actions of the agent even if not authorised in the contract so long as they relate to agent banking services or matters connected therewith [12]. Notably, both Fiji and Kenya's Guidelines not only apply to banks, but are also, silent about liability allocation between agents and non-bank principals [12]. Subsequently, Safaricom's M-PESA in Kenya's liability contract with customers indicate that M-PESA Cash Merchants are independent contractors and Safaricom shall not be liable for the acts or omissions of M-PESA Cash Merchants [12].

On the contrary, a country like Malawi has no agent banking guidelines and the existing e-money regulations do not explicitly allocate agent liability as such the liability allocation need to arise from contractual arrangements or the law [12].

2.1.3.2.3 The effects of agent exclusivity

Even though a strong agent network is necessary for the DFS business to succeed, other factors like people being ready to receive cash-in transaction or provide cash for cash-out transactions should be integrated [1]. As a matter of fact, DFS providers with an established secure widest coverage of agents have a significant competitive advantage over entrants still growing their agent network [1]. MTN in Uganda has recorded a success over any competitors due to the fact that this DFS provider did not restrict its agent network to its existing retailers but also to a wide range of individuals especially those who were willing to become agents [1].

It must be remembered that agents are the cornerstone of any DFS which allow customers to not only, access their account from any small kiosk or rural store, but also, facilitate easier cash in and cash out (CICO) transactions to customers [2].

The success of a DFS depends on the activity and health of the agent network which in particular should ensure that agents are: ubiquitous in all regions, are adequately trained, have marketing capacities, are prudently managed and have sufficient liquidity available, in both cash and electronic form, to service the transaction needs of customers [16]. The agent network in Uganda has succeeded due to utilizing agent aggregator relationships in it's over 25,000 agents such that the partnerships between mobile network operators (MNOs) with banks has also contributed to consistent provision of liquidity to the agent network [16].

As a matter of fact, the European Investment Bank study postulates that Cameroon, Nigeria, Senegal and Uganda all have well-developed rural distribution agent networks as such, the four countries are the best performing DFS markets [16]. A key point to realize is that building an agent network involves substantial upfront costs in matters related to: recruitment, training and ongoing costs in commissions and supervision [1].

In contrast, DFS providers who have already made such investment and achieved an extensive agent network may want to recoup their investment such that they would not allow their competitors to use the same agents [1]. In fact, a second firm, finding agents that have already been recruited (i.e. identified, evaluated, contracted) and trained in the DFS business by the first firm, will ultimately face lower upfront costs [1]. As a result, leading firms may wish to ensure that their agents act exclusively for them and exclusivity is common such that it is meant to protect their incentive to invest (See Figure 3 below) [1].

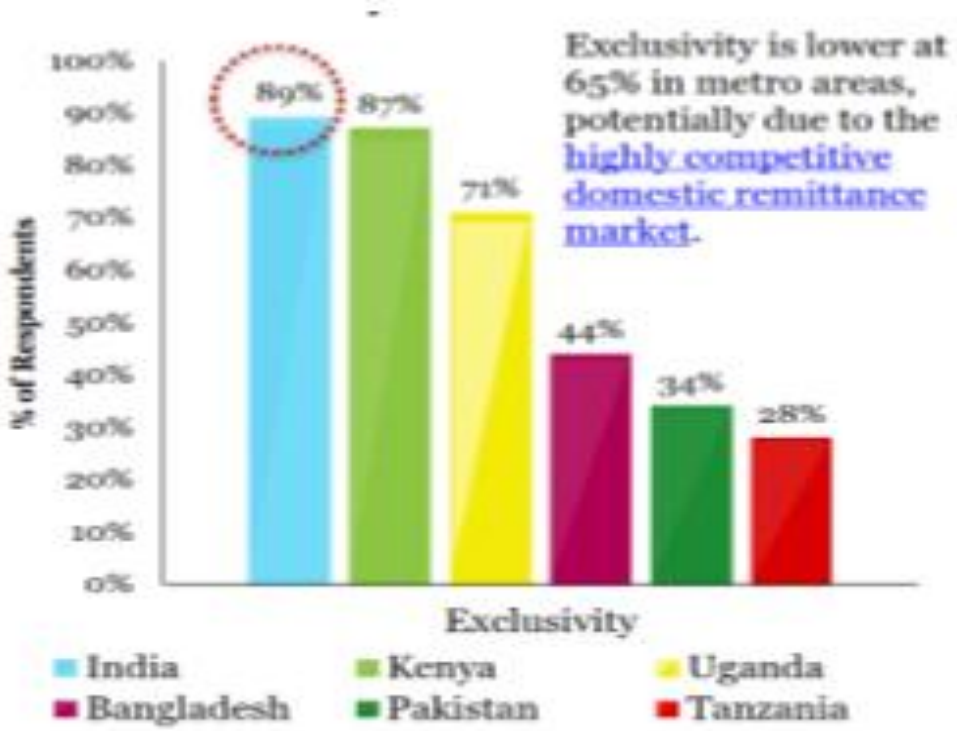


Figure 3: Exclusivity in Helix agent network accelerator countries[3]

As an illustration, the impact of agent exclusivity is not merely in making the first mobile money provider's agents unavailable but also in making them economically feasible especially for the second, third and later DFS to engage [1]. A study conducted by European Investment Bank, indicated that Benin, Mozambique and Zambia are the three least developed DFS markets because they do not have a well-developed systems for rural distribution, such as retail goods stores, agricultural input suppliers and post offices all of which could be important for distribution of agent networks for rural development [16].

Notably, exclusive agreements with downstream distributors of a given product or service are not always regarded as anticompetitive, as sometimes there may be justifications for them [1]. For example, franchise agreements (e.g., fast food restaurants) are known for a common business model whereby the franchisor (supplier) will typically license to the franchisee (distributor) with various intellectual property rights like trade-marks and know-how, for the distribution of the

[3] Source: Helix Institute,2015, Agent network accelerator survey: India Country Report, 2015

specific types of goods or services [1]. Likewise, the franchisor will not only provide training and ongoing support throughout the contract but also provide exclusive distributorship and single branding to form a legitimate part of the agreement [1].

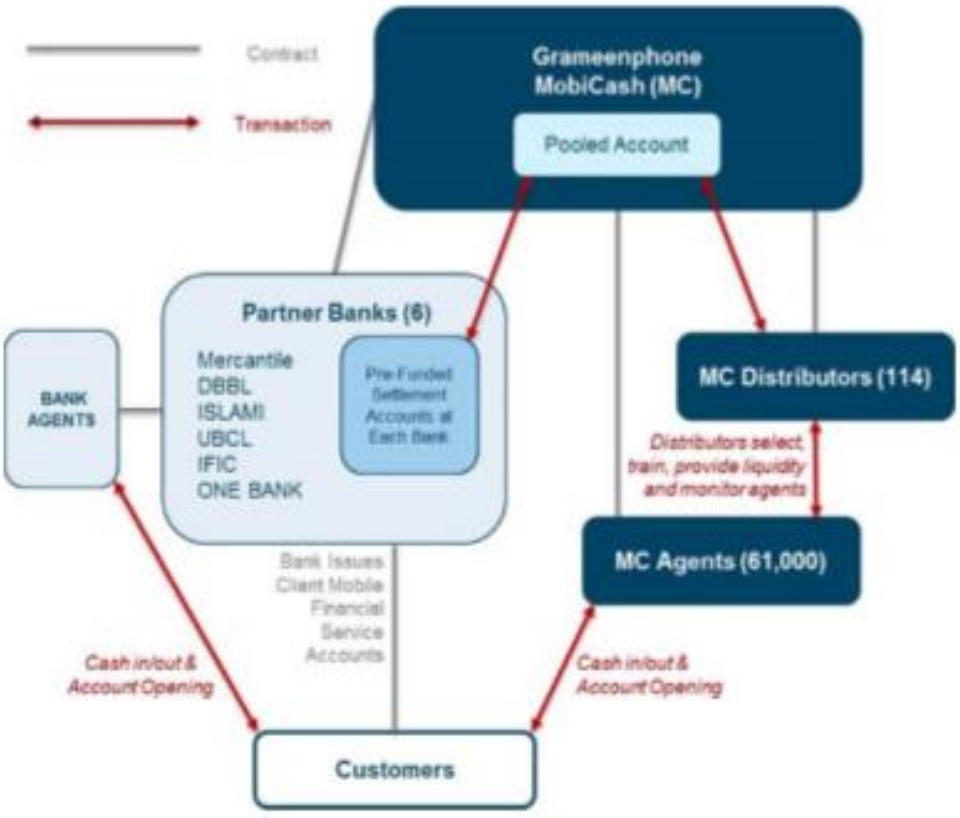


Figure 4: MobiCash shared agent network in Bangladesh[4]

Countries like Benin and Senegal have microfinance institutions (MFIs) who have expressed great interest in providing agent services for the DFS providers [16]. However, these institutions are challenged by limited hours of operation (similar to banks) coupled with demotivated salaried staff who are not given commissions every time they carry out DFS transactions [16]. Even though, salaried workers of MFIs in Benin and Senegal are not given commissions for each transaction and account opening they perform, small rural retailers who traditionally stay open in the evenings and on weekends, receive commissions directly for each transactions they perform [16]. See Figure 4.

[4] Source: Noor, W & Shrader, L., CGAP, MobiCash shared agent network - Bangladesh

2.1.3.2.4 Benefits alluded to agents

There is overwhelming evidence of successful agent networks in DFS that is emerging in many parts of the world [17]. Notably, in South East-Asia, Cambodia's WING mobile money product has reached a record success of agents such that agents are now competing to provide the WING business and are investing in their own shops to attract customers [17]. Similarly, survey results of The Microsave Agent Network Accelerator Country Survey for Bangladesh have revealed that agents are making huge profits despite very low transaction possibly due to the low operational costs [17].

M-PESA has revolutionised business practices in Kenya such that it has become popular with the banked and the unbanked population who are using the platform to pervade daily transactions [16] Some of the transactions carried out on M-pesa are: paying suppliers for goods and services, paying bills, sending money to friends and relatives, withdrawing cash and topping up airtime accounts [16].

Similarly, the sole proprietors and small businesses in Kenya are able to make savings and gain access to more customers and new services through the platform of M-PESA [17]. In fact, M-PESA (M for mobile, PESA is Swahili for money) is a mobile-phone based money transfer and micro-financing service, which was launched by Vodafone for Safaricom and Vodacom in 2007 and is the largest mobile network operator (MNO) in Kenya and Tanzania [16].

2.1.3.3 Consumer Protection

2.1.3.3.1 Background information

First thing to remember, within regulation is how the rights and interests of consumers are protected and promoted for consumer trust to be enhanced in order to achieve sustainable uptake and active usage of DFS [14]. Even though, an effective consumer protection framework within DFS can increase consumer confidence and ultimately lead to faster adoption and active use of the services, the unbanked users are more important in the value chain despite the fact that they may not have prior experience with formal banking services [18]. Likewise, the interests of consumers are not only important, but also, supreme for legal and regulatory framework to be

fair and balanced for all stakeholders [19]. As a matter of fact, consumers are exposed to a number of potential risks when conducting DFS transactions [20]. When M-PESA in Kenya, emerged and scaled rapidly in a safe manner, there was no elaborate consumer protection framework in that country [20]. Likewise, the perception of risk and the premise that substantial consumer protection rules are a precondition for healthy development for DFS are ultimately challenged if there is no elaborate consumer protection framework [20].

As a result, the DFS provider, being the entity providing the service to the consumer is ultimately responsible for ensuring: Transparency, fairness, safe services, protection of consumer's funds and personal information [14]. Similarly, with regards to regulation of consumers, the four core themes that are central in consumer protection are: provision of information and transparency, dispute resolution, fraud prevention, data privacy and protection [14].

DFS is not new, but, has rapid expansion of services to large numbers of previously unbanked and low-income people who often migrate from informal services directly to electronic transactions offered by formal providers is definitely new [20]. Likewise, it is imperative to strike a balance between openness to innovation and consumer protection in order to inculcate new approaches and rules in DFS which may be different from traditional banking services [20].

Subsequently, according to United Nations Conference on Trade and Development (UNCTAD), 2016 studies, consumer protection regulation is summed up into six pillars called: redress and dispute resolution mechanisms, fraud prevention, data protection and privacy, information disclosure and transparency, protection of funds, encourage competition [6].

The following section will only elaborate on four of the core themes of consumer protection regulation, namely: provision of information and transparency, Dispute resolution, Fraud prevention, Data privacy and protection; as such, protection of funds and encouragement of competition will not be explained.

2.1.3.3.2 Provision of information and transparency

Trust and uptake of all DFS can be enhanced only when there is adequate provision of information and transparency from DFS providers to consumers [6]. As such, consolidated knowledge and awareness on key product features, terms and conditions coupled with risks of

consumers is the responsibility of DFS providers and this ultimately lead to consumer trust and uptake of all DFS [14]. As a matter of fact, determining information transparency especially the one related to financial inclusion perspectives requires availing end users with adequate information in order for them to have a strong understanding of how digital financial services may or may not impact them and their behaviour [14]. Moreover, transparency is particularly valuable because it relates to fees applied to a transaction such that consumers are supposed to be told the fees before the transaction is submitted [14].

Additionally, for consumer trust to be built in DFS usage it is imperative for DFS providers to have clear and transparent product disclosure as such, there is need for DFS products to be kept simple and relevant to users' needs coupled with consumer education on how to use new products and when it is appropriate for consumers to use the products [3]. Arguably, research has shown that insufficient instruction on account usage by DFS providers and limited understanding of security features by customers has contributed to main barriers of adopting DFS [21].

As the matter of fact, resulting confusion and lack of confidence in electronic transactions such as the ones involved in DFS transactions has two key consequences namely: frustration which ultimately stops consumers from using the service and consumers turn to their children or to agents to transact on their behalf [21].

In contrast, greater account usage is as the result of greater emphasis on building trust and client relationships through education or awareness programs that should be provided by DFS providers [3]. As an illustration, according to the People's Bank of China (PBOC) payment rule, a Pledged Supplementary Lending (PSL) holder is supposed to keep confidential the trade secrets of clients and also preserve safely customer's information with reference to Article 33 & 34 [22].

A study conducted by the Office of Fair Trading in the United Kingdom concurs with the view that consumer information and the condition under which the online and mobile transaction may be processed is essential in order to enable consumers to make informed choices [23]. The findings of this report indicate the importance of educating consumers in order for them to understand their rights as 80% of Internet users did not know that they can claim their money back from their credit card company if the goods or services are not delivered [23]. Similarly, three quarters of respondents were aware of their entitlement of returning goods within seven

days for a full refund while two thirds are aware they can claim back from the seller if products are not delivered by the due date or within 30 days of the order [23].

As a matter of fact, countries have taken different approaches to matters of provision of information and transparency to their consumers [23]. For instance, in Brazil and Mexico, it is mandatory for all agents to post signage with fees and prescribe specific rules for price transparency at agents, whereas in India and Peru, such standards are set in general consumer protection regulations [23]. Similarly, in India and Brazil agents are prohibited from charging fees directly to their customers such that banks may even charge more for agent transactions [23].

Moreover, in Peru, Brazil, Colombia, and Mexico agents are requested to disclose fees and charges coupled with their status as an agent of a licensed financial institution [20]. As such, agent receipts contain information about each transaction coupled with signage posted at agents and printed marketing materials so that consumers identify the responsible entity when problems arise and such facilitates complaint filing [20].

Additionally, in order to ensure that there is continuous provision of information and transparency to consumers, the BCP, which apparently is the largest bank in Peru, distributes printed materials to consumers to explain the services provided by its agents [20]. Similarly, in Brazil, banks make use of videos which are played in their branches, elevators and buses to sensitize people of agent networks and how best to use them [20].

In South Africa, WIZZkids (i.e. young people who promote and sell mobile phone-based services offered by WIZZIT, a nonbank) teach customers how to use mobile phones to conduct financial transactions while in Peru and India, providers use minority languages in informational materials to educate customers on the use of agents [20].

Moreover, in Uganda, all mobile users are registered by MNOs in order to comply with know your customer (KYC) requirements from financial regulators [24]. As such, the user appears in person at an agent or MNO service centre to complete the registration process which involves completing a form and also presenting some type of identification to the agent, who then makes a copy of the ID document [24].

The documents that MNOs have agreed with financial regulators to accept for the registration process across East African Communities (EAC) are: a voter’s card; driver’s license; valid

passport; local village council letter or certificate; company or employer issued ID; Government issued ID; tax certificate and national ID (only available in Kenya) [24]. When registration is over, the completed form and photocopy of the ID document are then forwarded from the agent's location to the MNO offices for processing such that processing is meant to ensure that an agent had captured all the necessary information and ensured that they had made a legible copy of the ID document [24]. Thereafter, a user mobile money account is then activated on the mobile money platform such that their documentation is filed at the MNO for regulatory compliance [24].

The registration process still relies on a paper form across all mobile money platforms unlike M-PESA in Kenya that introduced phone-based registration which allows an agent to submit new user data more efficiently [24]. All mobile users are registered by MNOs in order to comply with know your customer (KYC) requirements from financial regulators [24]. As such, the user appears in person at an agent or MNO service centre to complete the registration process which involves completing a form and also presenting some type of identification to the agent, who then makes a copy of the ID document [24]. The documents that MNOs have agreed with financial regulators to accept for the registration process across East African Communities (EAC) are: a voter's card; driver's license; valid passport; local village council letter or certificate; company or employer issued ID; Government issued ID; tax certificate and national ID (only available in Kenya) [24]. When registration is over, the completed form and photocopy of the ID document are then forwarded from the agent's location to the MNO offices for processing such that processing is meant to ensure that an agent had captured all the necessary information and ensured that they had made a legible copy of the ID document [24].

Table 2: Information and transparency (Adapted from: Commonly identified consumer protection themes of Digital financial services)

KEY ISSUES	EXAMPLES
1. Transparency of fees	Full disclosure of all fees and charges is provided prior to a transaction. Ideally fees are disclosed in multiple formats (in brochure, verbally, on website etc.)
2. Key facts or summary document	Standardized key fact documents can enable providers to give consumers the key information related to the service or product concisely and in local language.
3. Terms and conditions are transparent	Full disclosure of terms and conditions of contract is made prior to the customer initiating use of the services. Unclear terms or complicated sentences are avoided so that they are as easy to understand as possible. T&Cs are available in common local languages. Simplified contracts and standard form contracts also enable simplified disclosure of terms and conditions to customers.
4. Cooling off period	Cooling off period is available to consumers so that if they change their mind on a product/service within x weeks and terminate a contract without facing penalties.
5. Notice period for changes to T&Cs, fees	There is an adequate time given to consumers by the providers before any changes to fees or terms and conditions come in effect.
6. Misleading advertisements and sales promotions are prohibited	Advertisements which are misleading are prohibited. Ideally advertisements should use plain and simple language.
7. Policy on dormant accounts	Clear policies over when an account is considered dormant and what happens to the funds are effectively communicated to the consumers.

Thereafter, a user mobile money account is then activated on the mobile money platform such that their documentation is filed at the MNO for regulatory compliance [24]. The registration process still relies on a paper form across all mobile money platforms unlike M-PESA in Kenya

that introduced phone-based registration which allows an agent to submit new user data more efficiently [24]. See Table 1 above for information and transparency.

2.1.3.3.3 Dispute Resolution

In the first place, it is important to realize that the DFS ecosystem will continue to expand with more services and products available to consumers, as such putting effective recourse mechanisms in place is becoming increasingly essential [14]. Likewise, Financial Consumer Protection has been stipulated in Principle 9 of the G20 High Level Principles which states that redress should be accessible, affordable, independent, fair, accountable, timely and efficient [23]. Most compelling evidence was found in a study of M-PESA in Kenya where effective dispute resolution led to increased trust and loyalty which had a positive effect on increasing customer uptake of the services [25].

Even though DFS providers are compliant with consumer related regulations and offer out-of-court complaint and redress procedures, it is still difficult to resolve problems in most cases [23]. In fact, some of the available recourse mechanisms for consumers may not be: effective, convenient, widely publicized or affordable [23].

As such, problems that can be exacerbated especially when the customer interface is done exclusively by third-party agents and customers who are not only, less educated but also, inexperienced in the use of formal financial services [23]. In fact, non-judicial redress and complaint mechanisms may not exist or almost non-existent, like in Russia, where a network of over 250,000 automated payment terminals rarely offered means for customers to file complaints and solve problems until fairly recently [26].

As an illustration, holding DFS providers liable for complying with applicable regulations when they use agents is an important step for ensuring adequate redress although, it is not sufficient, as such, regulations are capable to set minimum standards for internal dispute resolution channels and procedures coupled with some standards that need to be tailored to branchless banking [23].

Consequently, effective dispute resolutions are not only important in improving trust and adoption for consumers but also the wealth of information should be collected and analysed in order to offer an opportunity of improving products and services [14]. Similarly, other scholars have argued that consumer resistance to product uptake has been known to occur when adoption

involves: the use of the product that require significant alterations in the consumers' value systems as well as their established behavioural patterns, norms, habits and traditions [27].

As the matter of fact, the United Nations Conference on Trade and Development (UNCTAD), in their 2016 studies, postulated the key mechanisms for redressing dispute resolutions and they are summarised as:

a) Complaints policy and procedures;
b) Clear policy communication;
c) Availability of multiple recourse channels;
d) Possession of alternative dispute resolution process;
e) Accordance of a timeframe for dispute resolution process;
f) Possession of a dedicated helpline;
g) Efficient coordination between telecom and financial regulators;
h) Oversight of recourse system;
i) Continuous provision of capacity building for employees on handling disputes [24].

As an illustration, consumers should be availed with an affordable, efficient, respected, professionally qualified and adequately resourced mechanism for dispute resolution like an independent financial ombudsman or equivalent institution with effective enforcement capacity [28]. As such, these institutions act impartially and independently as opposed to the appointing authority, the industry or rather the institution with which the complaint has been lodged from [28].

In fact, the ombudsman or supervisory authority keep compiling and publishing statistics of customer complaints coupled with breaches related to code of conduct such that the complaints are compiled by product type to facilitate identification of patterns and opportunities for improvements of service [28]. Similarly, every financial institution has a designated contact point with clear procedures where customer complaints can be handled coupled with complaints that are submitted verbally [28]. As the result, financial institutions would maintain up-to-date records of all complaints they receive in order for them to develop internal dispute resolution policies and practices which should include processing time deadlines, complaint response and customer access [28].

Another key point is that regulatory agencies are legally obliged to publish aggregate statistics coupled with analyses related to their activities regarding consumer protection and thereafter propose regulatory changes or financial education measures in order to avoid the sources of systemic consumer complaints [28]. As such, industry associations also play a vital role of analysing complaint statistics and also propose measures which are aimed at preventing recurrence of systemic consumer complaints [28]. Consumer dispute resolution in Lesotho is done through courts of law which range from Small Claims Procedures to Court of Appeal coupled with Commercial court which relatively tackle consumer disputes [29]. In contrast, these courts are inaccessible, inflexible and complicated for many consumers [29].

In South Africa, the main legislation involved in offering protection for the rights of consumers is enshrined in the Consumer Protection Act 68 of 2008281 (CPA) [29]. In this piece of legislation, there are different enforcement mechanisms for consumers on how to seek redress for infringement of their rights [29]. Even though South Africa has various dispute resolution mechanisms for consumers in place, the possibility of overlapping of functions by the regulatory bodies and other institutions that provide dispute settlements is very high [29]. Mechanisms of how disputes can be resolved are very vast, as such Table 2, indicates key issues involved in dispute resolution for consumers.

Above all, DFS providers often provide free customer service hotlines and communication channels such as Digicel which reportedly doubled its call centre staff in Haiti on paydays for the Ti Maman Cheri Program [1]. Similarly, provision of free customer service hotlines and communication channels also helps in generating feedback from customers, as seen in Ghana's LEAP Program [1]. Moreover, Banco Davivienda in Colombia trains and employs former recipients of government-to-person payments to support the hotline coupled with encouraging reporting of complaints and improvement of resolutions [1].

Table 3: Dispute Resolution [6]

KEY ISSUES	EXAMPLES
1. Complaints policy and procedures in place	DFS providers have a complaints policy and procedure in place.
2. Complaints policy is transparent and communicated to the consumer	Policy is effectively communicated using multiple channels (such as in the branch, online, leaflets, verbally by agents etc.), and the policy is made available in common local languages.
3. Multiple recourse channels available to the consumer	Access to the variety of channels to make complaints such as toll free numbers, local agents, social media and branches etc.
4. Alternative dispute resolutions or external recourse	Consumers who are not satisfied with how their complaint was handled by their provider are able to access alternative or external channels to seek redress. Information on how to use alternative methods is readily available.
5. Time frame provided for dispute resolution	Time frames on how long consumers should expect to wait for a response are clearly communicated to consumers.
6. Dedicated, toll-free recourse helpline available	Consumers have access to a designated phone line for dispute resolution and it toll free.
7. Coordination between the financial and telecom regulations in dispute resolution	Close coordination and collaboration between the financial and telecom regulators (including sharing data and analysis on DFS complaints) ensures effective resolution. This information can also inform their DFS related licensing, supervision/oversight, and enforcement roles.
8. Oversight of the recourse system by the financial regulator or supervisor	Financial regulator or supervisor has the remit to monitor complaints and listen to and dissolve disputes. This can include providers sharing complaints data with the regulator and/or onsite checks for compliance.
9. Employees and agents are trained in handling disputed	Employees are trained and provided with scripts/procedures for the most common complaints received. Moreover the categorisation of complaints makes handling disputes more efficient.

2.1.3.3.4 Fraud prevention

Consumers are prone to fraud such that consumer protection to such vices is very important because failure to do so would result in loss of funds or rather misuse of personal data which ultimately could prevent users from adopting DFS in the first place or prevent over-the-counter (OTC) users from adopting wallets and more advanced services [14]. Although fraud could be in different forms, the GSM Association has identified three common types of fraud called:

a) Transactional – this is fraud which may be committed by a user who is posing as a genuine consumer. Examples of transactional fraud are:
    i. Vishing/smishing – (i.e. using phone calls or SMS to gather personal information like account details, PINs or passwords or other identification details);
    ii. Advance fee scams – (i.e. where customers are tricked into sending funds under fake circumstances or promises (i.e. lottery scams);
    iii. Reversal requests – (i.e. happens when a person may ask a user to refund them an incorrect transaction which was deposited in their account);
b) Channel – it is fraud which may be carried out by the agent;
    i. Split transaction – (i.e. is done when agents split transaction to earn more commission);
    ii. False transactions – (i.e. happens when agents transfer a consumers funds to their own account);
    iii. Registration fraud – (i.e. false accounts creation for the purpose of obtaining extra registration commissions);
    iv. Overcharging – (i.e. agents charging unauthorised or incorrect fees to consumers);
c) Internal – is fraud which may be committed by an internal employee:
    i. Internal fraud – (i.e. happens when employees collude for unfair personal gain);
    ii. Identity theft – (i.e. this is when employees access and exploit customer information without any authorisation [30].

Fraud has not only become big business but it is also costing the banking industry a total sum of $67 billion per annum [31]. As such, this problem cannot be ignored as firms struggle to recover

from the global financial crisis coupled with the world's major economies teeter which are on the edge of recession [31].

Fraud is not only a notorious risk to the banking industry, but also for DFS such that it is a cause of much concern to DFS providers [39]. Most compelling evidence show that large cases of fraud in mobile money have been reported over the last few years which ultimately has led to financial damages of millions of dollars [39]. The cause of fraud in DFS has been due to: customer, agent and employee fraud from creating ghost accounts and conducting fraudulent transactions [39]. Consequently, funds have been stolen from providers, agents and customers such that the reputation of an institution and the industry as a whole can be adversely affected [39]. Notably, if the customer's funds are stolen from their accounts, the provider must ensure that the stolen funds are returned to customers immediately [39]. As the result, the process of preventing fraud entails conducting assessments in order to fully understand where fraud could be detected and prevented coupled with determining risk appetite and establishing effective controls [39].

As an illustration, fraud can generally be described as either major or minor fraud, though the former fraud involves very large sums and is usually perpetrated against the financial institution by staff while the latter fraud involves agents or customers as victims or perpetrators and smaller sums of money are siphoned [39].

Even though there are a number of reasons why people commit fraud, these reasons can be reduced into a common model called the fraud triangle [39]. As the matter of fact, Cressey's fraud triangle consists of three factors typical of leading someone to commit fraud, namely: pressure/risk, opportunity and rationalisation [31]. In fact, pressure or incentive implies describing the motivation of committing fraud by the employee which could be as the result of personal problems related to drink or drug abuse, relationship breakdown or gambling [31].

Likewise, opportunity arises due to poor or non-existent internal controls or because of the individual's position of trust that is vulnerable to abuse such that the fraudster can decide to cover their tracks by concluding that they have a good chance of making a substantial gain with a low risk of discovery [31].

Similarly, rationalisation is when fraudsters are not able to see themselves as criminals as such, they would justify their actions to themselves by feeling logical and reasonable [31]. In fact, in rationalisation, the fraudster would justify their actions by arguing that they are underpaid and

should rightfully receive more as such, they would commit the fraud in order to provide for their family or rather their theft is justified because their employer is dishonest or corrupt [31]. See Figure 5, for illustration of fraud triangle.

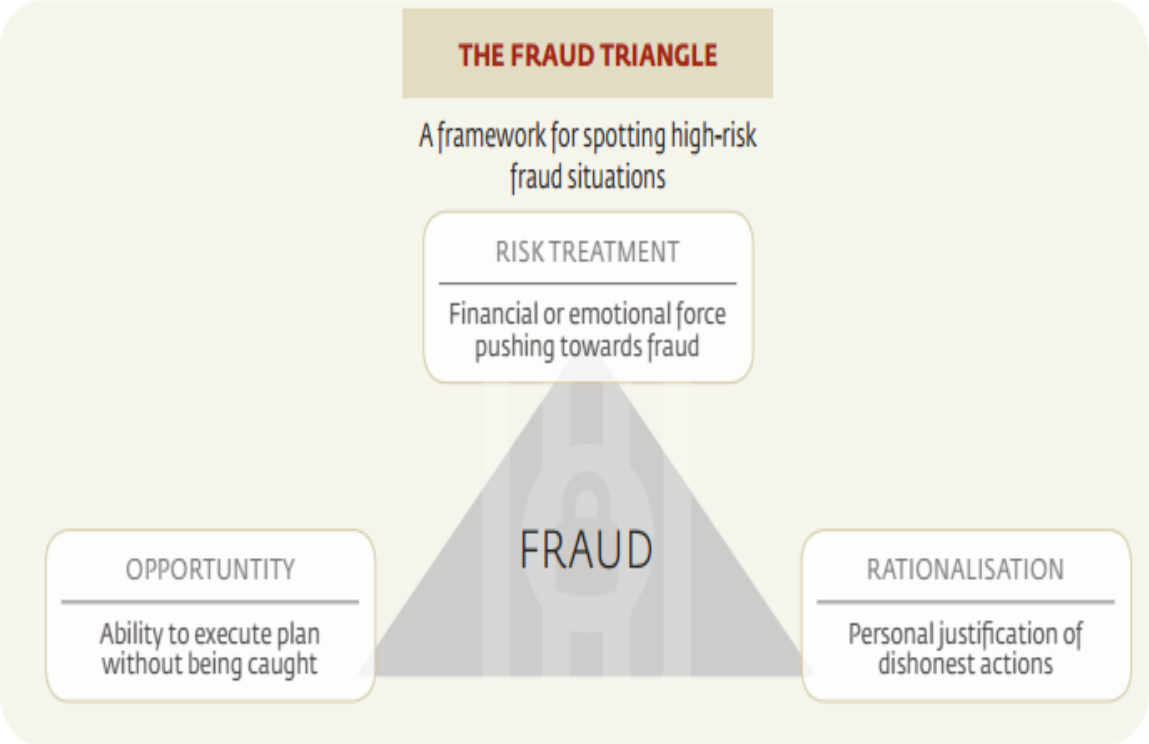


Figure 5: The fraud triangle: framework for spotting high risk fraud situations[5]

Another key point, most reported large scale frauds experienced by a DFS were as the result of poor operational practices [32]. Even though, DFS deployments were early in Africa and ultimately became successful, the service providers had put much focus on increasing numbers of customers and transactions without adhering to many early warning signs like failure by employees to reconcile daily transactions between e-money issued and the money in the bank [32]. In fact, for nearly two years, a number of DFS employees created 'counterfeit' e-money that were not covered by 'real' money such that they became more creative in finding ways of cashing it out through complicit agents or by creating bogus customer accounts [32]. As a matter of fact, perpetrators could abuse the system with impunity due to lack of operational controls, as such operators could make their own logins coupled with some individuals creating multiple user

[5] Source: L. Denyes and S. Lonie, Digital Financial Services and Risk Management, 2016.

IDs in order to confuse ant audit trail [32]. Similarly, there was no segregation of duties to curtail operators from processing bogus transactions, lack of suspicious behaviour monitoring to identify potential fraud and new staffs were not formally trained on operating the complex back office [32]. Likewise, there no procedures in place to investigate any issues that were reported such that this worst omission led to various fraudulent activities which lasted for many years before being unearthed [32]. See Table 3 for illustration.

Table 4: Payments fraud in the DFS Ecosystem (Adapted from: L. Denyes & S. Lonie, Digital Financial services and Risk Management, 2016)

Type of Fraud	How Fraud Control is changing with technology	Financial inclusion impact
User Authentication	Biometrics creating new possibilities. Online connections from point-of-account set-up to databases for identity confirmation can lower the cost and improve accuracy of KYC.	If biometrics can be integrated into actual payments, transaction fraud could be greatly decreased, making a payment system less expensive. Could reduce many aspects of account set up fraud as well.
Device Authentication	Multiple new fonts, chip cards are more fraud-resistant and mobile phones have multiple authentication possibilities.	Any large-scale technical fails on biometrics could hurt consumer trust in systems.
Data Analysis	The value of shared fraud data, long understood can be more easily realized with fully electronic transactions, AML/CTF techniques can be automated, reducing the need for manual processes.	Lower cost financial systems; reduced consumer/agent/provider losses.
Counterparty Certification	Online registration of merchants, billers, agents and immediate "black listing" of problem parties can be cost-effective in reducing multiple kinds of fraud, could scheme frauds of various kinds.	Lower cost and more trusted financial systems.

Notably, one common type of small scale agent fraud in DFS is by splitting large transactions into many smaller transactions and the agent would earn same commission multiple times instead of just once [32]. Another DFS agent fraud is when they register customers who have come in for an airtime top up for the mobile money service without their knowledge or consent and earn a commission for this [32].

Subsequently, the other DFS fraud is when an agent registers a genuine customer and then offers to demonstrate how the service works by doing a deposit, immediately followed by a withdrawal in order to earn a commission, as such the agent will earn a commission on both cash in and cash out despite no real exchange of money having happened [32]. See Table 4 below for fraud prevention issues.

Table 5: Fraud prevention issues [6]

Key issues	Examples
1. DFS providers are licensed and supervised under a regulatory framework.	DFS can only be provided by licensed entities (banks and non-banks) and are regulated by the financial regulator. The DFS provider is required to adhere to the licensing requirements at all time.
2. Regular network testing, real-time monitoring and security systems and processes.	To prevent and detect fraud there should be ongoing checks to ensure that information systems and applications are working correctly.
3. Due diligence to be conducted on staff and agents.	Due diligence is carried out on all staff (employees, contractors, agent etc.) prior to hiring.
4. Providers are responsible for their agents.	Providers are responsible for the conduct of their agents; ensuring providers effectively manage and train their agents.
5. Agent monitoring	To ensure that agents comply with regulations and guidelines their activities are monitored by providers. This may be done through onsite checks or mystery shopping. Clear sanctions are in place for agents who are found not to be complying.
6. Agent training	Providers ensure agents are trained to a higher standard to reduce the chance of errors occurring and to be able to offer knowledgeable support to consumers. Ideally training should be compulsory and ongoing.
7. Transactions occur in real time	When the network is down, consumers sometimes leave money with agents to carry out the transaction later. This can leave customers open to agent fraud, if the agent instead keeps the money. Real time transactions would cut down on this type of fraud, though in many geographical areas real time transactions are still challenging in practice.
8. Consumers are encouraged to report fraudulent activity	Consumers are aware of and understand the process to report suspected incidences of fraud to their provider or to financial and telecom regulators.
9. Consumer awareness campaigns on the common types of fraud	Consumers are informed of the common types of frauds prevalent in the market through various channels (such as SMS alerts, radio announcements, signage at agent location etc.).

2.1.3.3.5 Data protection and privacy

Data protection and privacy measures involve ways and means of collecting data, storing, sharing and exploiting customers' data [14]. Keeping customers' data safe is very important because misuse of data may result in: identity theft, user's credit profile damage, unsolicited offers, nuisance calls and the influx of fraudulent or unsolicited messages among other risks and harms [14]. However, data protection and privacy, is an area of consumer protection in DFS which is not only, in very early stages, but also has little law and regulation in existence [14]. Even though many new users of DFS are creating a digital footprint (i.e. accumulation of data as consumers use their digital device) for the first time, data privacy for DFS in Africa, still have many opportunities for data abuse coupled with leakages which are as the result of extended value chains and many players being involved in a transaction [33].

Arguably, in Uganda, the government in that country did not only misuse data on claims of national security but it also passed it to business entities in order to promote their services through unsolicited messages [33]. The United States' commercial privacy regime is arguably the oldest, most robust, well developed and effective in the world although it is not universally acknowledged [34]. In fact, the US has led the way for the world by:

a) Establishing model legal data protection standards in the 1974 Privacy Act;
b) Imposing affirmative data breach notification and information security requirements on private entities that collect or process personal data from consumers, employees coupled with other individuals [34].

As an illustration, data protection and privacy concerns are distinct issues that enhance DFS transactions and are linked to consumer protection policies within banking services coupled with telecommunications including certain practices in financial regulation [35]. Likewise, DFS agents are exposed to various types of consumers' data such as: sender and receiver IDs, their geographic location, time of day, mobile numbers and the transactions involved in DFS may create a data trail that could be used to defraud the consumer [35]. For instance, a study conducted by Gilman and Michael on Managing the Risk of Fraud in Mobile Money, postulates that Vishing/Smishing scams which are as the result of customers being tricked into sharing personal information like personal identification number (PIN) are too common [36]. Similarly, it has been revealed through a study conducted by Kaffenberger and Butt that few users

understand the concept of PIN and how best to protect it [37]. In fact, allowing access to end user data may not only allow for improved products/services, but may also be used incorrectly, resulting in invasive advertising (e.g. spamming) and aggressive selling [14]. As such, these trade-offs should be top of mind as regulators determine the appropriate level of privacy so that financial inclusion is enhanced [14]. Table 5 is an illustration of the key issues of regulation contained in data protection and privacy.

Table 6: Data protection and privacy [6]

Key issues	Examples
A) Encryption of data	Where feasible, data related to DFS is encrypted both when in transportation and when stored. The systems in place which encrypt data are regularly tested and problems addressed.
B) Access restriction to consumer data	As a measure to prevent the misuse of data, providers implement levels of authorization and/or separation of roles to ensure that employees, agents, or business partners are not able to access the entirety of a consumer's data without justification.
C) Informed consent	Customers are clearly and effectively informed of what data will be collected and how it will be used, prior to its collection and use, and are given the option to consent or not.
D) Minimisation of data collection and limitation of retention	Providers limit the amount of personal data they collect from consumers to only what is necessary for the purpose. Providers limit the retention of data and destroy data after it is used for its intended purpose.
E) Protection of personal data	Providers ensure that personal data is maintained securely, and there are authentication systems in place. There are repercussions in place when personal data is misused.
F) Clear policy on data collection and sharing	Providers should have a data collection and handling policy which states what types of data will be collected and under which circumstances it may be shared.

Above all, privacy and data protection laws will generally need an overhaul in many countries that have as yet only rudimentary legislation [1]. As such, they may rely extensively on recent data protection adopted in the European Union which applies to the processing of personal data of data subjects in the EU, regardless of the location of the data controller and/or of the data processor [1].

2.1.3.4 Market Access

2.1.3.4.1 Background information

Market access entails specifying the types of entities that should be allowed to hold a mobile money license or rather offer digital financial services [14]. Similarly, regulatory issues that allow an open system is beneficial for lower income end users because this would access coupled with driving prices down through increased competition [14]. Subsequently, cross-border money transfer regulations should aim to support open, low-value cross border payment in order to attract end users in different countries who might decide to use the similar DFS when transacting with their friends or families [14].

Expressively, Kenya's rapid scale up of DFS raises key questions for other countries on how best to regulate the mobile money sector for one to replicate similar success [38]. Likewise, regulation for DFS is paramount, granted that the practice enables or thwarts a healthy digital financial services ecosystem [14].

It must be remembered that, when Kenya closed down rural branches in 2005, due to high operational costs of maintaining them, the Central Bank of Kenya (CBK) oversaw an underdeveloped financial sector with high potential demand, despite suffering under the weight of inefficiencies and an inadequate statutory and legal framework to support the development of digital financial services [39]. Under those circumstances, when Safaricom Limited and Vodafone Group applied for the operation license at CBK, the bank was faced with a stark of two choices: whether to maintain the status quo and refuse the application on the grounds that the legal framework did not permit the participation of nonbanks, or to navigate the necessary risks to find a regulatory solution that would foster greater financial inclusion [39]. With this in mind,

CBK chose the latter as opposed to the former, which give a rare audience to Safaricom and its partners to have an all-inclusive enabling environment [39].

Even though the Central Bank of Kenya (CBK Act) gave the discretion to formulate and implement policies in order to best promote the establishment, regulation and supervision of efficient and effective payment, clearing and settlement systems to non-bank organizations, the Act was still weak on statutory authority which required CBK to issue regulations on payment services generally [39]. Subsequently, the statutory authority was only granted when the National Payment System Act was enacted in 2012, such that DFS in Kenya now have the mandate to operate in parallel with the formal banking system [39]. Notably, Safaricom and the CBK had to overcome the challenge of ensuring that the product design was compatible with the existing legal framework, and on the other hand, CBK had to be satisfied that Safaricom would not in any way be an intermediary for M-PESA customer funds of which the Banking Act restricted to licensed banks at that time [39].

2.1.3.4.2 Open market system and mobile network operator led

Important to realize, an enabling environment for DFS in Kenya, has enabled CBK, not only to allow Safaricom through Vodafone to partner with Vodacom in Tanzania, but the bank has also, allowed Safaricom to collaborate with Roshan in Afghanistan (i.e. in 2008) as well as with Nedbank in South Africa (i.e. in 2010) by unveiling an M-PESA mobile-based cash transfer services in the mentioned markets [36]. Moreover, CBK, in August 2009, authorized Safaricom to transact foreign exchange business while the United Kingdom (UK) partners were authorized by Her Majesty's Revenue & Customs (HMRC) to transact in international remittances which led to the establishment of M-PESA International Money Transfer Product such that similar arrangements have been extended to other countries in East Africa [36]. As an illustration, the pertinent legislations that influence the operations of DFS within Kenya include the following laws:

a) Central Bank of Kenya Act (enacted 1966, amended through 2009), creating the Central Bank of Kenya and defining its mandate;

b) Banking Act (enacted 1991, amended through 2010), regulating the activities of banking institutions within the financial sector in Kenya;
c) Guideline on Agent Banking (2010), providing for the appointment of agents to extend banking services within Kenya;
d) Draft Electronic Retail Transfers Regulation and Draft E-Money Regulation (stake holder consultations have been organized and comments to the draft are now being integrated), regulating electronic money issuance and exchange, as well as its transfer between different parties within Kenya;
e) The Kenya Information and Communications Act (enacted 1998, amended in 2010 and 2013), providing the mandate of Communications Authority of Kenya (CA) and a framework to regulate the information, communications, media, and broadcasting subsectors; A range of Kenyan information and communications regulations made by the Minister in charge of Information and Communications in tandem with the CA to regulate various aspects of the communications sector that include consumer protection, competition, tariffs, numbering, inter-connection, quality of service, among others;
f) The Kenyan Competition Act No. 12 of 2010 which includes Consumer Welfare in its part IV; The act repealed the weaker Monopolies and Price Control Act; The Act also established the Competition Authority of Kenya as an independent agency [36].

In like manner, in Zambia, the requirements for authorization or designation for issuance of electronic money should be applied to the Bank of Zambia (BOZ) and the following are the steps:

a) Any person intending to issue e-money shall apply to the Bank for authorization or designation;
b) Commercial Banks shall only require the Banks' authorization or approval to issue e-money. As such a bank shall be required to submit among other the following:
    i. A detailed product proposal;
    ii. Risk management framework for the product; and
    iii. Service level agreements and any other agreements related to the product [40].
c) Applicants other than commercial banks shall apply to the bank for designation [40].

d) The application shall be in a form prescribed by the Bank and shall be accompanied by such fees, and the form of application shall include the following:

i. Certified copies of the Certificate of Incorporation and Articles of Association of the company;

ii. The physical and postal addresses of its head office;

iii. The names and the permanent residential addresses of its directors and key senior management and significant shareholders or beneficial owners;

iv. The addresses of each branch proposed to be opened by the applicant and, in the case of mobile office, the area proposed should be served;

v. Details of the types of services proposed to be offered;

vi. Business plan with projected financial statements for at least three years that demonstrates that the applicant is able to employ the appropriate and proportionate systems, resources and procedures to operate soundly;

vii. Where the applicant is an established business, audited financial statement for the previous two years;

viii. The source and evidence of availability of capital;

ix. A description of the applicants governance arrangements and the internal control mechanisms (including it administrative, risk management and accounting procedures that demonstrate that those governance arrangements, control mechanisms and procedures are proportionate, appropriate, sound and adequate);

x. A description of internal control mechanism that the applicant has established to comply with its obligations in relation to money laundering and terrorist financing;

xi. The name and address of applicants' auditors, who shall be registered under an accounting body of Accountants and shall be subject to the approval of the Bank;

xii. The name and address of the applicant's proposed bankers;

xiii. Details of risk mitigation, management and control mechanisms that have been or will be put in place;

xiv. Standard Agency Agreements and Agreements with other key stakeholders;

xv. Proposed Holding Account Agreement;

xvi. Certified copies of all significant Shareholders, or Directors' identification documents;

xvii. Detailed curriculum vitae of each of the significant Shareholders, Directors and senior management such as the Chief Executive Officer, Chief Financial Officer, Chief Operating Officer, Chief Information Technology Officer and Compliance Officer;

xviii. Directors' questionnaires for significant Shareholders, Directors and Senior Management;

xix. Vital statistics forms for each of the significant Shareholders, Directors and Senior Management;

xx. Where a significant Shareholder, Senior management or Director is a non-Zambian, results of security screening from the country of origin; and

xxi. Any other information that the Bank may require [40].

e) At any time after receiving an application and before determining it, the Bank may by written notice require the applicant to provide to the Bank additional information or documents or direct the applicant to comply with such other requirements as the Bank may require [40].

f) Any information or statement to be provided to the Bank under this directive shall be in such a form as the Bank may specify; and the Bank may by written notice require the applicant to cause a report to be provided by an accountant or other qualified person approved by the Bank on such aspects of that information as may be specified by the Bank [40].

g) Where the Bank is satisfied that the applicant has met the requirements for designation, the Bank shall approve the application [40].

h) The Bank shall, where an application is approved and upon payment of an annual designation fee by the applicant, issue the applicant with the designation certificate [40].

i) A designation certificate may be issued subject to such terms and conditions as the Bank may impose [47].

j) A designation certificate shall remain valid unless it is revoked by the Bank [40].

2.1.3.4.3 Bank-led and partnership systems

In Uganda, DFS offered by MNOs are regulated by the Uganda Communications Commission (UCC) in Uganda, although a comprehensive regulatory framework for DFS has not been

developed [41]. Additionally, it is a requirement by BOU for DFS providers to partner with licensed institutions for them to offer DFS and hold DFS clients' funds in escrow accounts [41] [22]. In other words, the bank-led model does not allow MNOs to transact parallel operations of formal banking systems without going into partnership with a bank [42]. Moreover, Banks and other financial institutions in Uganda are not allowed to provide DFS under the current Banking Act (2000) unless these institutions foster partnership with a DFS providers [22]. According to the Bank Of Uganda (BOU), Mobile Money Guidelines, 2013; any person providing or intending to provide mobile money services should adhere to the following conditions:

a) Must be a registered limited liability company;
b) If not a Bank of Uganda licensed institution, then they should be in partnership with a licensed institution and application to Bank of Uganda should be sought in order to obtain approval for the provision of mobile money services in partnership with the mobile money service provider;
c) Must provide proof of its financial position, a business plan and a risk management proposal;
d) and must have in place appropriate and tested technology systems [36].

However, the primary weakness of the bank led model (i.e. model prevalent in Uganda's DFS) has been adoption among the poor of the country [10]. For instance, in Uganda, 33% among adults have active mobile money accounts as opposed to 13% of adults who have bank accounts in commercial banks [40]**.** In other words, the bank-led model adversely impact on the poor because barriers that make them not to open bank accounts in formal banking systems can prohibit them not to be integrated in the DFS system [43].

In Pakistan, the SBP regulations stipulate the procedure and documentation required for an authorized financial institution to provide DFS services [44]. As such, the Board of directors has the responsibility to ensure development of strategic plans for DFS such that the senior managers therefore have the responsibility to implement the plans [44]. Likewise, regulators have not only, imposed several restrictions to limit the scope of DFS banking, but also, the restrictions are meant to protect of consumers [44]. Even though money laundering need to be controlled SBP has ensured regulations are more flexible in order to ensure that an opportunity is availed for financial inclusion of un-accessed segment of population [44].

Subsequently, the Filipino Central Bank, (i.e. Bangko Sentral ng Pilipinas [BSP]) not only, has a strong financial inclusion mind set, but has also a belief that mobile money can help bring about financial inclusion [45]. Likewise, BSP worked with the mobile industry for a number of years to ensure development of an environment in the country that would ultimately facilitate mobile money services [45]. Consequently, BSP implemented several steps which formulated a central role in the development of the country's main mobile money services, such as Smart Communications Smart Money and Globe Telecom GCASH [45]. Subsequently, the role played by BSP resulted in non-banks (e.g. MNOs) to offer mobile money services [45].

Moreover, BSP has in essence taken a test and learn approach to regulation while creating legal certainty [45]. For instance, the BSP provided each operator with a letter of no objection which allowed them to build their service with certainty by avoiding going beyond the bounds of the law [45]. Eventually, after Smart Money and Gcash had being on the market for several years, more formal regulations were developed [45]. Subsequently, the BSP allowed non-bank agents to perform cash-in & cash-out enabled mobile money operations to scale their agent networks by utilizing the country's existing retail infrastructure including pawn shops, airtime resellers, and money changers [45]. In contrast, for agents to function efficiently, the BSP requires agents to do the following:

a) Apply to be an agent;
b) Ensure provision of relevant business documentation in their application;
c) Agents to undergo training on anti-money laundering;
d) Know your customer (KYC) should at least to be performed once for each customer coupled with allowing a number of different forms of ID to be used for KYC;
e) BSP has evolved these regulations over time to remove friction from the process [45].

In India**,** DFS is regulated under the terms of the 2007 Payments Act [46]. The Indian government introduced regulations which requires mobile money schemes be operated by banks such that M-PESA–type market cannot be allowed in this country [46]. Bank-led DFS in India have contributed to the slow growth of mobile money in India, as such only 4 percent of adults in the Global Findex snample reports have used a mobile phone in the past 12 months to pay bills or send or receive money [46].

Even though the financial inclusion program was launched in 2006 by the Indian government with the aim of extending banking services to 40% of India population, the government also adopted a bank-led model in the same year [46]. Subsequently, by March 2012, 96,828 Customer Service Points (CSP) have been established in villages across India under the bank-led model which encourages the opening of mobile banking accounts for the currently unbanked [46]. The Unique Identification Authority (UIA) of India issued a universal identity infrastructure called Aadhaar which is a 12 digit individual identification number that serves proof of identity and helps provide access to services like: banking, mobile phone connections and other government and non-government services [46].

Additionally, the regulatory stance in South Africa has mostly been with reference to electronic money, a subset of e-banking [47]. The legal and regulatory framework with regards to e-banking would apply to mobile banking [45]. As such, in South Africa, the consolidated legal framework comprises the following:

a) South African Reserve Bank Act;
b) National Payment System Act;
c) Banks Act;
d) Exchange Control Regulations (if cross-border);
e) Financial Intelligence Centre Act;
f) South African Reserve Bank Position Paper on Electronic Money [47].

In contrast, increasing entry and exit controls is likely to decrease access market access in the country and may limit competition and innovation [8]. Likewise, fragmented markets can be difficult to properly supervise such that regulators should aim at lowering entry and exit controls to ensure supervision does not suffer [8].

2.1.3.5 Payment systems

Payments are not only the connective tissue of a financial system, but they also link buyers with suppliers to allow governments to transact with their citizens coupled with connecting friends

and relatives in webs of financial support networks [48]. In contrast, roughly 2.5 billion people in the world live on less than $2 a day and 77 percent of them lack access to a bank account while the figure jumps to 85 percent in the sub-Saharan Africa [48].

Payment systems regulations should ensure that requirements for e-float to non-bank entities are identified and DFS providers are required to keep 100% of float in liquid assets in order to ensure refunds or redemption by the end users [14]. Likewise, an interest accrued on trust accounts by customers should be paid by custodian banks coupled with payment of interest on float [14].

In contrast, there are several weak protections for consumers which significantly impact adversely on them [1]. For example, some DFS providers do not clearly disclose amounts associated with a transfer such as: the interest rate applicable to a loan and USSD charge the customer may be paying for the transaction [1]. Although, some of the DFS providers may at times disclose payment fees via a uniform resource locator (URL) link to a website, they ignore the fact that many users only have Global system for mobile communication (GSM) access on a feature phone [1]. Likewise, some of the DFS providers only disclose prices after the customer has contracted the service, including fees and interest rates for loans [1].

As a matter of fact, some countries have developed rules as to what must be disclosed and when it must be disclosed to potential customers [1]. For instance, Tanzania's Electronic Money Regulations 2015 requires disclosure of fees and charges before imposing them [1]. In addition to the price of the financial services (e.g., fee for an inquiry, a transfer or transacting a loan), in many markets, there is a lack of transparency when it comes to the charges for the underlying telecommunications service (principally USSD) that customers use for those mobile financial services [1]. In fact, the customer may not even know whether the MNO is charging him or her when accessing a DFS provider for their session [1]. Notably, some MNOs inform the customer of the charge after the transaction while others do not inform the customer at all [1].

Subsequently, proper disclosure of payments to consumers should show the total effective cost of credit, including an annual percentage rate and one-off and recurring fees, as illustrated in Table 6 below.

Table 7: Basic consumer disclosures in digital financial services [1]

Poor disclosure	Better disclosure
"Your loan request of **** has been approved and funds credited to your account."	"You will receive ****. The annual interest rate is **% in addition to a fee of ****. You will make 3 weekly payments of: **** and repay a total amount of ****. Your first payment is due 7 days after you receive your loan. Early payments are welcome. Your next payment of **** is due on 8 July 2016. Please confirm you agree to these terms by pressing 1."

The prospects of financial inclusion for the unbanked can only be achieved when there is a defining or limiting payment scheme interchange between providers [49]. As such, in instances where interchange from one DFS provider to another is required or makes sense, providing a sunset period (where interchange is at first limited than phased in) may avoid higher retail prices in the long run [49]. Requiring interoperability of digital financial services providers and schemes for financial inclusion perspective to be achieved entails avoiding fragmented markets which may limit access and usability for end users [49]. Moreover, it is the duty for regulators to ensure that they aim to achieve full interoperability across all DFS providers and schemes [49].

2.1.3.6 Management of risk

The undocumented end users may be restricted from opening accounts due to Know Your Customer (KYC) requirements for digital financial services providers [49]. For instance, the BSP requires agents to do the following:

a) Apply to be an agent;
b) Ensure provision of relevant business documentation in their application;
c) Agents to undergo training on anti-money laundering;
d) Know your customer (KYC) should at least to be performed once for each customer coupled with allowing a number of different forms of ID to be used for KYC;
e) BSP has evolved these regulations over time to remove friction from the process [50].

Similarly, this kind of a wave of regulation has swept the World in recent years, requiring MNOs to register subscribers and has been ultimately so forceful that non-compliance has led to disconnecting a large numbers of customers like in Uganda's MTN which disconnected 3.7 million customers in 2015 and imposing of major fines such as the Nigerian Communications Commission which imposed the World's largest ever known fine on a telecommunications operator (i.e. MTN-Nigeria) for failure to carry out registration [1]. Notably, Telecommunications KYC requirements have increasingly become an input to compliance with KYC requirements for DFS, such that in Uganda, the Bank of Uganda is in the process of approving the introduction of lending products by MTN in collaboration with the bank CBA, relying on the information it collects at the time of SIM registration to open bank accounts [1]. As the matter of fact, control of risks through using banking and payment systems for fraudulent, terrorist and money laundering purposes is managed through financial regulation by licensed financial institutions [1].

One key point to remember is that financial inclusion can be enhanced especially for the unbanked only when tiered access is preferred [49]. In fact, tiered or progressive KYC rules vary with the following parameters:

a) the content of information that the system needs from consumers;

b) the type of documentation customers must bring to verify information, (e.g. national IDs, birth certificates, evidence of residence);
c) Method of verifying documents (i.e. face-to-face meetings, cross-referencing to other databases and whether such verification can be delegated to agents) [1].

Similarly, when consumers are connected to a national identity scheme it may prove beneficial to the unbanked who may otherwise have few forms of identification coupled with the national identity scheme with biometric components could be a powerful tool for avoiding payments to ghost recipients [12]. See Figure 6.

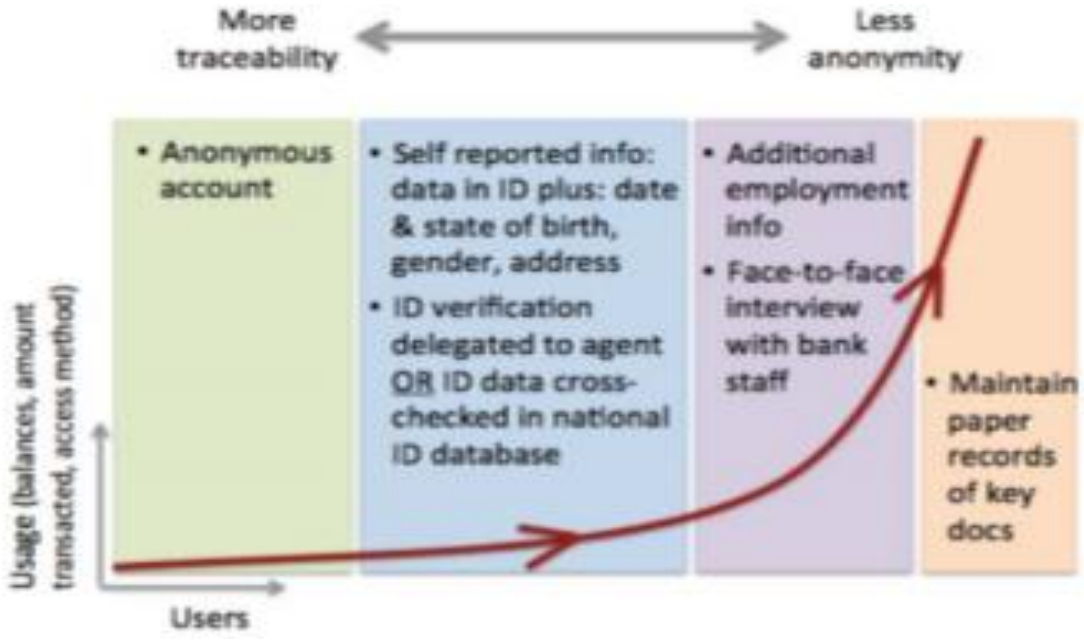


Figure 6: Progressive KYC in Mexico[6]

However, following the financial inclusion perspective, it is not in order to have overly tight Anti-Money Laundering (AML) for combating the financing of terrorism (CFT) because this will not only discourage usage or make the cost of operating a system high but also lead to prices unsupportable for poor populations [49]. As the matter of fact, it is the duty of regulators to ensure they aim to achieve risk proportionate AML/CFT monitoring for financial inclusion to be achieved [49]. Likewise, there should be AML/CFT reporting of any suspicious activities even for lower-risk accounts coupled with properly training and monitoring of agents in order for them to follow all required customer due diligence procedure upon account opening (i.e. as required for cash-in, cash-out, bill payments etc.) [49].

[6] Source: R. Macmillan, Digital financial services: Regulation for financial inclusion an ICT perspective

2.1.3.7 Other related issues

The customers of DFS services need high quality of service as such telecommunication regulations should ensure meeting minimum quality of service requirements [49]. As such, agents should be accorded regulations related to labour laws due to the critical role they play in supplying digital financial services especially to the unbanked [49]. In contrast, agents' services may not be commercially viable if the cost to serve becomes too high, as such regulators should factor this balance and how it may intersect with labour laws [49]. Additionally, financial inclusion perspective entails avoiding dissuading merchants with sudden taxes on gains especially the unnoticed and untaxed when using [49]. Consequently, regulators are supposed to be very cautious with the manner they implement and message tax policies to merchants in order to cater for the lower income end users as such considerations should be tailored at creating new tax policies meant to actively urge merchant participation in the DFS ecosystem [49].

2.1.3.8 Managing the environment for regulation

Even though, a large number of populations have mobile connectivity, a digital-payment infrastructure is very important to support digital finance and should include:

a) A robust digital-payment backbone to enable connectivity to banks, telecoms companies and other players;
b) A wide network of CICO points to serve people with cash when they need it;
c) Countrywide POS terminals to accept digital payments so that customers can replace cash purchases with digital ones [50].

Similarly, due to the complexity of the DFS regulatory environment it is imperative for the two sector authorities (i.e. financial services and telecommunications) to collaborate in order to address issues [49]. According to the study by ITU-T Focus Group Digital Financial Services on how regulators currently work, the following were the findings:

a) The majority (i.e.83% of respondents) indicated that digital financial services (DFS) are currently offered in their country while the minority (i.e. 17% of respondents) said DFS are not currently offered but half indicated that these services will be offered in the next 12 months;

b) Out of all the countries currently offering DFS, 64% of them are licensed MNOs, 35% and 32% allow MNOs to offer DFS through joint ventures and wholly controlled subsidiaries respectively;
c) More than 80% of respondents coordinate with the Central Bank on DFS activities while over half cited a formal relationship with 20% citing an MOU and 33% citing a Task Force [49].

As a matter of fact, regulators tend to be rather passive in emerging markets [51]. Regulation is often characterized by a lack of guidance and clarity on security issues, such as digital know-your-customer (KYC) protocols, or the use of technology enablers, such as cloud or mobile [51] [51]. In fact, authorities sometimes fail to keep up with the rapid pace of technology evolution because of: lack of expertise and limited interaction and consultation with other regulators, FIs and external parties such as technology vendors and independent experts [51].

As an illustration, The Nigeria Communications Commission (NCC) does not only regulate the MNOs, but it also manages the Nigerian regulatory framework (2009) [43]. In fact, the NCC has been mandated with the responsibility to regulate the supply of telecommunications services and facilities, promoting competition, and setting performance standards for telephone services in Nigeria [43]. Likewise, NCC ensures that MNOs:

a) Allow subscribers to use any mobile payments system of their choice;
b) Do not receive deposit from the public except in the respect of prepaid air time billing of their subscribers;
c) And are not allowed the use of the prepaid airtime, although this seems to have not had a greater impact on financial inclusion compared to the case of Kenya where regulators have allowed MNOs to handle financial transactions [43].

2.1.4 Higher institutions challenges

Recognition for skills and human capital is not only, widespread but has also become the backbone of economic prosperity and social well-being in the 21st century [52]. It is important to realize that nations can prosper if they retain their competitive edge by continuous development and sustenance of skilled workforce [52].

However, the UNESCO institute for Statistics (UIS) revealed that enrolment trends in higher education institutions have been increasing worldwide from roughly 32.5 million students in 1970 to 178 million in 2010 such that the number of higher education students is forecasted to expand further to reach 263 million worldwide by 2025 [52]. See Figure 7 for illustration.

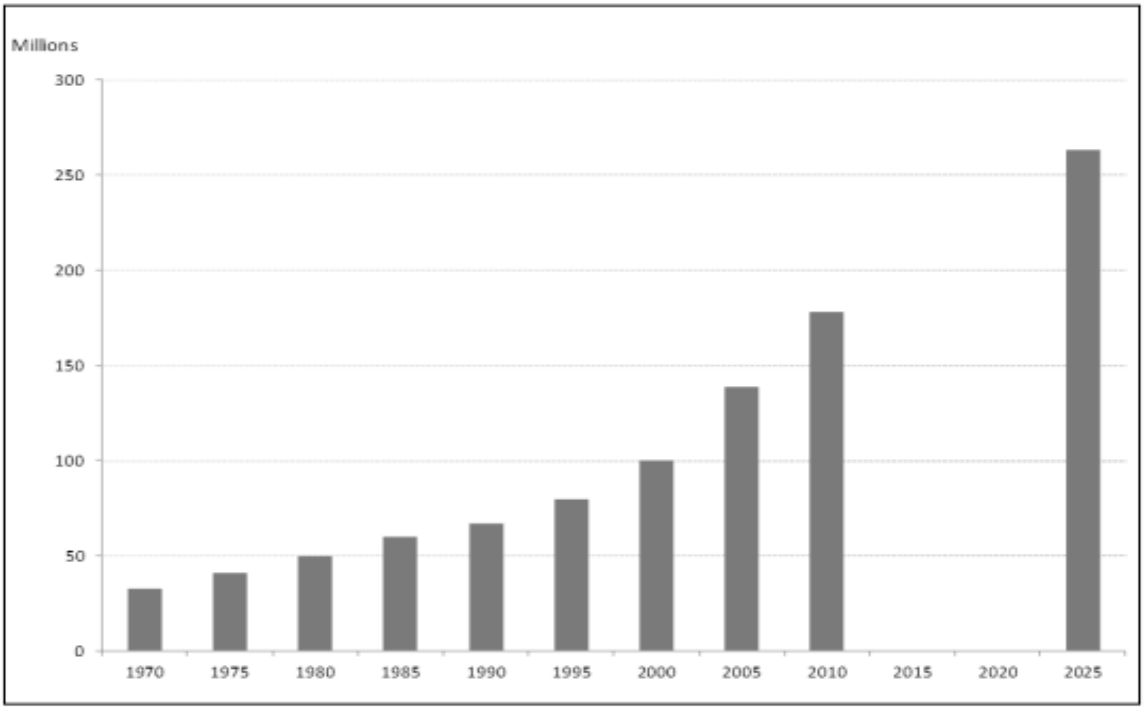


Figure 7: Trends in higher education enrolments worldwide from 1970 - 2025[7]

2.1.4.1 Challenges faced by South African universities

Important to realize, the major challenge that most of the South African universities are facing is inadequate financial resource [53]. Lack of adequate funding for institutions does not only impact negatively on adequate remuneration, but also, limits the universities' ability to invest in various activities such as: infrastructure, facilities and equipment which eventually, limit research capabilities [53]. In fact, it is the responsibility of the State, through the department of higher education and training to secure and advance high-level research capacity which can

[7] Source: UNESCO Institute for Statistics Data Centre for 1970-2010 and Daniel (2009) for 2025 forecast.

ultimately enhance continuation of self-initiated, open-ended intellectual inquiry and the sustained application of research activities to technological improvement and social development in South Africa [53].

Another key point, researchers in South Africa have suggested other challenges that have impacted negatively on higher education institutions in that country such as: lack of interdisciplinary infrastructure that can train researchers in integrated research, lack of quality journals to publish in and lack of a college of peer [53]. Likewise, South Africa has a huge intellectual capital in its South African higher education that is still untapped because of inadequate funding needed to implement research in various fields [53].

2.1.4.2 Challenges faced by United States of Africa higher education system

First thing to remember, the USA higher education system has also prided itself in its rich diversity of higher education institutions [54]. However, the major challenge in the U.S higher education systems has been growing concerns about whether American colleges and universities are funded sufficiently in order to maintain their high reputation in an increasingly competitive world [54].

In the same fashion, many analysts, parents and students have always wondered of the ever increasing cost of tuition which has not only, outstripped household incomes but has also, adversely impacted on the socially disadvantaged groups to access higher education [54]. Similarly, the other challenge that has impacted on USA higher education institutions in the USA is dramatically lagging behind of many developed nations in percentage of students completing college and which is even falling behind a few other nations in the percentage of students attending college [54].

2.1.4.3 Challenges faced by India's higher education system

India's higher education system is not only, the second largest in the world, but has also, higher unprecedented enrolment levels every successive year [55]. Recent studies indicate that the higher education system in India has the following challenges:

a) Heterogeneous education system based on geographical, rural-urban, rich-poor set up have pose a great challenge for the educational institutions such that varieties of colleges, universities, technical institutions have produced different types and quality of education that adversely imparts on the education system;
b) Most of the institutions that impart education in India are owned by the dominant political leaders as such there is interference of political factors and own youth cells which encourage students' organization on political basis and students' energy is exploited for political purposes;
c) Economic difficulties is one of the most troublesome challenge that have negatively impacted on most students who are unable to provide the minimum necessities of life for themselves such that students hold part jobs in order to pay for their educational expenses;
d) Rapid growth of science and technology and subsequent industrialization in India, has become a great danger to old moral and values such that it has led to lack of moral values for the younger generation's dissatisfaction and revolt has become an outcome of the decaying system of values [55].

2.1.5 Related works

The Figure 8 describes countries that have developed innovative policy solutions in order to enhance mobile financial services. However, there is no one size to all with regards to DFS. In this section, related works elaborates DFS that have recorded success in their countries.

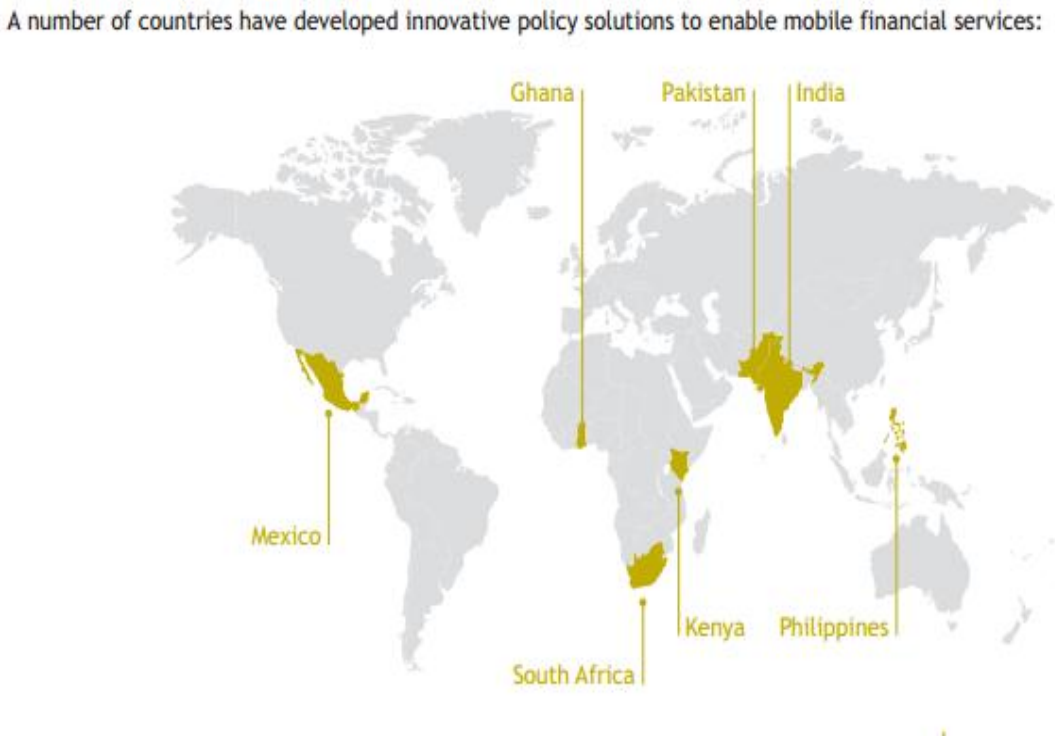


Figure 8: Innovative policy solutions in countries[8]

2.1.5.1 Easypaisa - Pakistan

Easypaisa is one of DFS found in Pakistan which was established in 2009, by Telenor Pakistan and Tameer Microfinance Bank [56]. Even though, Pakistan has 89 percent of the adult population with no bank accounts, the intention of Easypaisa aims at integrating most of unbanked and banked population in that country [56].

First thing to remember is that, customers using Easypaisa do not only, require a mobile phone or account with Telenor to pay their bills or to send/receive money, but also, require to make transactions at any of the 20 000 Easypaisa shops found in the country [56]. As a matter of fact, mobile account subscribers Easypaisa platform, use their own mobile phones for all transactions although, they are requested to go to the designated Easypaisa shops in within Pakistan to either deposit or withdraw cash from their Easypaisa mobile account [56]. Another key point,

[8] Source: https://www.google.co.zm/

Easypaisa is used for various daily transactions such as: bill payments, money transfers, airtime purchase, savings and insurance, retail purchase, corporate solutions, viewing account balances and recent transactions coupled with managing PIN codes [56]. See Figure 9.

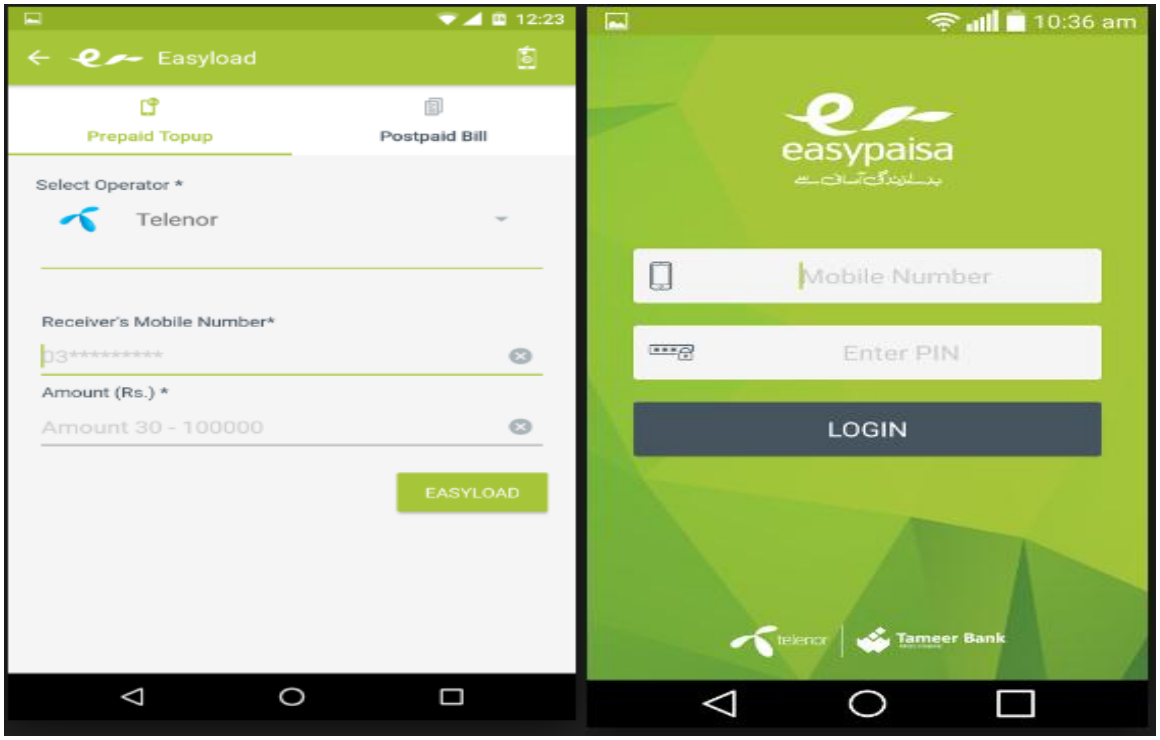


Figure 9: Easypaisa mobile phone wallet[9]

2.1.5.1.1 Key features and security of Easypaisa

Important to realize, Easypaisa uses one-to-one (1–1) model of business such that one financial institution like a Bank in collaboration with mobile telecom company under the regulations and supervision of State Bank of Pakistan will provide mobile banking services to its subscribers [57]. As an illustration, the lists of services offered by Easypaisa are:

i. Opening and maintenance of branchless accounts;
ii. Money transfer using person-to-person transfer (P2P);
iii. Money transfer using accounts which is referred to account-to-account transfer;

[9] Source: https://www.google.co.zm/search?q=images+of+easypaisa+transaction+screenshots+

iv. Utility bill payments;

v. Cash deposit and withdrawal;

vi. Merchant payments (i.e. purchases etc.);

vii. International remittances [57].

Easypaisa technology is based on USSD and internet coupled with the minimum security requirements as stipulated by the State Bank of Pakistan (SBP) [57]. As an illustration, the strength of DFS in Pakistan is based on three factors called: Non-repudiation and subscriber accountability, Central Control of Accounts/Transactions and ISO 27001:2005 certification [58]. Non-repudiation and subscriber accountability implies logging all subscriber financial transactions for evidence purposes such that when you are logged in, non-repudiation entails that the user will not deny the transaction performed when using the platform [58].

Moreover, centralized control of accounts/transactions entails processing all transactions through one main database of financial institution and SMS is send to both parties in order to provide ease of administration of the database server and other related backups [58].

Additionally, IS0 27001:2005 certification for information security management security system (ISMS) of which Easypaisa is accredited to, means that this DFS is accredited by United Kingdom Accreditation Services (UKAS) and compliance is audited by Moody International Certification Body (MICB) for evaluating the services to meet all international requirements [58].

2.1.5.1.2 Impact of using Easypaisa in Pakistan

Easypaisa is not only available in more than 800 cities and towns throughout Pakistan, but also, has an extensive network of more than 75,000 Easypaisa shops across the country [59]. As such, there are two ways of which customers can access the service like: through over-the-counter transactions (OTCs) from the nearest Easypaisa shops where agents assist with transactions (i.e. majority of transactions are made this way) or through the use of Easypaisa mobile accounts on mobile phones [59].

Although the initial deployment of Easypaisa was concentrated in urban areas where it was usually used to send money to the more isolated areas in rural Pakistan, the model can now pervade daily transactions such as: supporting airtime purchases, payment of bills, disbursement (loans, salaries) payments, charitable donations coupled with other banking products like insurance and savings [59]. Subsequently, Easypaisa introduced a merchant payment which supports online payments, including to a much lesser degree near field communication (NFC) mobile proximity payments [59].

2.1.5.2 G-Cash - Philippines

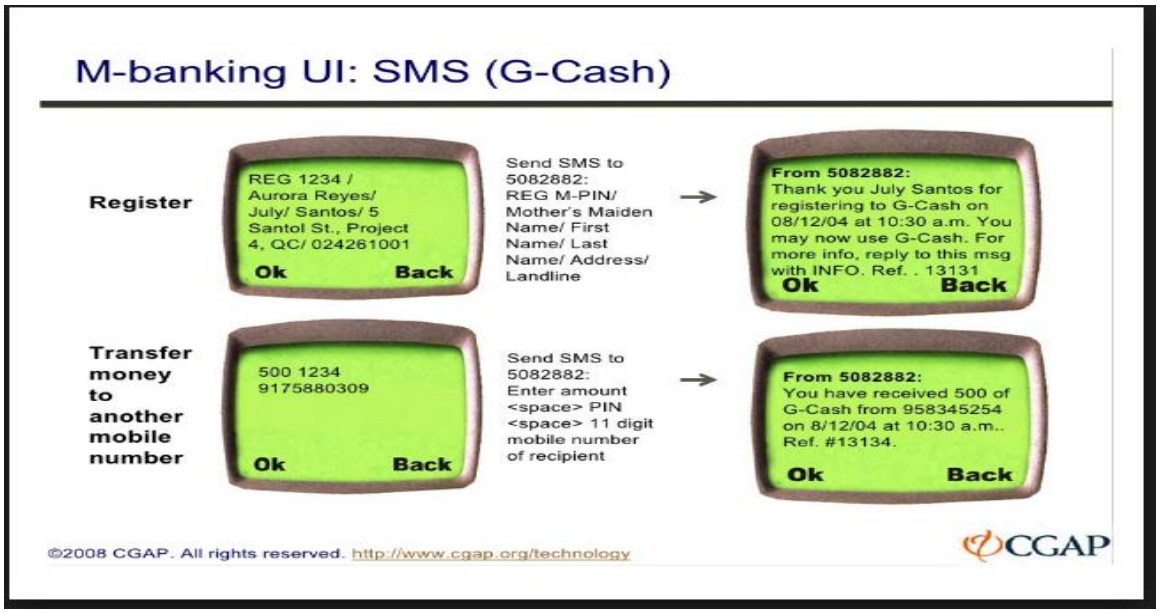


Figure 10: Transactions messages in G-cash[10]

G-cash is a DFS found in the Philippines and was established by Globe Telecom and launched in October 2004 [55]. G-cash makes use of a virtual wallet which can be installed on a mobile phone such that the services offered through this model are more: secure, faster and convenient for money transfers at the speed and cost of a text message [60]. As such, the recipient on the G-cash platform can easily receive a sender's remittance direct on their mobile phones [60]. In fact,

[10] Source: https://www.google.co.zm/

Globe Telecom issues an account (i.e. G-cash account) in which the money which is sent by the sender can be withdrawn by the recipient [60].

For the purpose of security, the recipient is sent an SMS alert indicating the amount sent to his or her G-cash account by the sender [60]. Significantly, G-cash has collaborated with the Rural Bankers Association (RBA) of the Philippines to ensure that mobile money is extended further into the rural areas on the Philippines in order to integrate the unbanked poor people in those areas [60]. See Figure 10 above for customer verification flow diagram in G-cash.

2.1.5.2.1 Key features of G-cash

The important main features that stand out on the Globe Gcash platform are:

a) Ability to Pay utility bills through the use of users' mobile phones;
b) Enables person-to-person (P2P) transfers such that users are able to send money to their relatives and friends;
c) The model uses a mobile wallet which can be installed on the users' mobile phone;
d) From the comfort of their homes or places of work, the use can increase air time credits by means of the mobile wallet found on the subscriber's mobile phone;
e) Sole traders and small business entrepreneurs can use the platform to pay for goods and services;
f) The basis of technology behind Gcash is called SMS and STK technology [60].
g) Above all, the general security features for Gcash model are as follows:
    i. One-time over-the-air (OTA) registration requirement by Globe Telecom to access the GCash services;
    ii. Downloadable GCash Menu requirement for mobile phone banking transactions;
    iii. Requirement of Mobile Personal Identification Number (MPIN) to enable mobile phone banking transactions
    iv. Enrolment of all clients at their respective bank branch for them to use mobile phone banking services;
    v. Signing of a Mobile Phone Banking Agreement listing all terms and conditions by customers [60].

Usage of a two-factor authentication process by customers by using their own registered mobile phone number (i.e. linked automatically to their SIM) and also confirmation of their identity using a Mobile Personal Identification Number (MPIN) to enhance security for all mobile phone banking transactions [61].

2.1.5.2.2 Impact of using G-cash in Philippine

Following the launch in October 2004, in Philippine, Gcash had approximately 1.3 million registered users as of March 2006 and 282 000 active users who had made transactions in the past 3 months [61]. Moreover, more than US$267 million have passed through the G-cash system since inception coupled with a vast distribution network of over 700,000 airtime loading retailers throughout the country [61].

2.1.5.2.3 Regulation of digital financial services in Philippine

The Filipino Central Bank, (i.e. Bangko Sentral ng Pilipinas [BSP]) not only, has a strong financial inclusion mind set, but has also a belief that mobile money can help bring about financial inclusion [50]. Likewise, BSP worked with the mobile industry for a number of years to ensure development of an environment in the country that would ultimately facilitate mobile money services [50]. Consequently, BSP implemented several steps which formulated a central role in the development of the country's main mobile money services, such as Smart Communications Smart Money and Globe Telecom GCASH [50]. Subsequently, the role played by BSP resulted in non-banks (e.g. MNOs) to offer mobile money services [50].

Moreover, BSP has in essence taken a test and learn approach to regulation while creating legal certainty [50]. For instance, the BSP provided each operator with a letter of no objection which allowed them to build their service with certainty by avoiding going beyond the bounds of the law [50]. Eventually, after Smart Money and Gcash had being on the market for several years, more formal regulations were developed [50]. Subsequently, the BSP allowed non-bank agents to perform cash-in & cash-out enabled mobile money operations to scale their agent networks by utilizing the country's existing retail infrastructure including pawn shops, airtime resellers, and money changers [50]. In contrast, for agents to function efficiently, the BSP requires agents to do the following:

a) Apply to be an agent;
b) Ensure provision of relevant business documentation in their application;
c) Agents to undergo training on anti-money laundering;
d) Know your customer (KYC) should at least to be performed once for each customer coupled with allowing a number of different forms of ID to be used for KYC;
e) BSP has evolved these regulations over time to remove friction from the process [50].

2.1.5.3 EKO - India

Even though, EKO was established in September 2007 in India, the model started operating in 2009, in order to provide financial services to non-banking customers coupled with connecting the telecom infrastructure to the bank's core banking system [62].

As a matter of fact, EKO desires to tap a huge potential market in India, by delivering banking services through the mobile phone banking which is substantially cheaper and affordable for a broader population, especially in a country like India where three quarters of the country's 1.25 billion people live on less than 2 dollars a day [62].

Likewise, EKO's other aim is to provide a platform for universal financial access and low-cost micro-transactions, such that the Reserve Bank of India (RBI) removed restrictions on agent exclusivity, in order to allow interoperability in systems so that customers can transact at customer service points of one bank even if their accounts are held at another bank [63]. Subsequently, EKO has served more than 1.5 million unique users [62].

Moreover, EKO has capacity to provide a multi-modal (USSD, SMS, and IVR11) approach to perform a transaction [62]. Consequently, EKO services work across all phones (i.e. lowest to most sophisticated handsets or mobile phones) such that it does not require a special SIM card or SMS application [62]. In fact, EKO also uses a two-factor strong authentication for the user to complete the transaction [62]. Moreover, usage of EKO model is very simplified such that the user requires numeric literacy for number dialing for a transaction to be performed [62]. See Figure 11 for illustration.

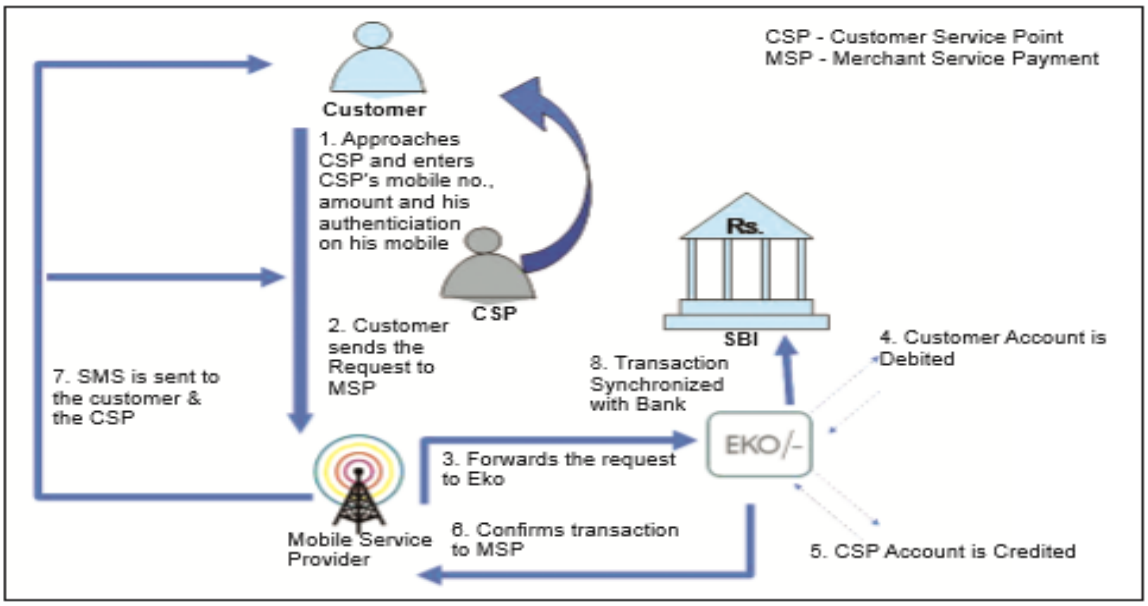


Figure 11: Transactions processes in EKO[11]

As an illustration, by using a mobile phone to act as an automated teller machine (ATM), POS device and debit card, it eliminates the costs of these additional elements [62]. Eko's banking solution is called SimpliBank and has a low-cost back-end embedded in a cloud system provided by Wipro (i.e. a cloud service provider in India) [62]. As a matter of fact, an existing open source software solution for microfinance called MIFOS was selected to form the core of SimpliBank and Eko added more components around this core in order to customize it for its operations [62]. In fact, SimpliBank effectively manages a high volume of small mobile-initiated transactions coupled with using cloud services for its infrastructure which is composed of: data center, storage, computer resources and security facilities [62].

2.1.5.3.1 Key features and security of EKO

The main features and technology involved in EKO are [62]:

a) Enables person-to-person money transfers;
b) Users are able to pay bills through this platform;

[11] Source: Global Policy: Digital Debates," *CyFy Journal*, Vol. 2, 2015.

c) The platform allows users to settle loan payments;
d) The technology used in EKO is called USSD.

EKO has multilevel authentication for its m-banking service which uses the phone number to act as the bank account number, the four-digit pin and the ten-digit transaction number [62]. Moreover, the platform has analytics provided by SimpliBank who also help in detecting money laundering and fraud patterns [62].

In India, the IT industry has not only been enthusiastic in adopting international quality standards such as ISO 27001 and ISO 27002, but also, these standards have been instrumental in enhancing the maturity of security programmes in Indian organisations [62]. The certifications against international standards have enhanced Indian service providers to international requests such that these DFS have gotten business from global clients [62].

2.1.5.3.2 Impact of usinf EKO in India

EKO's M-Banking has positively impacted on a number of categories of people such as: migrant workers, small business entrepreneurs and students [63]. Even though EKO started with an initial pool of 5,000 customers and a network of 200 agents the model has grown exponentially over time [63]. As the matter of fact, EKO has not only, served 912,485 customers through its 1500 customer service points (CSPs) across Delhi, National Capital Region, Bihar and Jharkhand, but also, employs more than 100 people [63].

Similarly, EKO has partnered with ICICI Bank (i.e. India's second largest private sector bank) by launching the Apna savings account scheme [63]. Likewise, EKO moved beyond the No-Frills Accounts to the large domestic remittances market in north India by adopting Tatkal (i.e. a remittance facility introduced by SBI in mid-2010) [63].

2.1.5.4 Wizzit – South Africa

Wizzit was the pioneer of branchless banks which was founded and launched in December, 2004 by two independent entrepreneurs to primarily target the almost 50 percent of unbanked

South African adults [65]. Wizzit does not only operate in partnership with the Bank of Athens, but also, had signed up approximately 300,000 customers by January 2010 [65].

As a matter of fact, to open a Wizzit mobile bank account, the Wizzkids request for a copy of the applicant's identity document (e.g. A South African Identity Book or Asylum seeker permits) [63]. Moreover, a photograph of the applicant is also captured such that the consolidated information is thereafter emailed to the Wizzit head office and when the client's account is opened, confirmation is sent to them [65].

As such, customers are primarily recruited by Wizzkids (i.e. formerly unemployed people who are trained by Wizzit to conduct KYC procedures) who provide clients with new Maestro-branded debit cards coupled with familiarizing clients with the use of the application [65]. Wizzit is a mobile phone agnostic (i.e. Customers can use their mobile phones operated by South Africa's MNOs) for several services [65]. For instance, transferring money to third-party accounts; checking balances and loading electricity accounts with prepaid credits buying airtime for prepaid mobile phone subscriptions such that the Bank of Athens is liable to the customers for their funds on deposit [65].

Wizzit has at present employed over 2,000 of Wizzkids who promote the product in townships and rural communities coupled with helping customers open accounts [65]. Likewise, Wizz Kids get commission for each new customer they recruit and when they open an account [65]. Transactions for the Wizzit service are initiated by using:

a) Unstructured Supplementary Services Data (USSD) – which combines digits and symbols (e.g. * at the beginning and # at the end);
b) The platform has a menu in English which appears on the customers' mobile phone when a request is sent;
c) Confirmation receipts are received by SMS [65].

As a matter of fact, Wizzit has no branches of its own although, it has collaborated with the Post Office and ABSA Bank through provision of approximately 3,500 sites deposits for Wizzit customers [65]. Similarly, the issuance of debit cards to Wizzit clients ensures that cash

withdrawals done at all South African ATMs [65]. As the result, employers can pay their staff by making payment directly into employees' Wizzit accounts electronically [65].

2.1.5.4.1 Key features and security of Wizzit

The key features for Wizzit are:

a) Allow users to carry out person-to-person (P2P) money transfers;

b) Users are able to buy air time;

c) Customers are able to check balances;

d) Users can view statements;

e) Allows users to pay electricity for their electricity;

f) The technology used is called Unstructured Supplementary Services Data (USSD) [66]. The services provide complete end to end security coupled with SIM Encryption, PIN security and Voice Recognition for security [66].

2.1.5.4.2 Impact of using Wizzit in South Africa

Since the introduction of Wizzit in 2004, the model has offered South Africans with an optional payment system that is relatively low-cost and can be used on any cell phone or any network to make and receive payments coupled with a Maestro-branded debit cards which can be used at ATMs and point-of-sale devices [67]. See Figure 12 for illustration of Wizzit transactions.

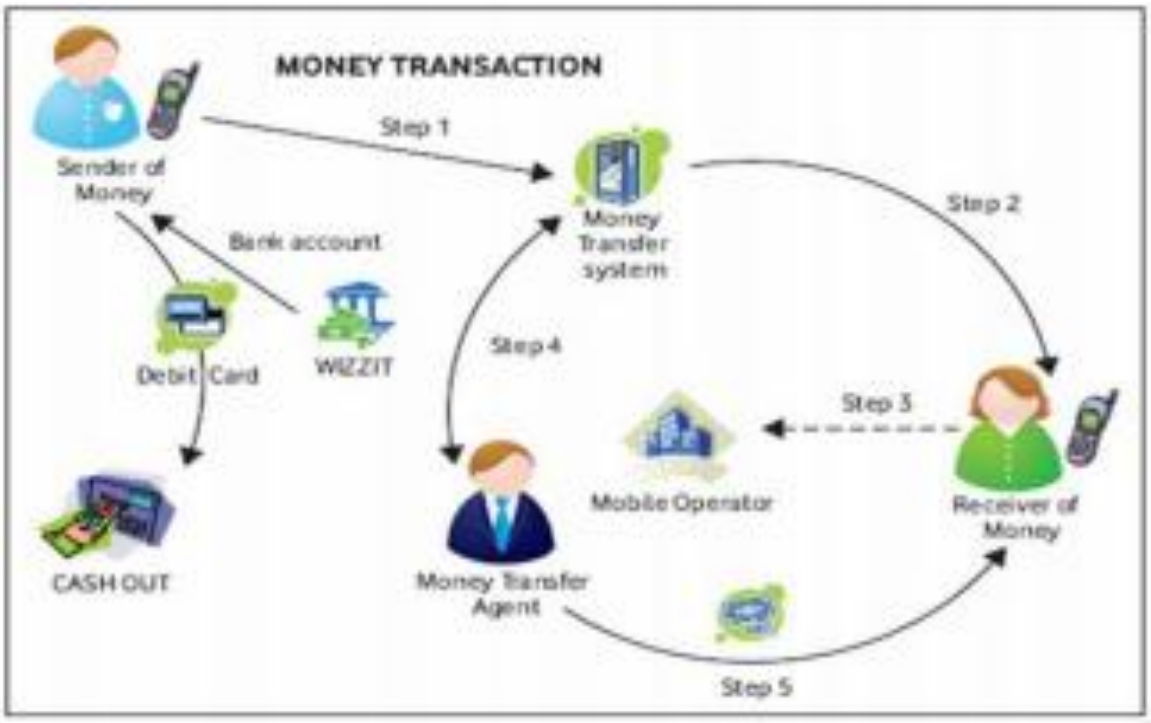


Figure 12: Wizzit transaction system[12]

2.1.5.5 M-pesa – Kenya

In the first place, a lot of countries can draw valuable lessons from Kenya's non-bank model which has recorded success in DFS usage by integrating 70 percent of the total population in their M-Pesa's platform [68]. As an illustration, when M-Pesa was launched in 2007, the share of adults using the M-Pesa mobile-money system in Kenya grew from zero to 40 percent within its first three years of launching and by the end of 2015; it stood at nearly 70 percent [69][75]. In like manner, M-Pesa has revolutionised business practices in Kenya such that it has become popular with the banked and the unbanked population who are using the platform to pervade daily transactions such as: paying suppliers for goods and services, paying bills, sending money to friends and relatives, withdrawing cash and topping up airtime accounts [69].

Similarly, the sole proprietors and small businesses in Kenya are able to make savings and gain access to more customers and new services through the platform of M-Pesa [70]. In fact, M-Pesa

[12] Source: Comparing MFS in Kenya, Philippines and South Africa under 7 P Evaluation Framework

(M for mobile, pesa is Swahili for money) is a mobile-phone based money transfer and micro-financing service, which was launched by Vodafone for Safaricom and Vodacom in 2007 and is the largest mobile network operator (MNO) in Kenya and Tanzania [71]. Different from the dominance of M-pesa in Kenya, the country also has other MNOs contributing to Kenya's non-bank model namely: Airtel, Orange and Yu [69]. In fact, the consolidated market share of Airtel's 16.9%, Orange's 8.1%, Yu's 10.5% coupled with M-pesa's dominance in Kenya has contributed to the unprecedented results of non-bank model digital financial services utilization in Kenya [69].

2.1.5.5.1.1 How M-pesa works

As a matter of fact, money deposited through M-pesa, does not generate interest, although this DFS can be thought of as a bank that provides transaction services which are operated in parallel with the formal banking system [69]. In particular, for the transaction to be implemented, the customers should not only own a Safaricom cell phone subscriber identity module (SIM) card, but also, must be registered as M-pesa users for Safaricom for them to accept deposits of cash [69]. Subsequently, the account is operated and managed by M-pesa which keeps a record of the quantity of e-float (i.e. money existing in your mobile phone account) owned by a customer at any particular time [69]. Markedly, M-pesa does not charge for depositing funds although a sliding tariff is levied on all withdrawals (e.g. the cost of withdrawing $300 is about $3) [69]. See Figure 13 for illustrations.

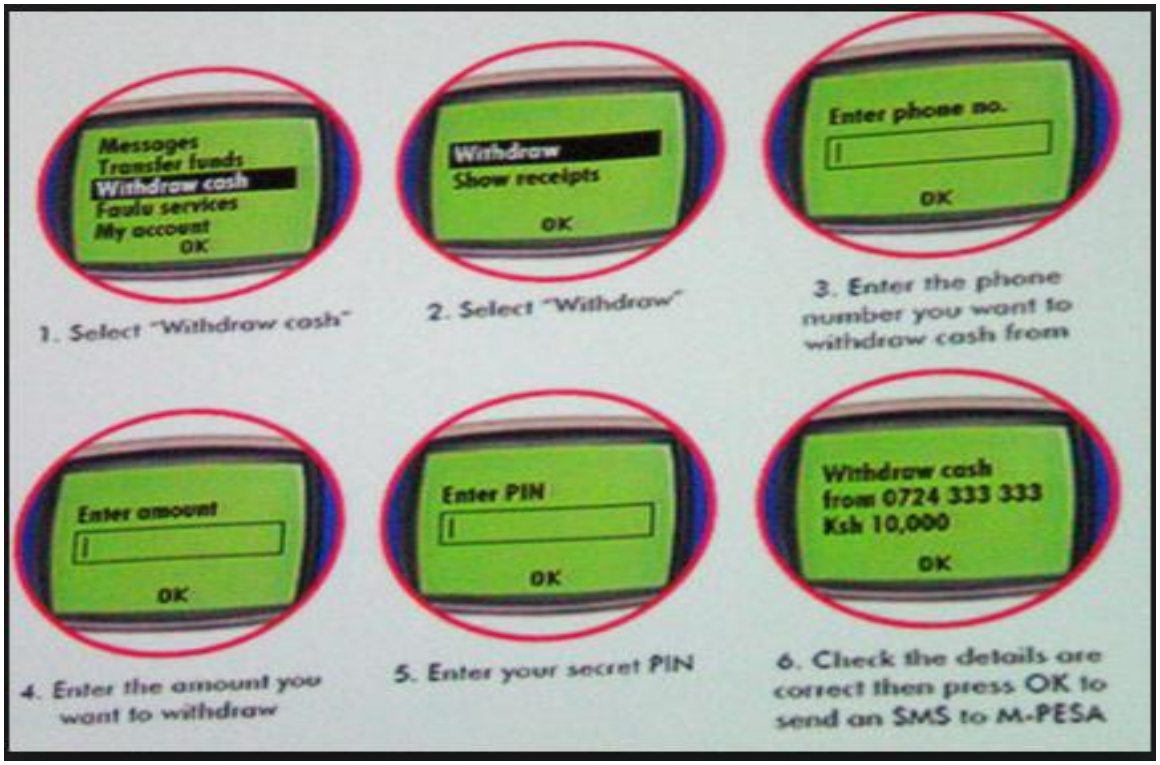


Figure 13: Transactions of M-pesa[13]

Comparatively, the tariffs levied on every withdrawals for M-pesa usage are very manageable for the majority poor people in Kenya when compared with other DFS in Kenya (i.e. Western Union, Postapay, M-PESA non-registered) [69]. See Figure 14.

Correspondingly, registration preliminaries are so simplified such that producing an official form of identification like the national ID card or passport held by all Kenyans is enough for one to be integrated in the system [69].

Every deposit made, Safaricom will formally issue a commodity known as e-float measured in the same units as money for every exchange for cash deposits made by customers and are held in an account of the user [69].

[13] Source: https://www.google.co.zm/search?q=m-pesa+transaction+screen+shot&biw

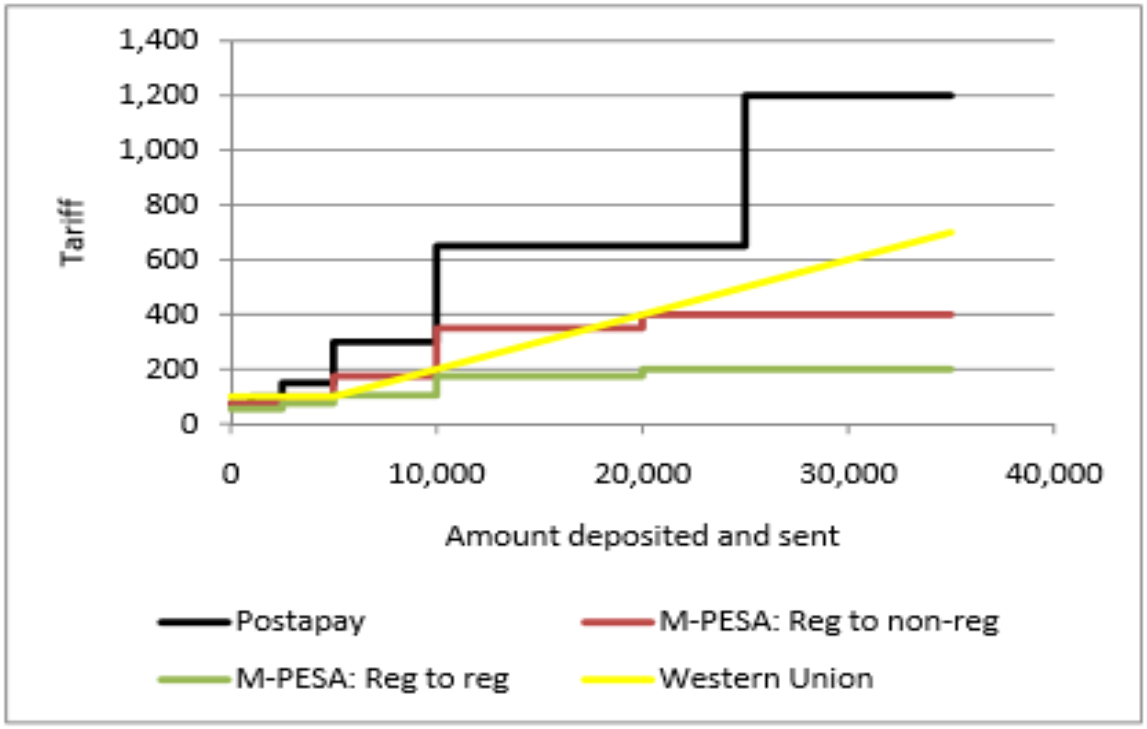


Figure 14: Comparative DFS tariffs in Kenya[14]

2.1.5.5.2 Key features and technology of M-pesa

The prevalent features and technologies found on the M-pesa platform are:

a) Person-to-person payment (P2P) transfers (i.e. an online technology that allows customers to transfer funds from their bank account or credit card to another individual's account via the Internet or a mobile phone);
b) Payment of school fees;
c) Ability to pay electricity bills;
d) Payment for goods and services;
e) And another key point, technology behind M-pesa is called SIM Application Toolkit (STK) (i.e. which is a standard for Global System for Mobile (GSM) [72].

[14] Source: Economics of M-PESA

As such, STK enables the Subscriber Identity Module (SIM) to initiate actions which can be used for various activities [72]. The other technology for M-pesa is called: Unstructured Supplementary Service Data (USSD) (i.e. GSM communication technology that is used to send text between a mobile phone and an application program in the network) [72].

2.1.5.5.3 Digital financial services and ecosystem in Kenya

Conversely, the successful record of M-pesa in Kenya can also be attributed to the blossomed DFS ecosystem in that country [13]. In like manner, Kenya's DFS ecosystem has not only succeeded in terms of operational utility but it has also excelled in terms of truly improving financial inclusion for the poor people in that country [10].

First thing to remember, blossoming of the DFS ecosystem is dependent on actors and services which hinge on two fundamental support structures such as: an enabling environment and a solid level of infrastructure readiness [10]. Certainly, for an enabling environment to be all-inclusive, the following factors should be available: laws and regulations, national policies, industry groups (i.e. individual providers and non-governmental organizations (NGOs) and development organizations working to implement DFS ecosystems [10].

Figure 15: Digital financial services in Kenya[15]

In the same way, for the DFS ecosystem to have infrastructure readiness, certain neat grits involving payment systems for transaction between and among end users and players should be available [10]. To put it in another way, the DFS ecosystem in Kenya has several consumers, businesses and governments that are involved in the use (i.e. users) and provision (DFS providers & support services) of digital financial services [10].

Subsequently, digital Financial Services ecosystem will encompass different activities such as: transaction accounts, payment services, savings accounts, Investment services, loans and Insurance services [10]. See Figure 15 above for illustrations of Kenya's digital financial ecosystem.

[15] Source: Digital Financial Services in Africa: Beyond the Kenyan Success Story. December 2014

2.1.5.5.4 Regulation of digital financial services in Kenya

Expressively, Kenya's rapid scale up of DFS raises key questions for other countries on how best to regulate the mobile money sector for one to replicate similar success [45]. Likewise, regulation for DFS is paramount, granted that the practice enables or thwarts a healthy digital financial services ecosystem [73]. In the event that, there is a healthy digital financial ecosystem the ability for value addition for all the different parties in the partnership ecosystem can benefit all stakeholders such as: customers, mobile network operators (MNOs), banks, agents, financial institutions and often other companies, such as retailers or dealers just to mention a few [73].

It must be remembered that, when Kenya closed down rural branches in 2005, due to high operational costs of maintaining them, the Central Bank of Kenya (CBK) oversaw an underdeveloped financial sector with high potential demand, despite suffering under the weight of inefficiencies and an inadequate statutory and legal framework to support the development of digital financial services [46]. Under those circumstances, when Safaricom Limited and Vodafone Group applied for the operation license at CBK, the bank was faced with a stark of two choices: whether to maintain the status quo and refuse the application on the grounds that the legal framework did not permit the participation of nonbanks, or to navigate the necessary risks to find a regulatory solution that would foster greater financial inclusion [46]. With this in mind, CBK chose the latter as opposed to the former, which give a rare audience to Safaricom and its partners to have an all-inclusive enabling environment [46].

Even though the Central Bank of Kenya (CBK Act) gave the discretion to formulate and implement policies in order to best promote the establishment, regulation and supervision of efficient and effective payment, clearing and settlement systems to non-bank organizations, the Act was still weak on statutory authority which required CBK to issue regulations on payment services generally [46].

Subsequently, the statutory authority was only granted when the National Payment System Act was enacted in 2012, such that DFS in Kenya now have the mandate to operate in parallel with the formal banking system [46]. Notably, Safaricom and the CBK had to overcome the challenge of ensuring that the product design was compatible with the existing legal framework, and on the

other hand, CBK had to be satisfied that Safaricom would not in any way be an intermediary for M-PESA customer funds of which the Banking Act restricted to licensed banks at that time [46].

Important to realize, an enabling environment for DFS in Kenya, has enabled CBK, not only to allow Safaricom through Vodafone to partner with Vodacom in Tanzania, but the bank has also, allowed Safaricom to collaborate with Roshan in Afghanistan (i.e. in 2008) as well as with Nedbank in South Africa (i.e. in 2010) by unveiling an M-PESA mobile-based cash transfer services in the mentioned markets [34].

Moreover, CBK, in August 2009, authorized Safaricom to transact foreign exchange business while the United Kingdom (UK) partners were authorized by Her Majesty's Revenue & Customs (HMRC) to transact in international remittances which led to the establishment of M-PESA International Money Transfer Product such that similar arrangements have been extended to other countries in East Africa [34]. As an illustration, the pertinent legislations that influence the operations of DFS within Kenya include the following laws:

a) Central Bank of Kenya Act (enacted 1966, amended through 2009), creating the Central Bank of Kenya and defining its mandate;
b) Banking Act (enacted 1991, amended through 2010), regulating the activities of banking institutions within the financial sector in Kenya;
c) Guideline on Agent Banking (2010), providing for the appointment of agents to extend banking services within Kenya;
d) Draft Electronic Retail Transfers Regulation and Draft E-Money Regulation (stake holder consultations have been organized and comments to the draft are now being integrated), regulating electronic money issuance and exchange, as well as its transfer between different parties within Kenya;
e) The Kenya Information and Communications Act (enacted 1998, amended in 2010 and 2013), providing the mandate of Communications Authority of Kenya (CA) and a framework to regulate the information, communications, media, and broadcasting subsectors; A range of Kenyan information and communications regulations made by the Minister in charge of Information and Communications in tandem with the CA to regulate various aspects of the

communications sector that include consumer protection, competition, tariffs, numbering, inter-connection, quality of service, among others;

f) The Kenyan Competition Act No. 12 of 2010 which includes Consumer Welfare in its part IV; The act repealed the weaker Monopolies and Price Control Act; The Act also established the Competition Authority of Kenya as an independent agency [14].

2.1.5.5.5 Adoption of M-pesa in other countries

Contrary to the great excitement about the potential for DFS and how it has addressed the financial needs of the poor in Kenya, other scholars have argued that M-PESA has not produced the same results after it was implemented in Tanzania [74]. A comparative study of Kenya and Tanzania, indicate that: both countries have similar populations of about 40 million although Tanzania is nearly twice the size of Kenya [74]. Likewise, Kenya has higher urban population of 41% compared to 30% of Tanzania, which is attributed to Kenyan government's encouragement or urbanization in order to promote urban economic development, whereas Tanzania supports a decentralized type of economy [74]. For one thing, the head of the family in Kenya would move to find employment in the city while leaving the entire families in rural areas which somewhat led to the dominant urban to rural regular remittance on money observed in Kenya accounting for up to 70% of all domestic remittances [74].

In contrast, the decentralized type of economy prevalent in Tanzania, has contributed greatly to the failure of M-PESA with regards to replicating the urban to rural remittances experienced in Kenya [14]. Moreover, failure to replicate results of M-PESA in Tanzania are due to the fact that: Kenya has a stronger economy with gross domestic product (GDP) of US$890 per capita while Tanzania has a GDP of US$520 per capita and Kenya has more developed banking system coupled with a number of bank branches compared to Tanzania [74]. That is to say, M-PESA agents are dependent upon the existing network of bank branches in Kenya to manage the cash required in their business, as opposed to the lower density of bank branches in Tanzania which makes cash management more challenging [74].

As a matter of fact, the major barriers that negatively impacted on adoption of M-PESA in Tanzania are: lack of education in general and high financial illiteracy levels (e.g. half of the

total population in that country have never heard of a debit card, an automated teller machine (ATM) machine or even knowing what current account entails) [74].

In fact, in the world of financial inclusion and digital financial services, no one size fits all, such that the appeal of mobile money is not very strong in the majority of developed nations [75]. Likewise many believe M-PESA platform will never reach Western Europe or the United States because less developed economies have many barriers compared to developed countries and the latter countries have existing services already which provide many of the same benefits (i.e. cards which provides liquidity, security, credit and reasonable fees) [76].

2.1.5.6 Zoona - Zambia

Brad and Brett Magrath founded Mobile Transactions Zambia, Ltd. (MTZL) (i.e. later rebranded to Zoona) in July, 2008 with funding from USAID and Dunavant with the aim of developing a product that would not only digitize payments but also provide communication to rural cotton farmers [77]. Likewise, around 2009, Zoona begun to develop the software that would process money transfers following an approval by the Banks of Zambia [77].

2.1.5.6.1 Initial growth strategy of Zoona

a) Members of the sales team were sent out to recruit agents in rural areas with three days diem coupled with a one-way bus ticket;
b) The recruiter was only given three days to find a person in town, while they were in rural areas, to cash out a money transfer to enable them buy a bus ticket back to Lusaka;
c) The people who were willing to cash out for the recruiter became the agent in that town;
d) However, this strategy only attracted three to five transactions per day;
e) The team quickly realized that agent location was essential to business success [77].

2.1.5.6.2 Market strategy, clients and partnership of Zoona

As an illustration, Brad Magrath and Mike Quinn (CEO) decided to be distributing flyers inside the main post office in Lusaka as part of their market strategy in order to compete directly with Zampost's money transfer service [77]. This market strategy did not only annoy the Post Master General, but also, caused Brad to be under citizen's arrest and was ultimately escorted to the Post Master General's office by a security guard who was armed with an AK-47 [77]. Even though Brad was stopped to be distributing flyers within the Post Office, the first outlet that Zoona established was in the Lusaka main Post Office parking lot [77]. Subsequently, there was an increase in the number of transactions for Zoona to 30 per day due to the first outlet which was opened and is still situated next to the main Post Office on Cairo Road in Lusaka, such that the spill over of many customers that Zampost's swiftcash attracted at that time were slowly being integrated in Zoona [77].

Zoona has continued to find more clients and partnerships with companies like: Zambia Breweries, Dunavant, and Airtel and has worked with organizations such as World Food Programme (WFP) on specific tasks [77]. For instance, Zambian Breweries used Zoona technology to collect payments from its micro beverage distributors from the almost 400 Zambian Breweries distributors [77]. Although, Airtel and MTN both launched mobile money in 2012, Zoona has not only, continued to attract more customers, but also, has more active consumers as compared to former and latter MNOs [77]. As a matter of fact, Zoona's sizable agent network has been key in supporting their over 700,000 active users such that approximately 300,000 people conduct at least one transaction per month [77]. In fact, Zoona's customer base was growing at an average of more than 65,000 new users each month in 2014, such that by November 2014, this DFS had over 500,000 transactions performed every month, at value exceeding USD25 million [77].

2.1.5.6.3 Achievements of Zoona

As an illustration, Zoona's Business-to-Business (B2B)/Busines-to-Consumer (B2C) business model, has reached most compelling evidence of success by focusing on meeting the

requirements for their clients through the use of their proprietary software [77]. Likewise, Zoona in like manner is a Kiva non-MFI mobile payments partner where agents can obtain loans [78].

In Zambia, Zoona is the most accessed digital financial service provider with 69 percent (see Figure 16) of the individuals in the country have accessed their services through their agent network which is spread through out the country [77]. Zoona internally refers to agents as its primary customers such that the company uses a framework of touchlines to map every single point in the Zoona agent's journey, from the beginning to the end [77].

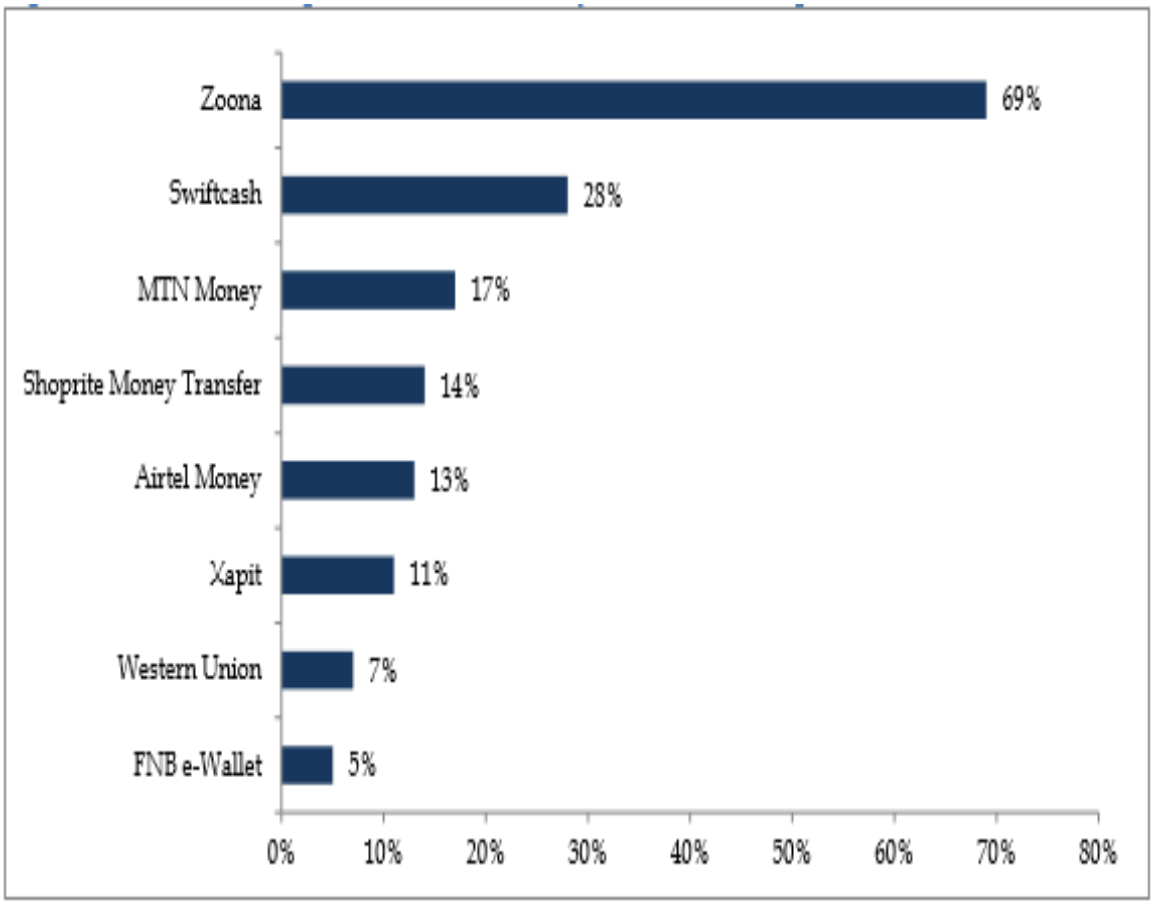


Figure 16: Utilization of digital financial services by individuals among providers[16]

[16] Source: ICT Survey Report – Households and individuals survey on access and usage of information and communication technology by households and individuals in Zambia in 2015

Money transfers through Zoona agents are done through provision of the sender's mobile phone numbers used should be registered in the system for the recipient to receive the transacted money by displaying the mobile phone numbers [78]. As such, the recipient is sent an acknowledgement of SMS verification that can be redeemed in cash at any nearest Zoona agent [78].To emphasize, Zoona charges a transaction fee which is tiered and is dependent on the size and type of the transaction made and agents also receive a commission for their service [78]. Additionally, Person-to-person transfers are charged an 8 percent fee of the amount sent, which is 25-40 percent cheaper than their formal competitors (i.e. Western Union or the post office) [77].

Figure 17: Zoona's monthly transactions for 9 months in 2014[17]

Surprisingly, companies like Dunavant (i.e. the leading cotton producer in Zambia), has managed to lower it costs, after using Zoona's platform such that farmers have been rewarded benefits related to: access to inputs, reduction of side-selling and improvement of recordkeeping and sales of input suppliers [77]. For one thing, the e-voucher and the mobile transaction histories the

[17] Source: Zoona: A Case Study on Third Party Innovation in Digital Finance

Zoona platform has are beneficial for building a financial identity for the farmer as such the farmer can be assisted with future access to credit [79].

2.1.5.6.4 Countries that have adopted Zoona

Even though Zoona started in Zambia, the company has embarked on the mission of replicating the successes attained in the country by expanding its market to other neighbouring countries like: Zimbabwe, Mozambique and Malawi [79]. Correspondingly, clients using Zoona are contributing to the colossal sums of money that the company is making, such that on the monthly basis the Zoona currently has more than 50,000 transactions valued at $3.5 milllion [79]. To put it differently, Zoona in Zambia provides services to over 60,000 people on the platform on the monthly basis [79].

2.1.5.7 Bitcoin

The Bitcoin phenomenon is another technology that could revolutionize money transfer in the near future [80]. Bitcoin lets you send money to anyone online, anywhere in the world at very low transaction fees such that, it the first decentralized electronic currency which is not controlled by a single organization or government [80]. Bitcoin is a type of virtual currency composed of digital bits which was devised by Satoshi Nakamoto and became operational in 2009 [80]. It is based on sophisticated mathematical schemes for encryption and digital signatures to protect against counterfeiting [80].

Bitcoin is the first digital currency that is completely distributed and does not require a bank or payment processor among users and whoever they are trading with such that the decentralization basis for Bitcoin is cardinal for its security and freedom [80]. Moreover, Bitcoin is open source software and is not controlled by any bank or government [80]. The central bank controls the kwacha supply to increase slightly faster than the growth of the economy, which entails the value of the kwacha falling slightly every year, in the phenomenon known as inflation [80].

However, Bitcoin is different from other payment systems because transactions are authenticated cryptographically and cannot be reversed to such an extent that there’s no need to restrict access

to the network. As such, there's no risk to accepting payments from complete strangers such that people don't need anyone's permission or trust to go into business as a Bitcoin-based merchant or financial intermediary [80].

Accepting Bitcoins also allows merchants to avoid much of the administrative overhead, like dealing with chargebacks that come with a conventional merchant account in financial banking organizations [80].

2.1.5.7.1 Key features of Bitcoin

Bitcoin is different from other payment systems because transactions are authenticated cryptographically and cannot be reversed to such an extent that there's no need to restrict access to the network [80]. As such, there's no risk to accepting payments from complete strangers such that people don't need anyone's permission or trust to go into business as a Bitcoin-based merchant or financial intermediary [80]. Accepting Bitcoins also allows merchants to avoid much of the administrative overhead, like dealing with chargebacks that come with a conventional merchant account in financial banking organizations [80]. Bitcoin on mobile phones will revolutionize payments and what a user needs to receive Bitcoin payments is to display the QR code in your Bitcoin wallet app and let a friend scan your mobile, or touch the two phones together (using NFC radio technology) [80].

2.1.5.7.2 Attributes of Bitcoin

Table 7: Regulation of Bitcoin in selected countries (https://www.google.co.zm)

Scope/Content	Country	Additional information
Prohibition	China	Banks and payment systems prohibited from dealing in bitcoins, individuals free to trade.
	Russia	Bitcoins cannot be used by citizens and legal entities.
	Iceland	Foreign exchange activities with Bitcoin illegal.
Prohibition of ATMs	Taiwan	Approval for Bitcoin ATMs refused.
Protection from money laundering & illicit activities financing	Singapore	Financial intermediaries to verify the identities of their customers and report suspicious transactions.
Taxing Bitcoin	USA	Bitcoin exchanges and most miners obliged to collect information on potentially suspicious transactions and report these to the federal government. The sale, exchange or use of Bitcoin for payment in a real world economy transaction may result in tax liability.
	Japan	The tax will cover gains from trading bitcoins, purchases made with bitcoins and revenues from transactions. Banks and securities firms will be prohibited from Bitcoin trades.
	Finland	Rules on taxation of capital gains apply when profits are made from transfer to another currency. Increase in value in Bitcoin after it was obtained as payment is also taxable.
	Germany	Profits from mining or trading subject to capital gains tax unless hoarded for at least one year.

Bitcoin's attributes have contributed to its adoption and has made this protocol become more supreme than other known mobile payment systems because of the following attributes:

a) Transactions on the network are pseudonymous such that whilst every transaction is publicly announced there is no easy way to link addresses to real world identities because of some techniques have been developed to get around this;
b) There are no direct costs of using the network and the miners who prop up the network have so far been incentivised largely by the creation of new coins;
c) Transactions are not location specific and can be sent across borders seamlessly;
d) Bitcoin's themselves are divisible down to eight decimal places but are not fungible in the sense that the history of each coin matters to determine its ownership;
e) Basic transactions are irreversible and once the transfer has been made there is no way for a third party to force a chargeback. Scripting allows for more complex transactions to be 14
f) selected places.

2.1.5.7.3 Universities utilizing Bitcoin

Bitcoin is used as an optional payment method for payment of students' tuition at Cumbria University found in northeast of England [81]. Cumbria University is the first public university in England, to roll out Bitcoin as an optional payment [81]. Likewise, some scholars have asserted that the University of Nicosia which is the largest private university in Cyprus in South America, has equally adopted Bitcoin technology and also offers a Master's degree in digital currency so that students create more efficient services for the betterment of society [82]. Many countries have been sceptical with matters of regulating Bitcoin because of Bitcoin system's possible impact on national currencies, its potential for criminal misuse coupled with the implications of its use for taxation [83].

2.1.5.8 Summary

There is no one size to fit all with regards to DFS. There are a lot of factors that should be put in place in order to enhance success of the DFS. The literature reviewed has highlighted the

importance of DFS ecosystem, regulation of DFS, challenges of higher education institutions coupled with related works in different parts of the world. Zambia and Kenya have similar parameters such that it is possible to replicate the achievements of Kenya's M-PESA in the country as shown in Table 8 below.

Table 8: Kenya and Zambia's parameter (E. Kabala & Seshamani, 2016)

Category	Parameters	Kenya	Zambia
		MNO	MNO
Social Context	Population	high	high
	Poverty levels	high	high
	Geographical area	urban/rural	urban/rural
Regulation	Operating licence requirements	high	high
	Knowing your customers	high	high
	Monitoring of MNO by monetary authorities	high	low
Existing mobile market situation	Population penetration	high	high
	Geographical coverage	high	high
	level of competition across MNO services	high	high
User perception	Trust in mobile operators/mobile money versus trust in formal banks	high	low
Potential demand	person to person money transfers	high	high
Pricing	Cost of mobile money services in relation to bank services	low	low

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter is focused on materials and methods that were used in this study. The chapter is structured around baseline study which includes: mixed methods research methodology, descriptive research design, target group, sample size, data collection tools, data analysis, ethical considerations, limitation of the study and presentation of findings. Similarly this chapter has system design methodology with the following subtopics: commercial banks, payment systems and sampled higher education institutions; current business process between commercial banks and higher education institutions; proposed model for higher education institutions; overall business process flow for the proposed model and areas of use.

Moreover, the chapter has system architecture which includes: system architecture, system requirement specifications, system modelling and design. As such, the study explains the methodology that was utilized to conduct the baseline study coupled with the methodology used to design the models and therefore implement the prototype.

3.2 Baseline Study

3.2.1 Mixed methods research methodology

The baseline study was used in order to investigate the methods and types of payment systems that students use in higher learning institutions of Zambia. Additionally, the use of the baseline study was to establish the major challenges faced by higher institutions of learning in the current student payment systems. As a result, the study used a mixed methods research methodology to analyse the data from the respondents.

As an illustration, mixed methods research is the type of research which involves the use of more than one approach to or method of design, data collection or data analysis within a single program of study (e.g. both qualitative and quantitative research), in order to integrate the

different approaches or methods occurring during the program of study, and not just at its concluding point [84]. As a matter of fact, mixed methods designs are used to provide pragmatic advantages when exploring complex research questions [85].

Subsequently, the study used qualitative data to deepen understanding of survey responses while the statistical analysis was done to provide detailed assessment of patterns of responses [85].

In contrast, the analytic process of combining both qualitative and survey data by quantizing qualitative data is not only time consuming but also expensive such that researchers working under tight budgetary or time constraints can compromise on sample sizes and eventually limit time spent on interviewing [85]. In this vein, these designs have become most appropriate for research that does not require either extensive, deep analysis of qualitative data or multivariate analysis of quantitative data [85].

Mixed methods approach to research, helps researchers to incorporate methods of collecting or analysing data from the quantitative and qualitative research approaches in a single research study [86]. Similarly, researchers can collect or analyse numerical data which refers to quantitative research coupled with narrative data which is the standard for qualitative research such that research question (s) are addressed as defined in any typical research study [86]. For instance, mixed methods approach entails that researchers might distribute a survey that contains closed-ended questions to collect the numerical, or quantitative, data coupled with conducting an interview by means of open-ended questions to collect either the narrative or qualitative data [86].

3.2.2 Descriptive research design

Descriptive research is meant to provide a picture of a situation as it naturally happens [87]. As such, it could be used to justify current practice and make judgment and also to develop theories [87]. As a matter of fact, descriptive research is meant to provide a picture of a situation as it happens naturally [87].

Likewise, a descriptive research design is used to explain the state of affairs at present existence [87]. For the purpose of this study, descriptive research was used to obtain pictures of the current prevailing payment methods in higher learning institutions of Zambia.

3.2.3 Target group

The study was made up of eight types of target groups of the digital financial services ecosystem comprising: students in higher education institutions, accounts personnel of higher education institutions, general users (i.e. consumers), banks, agents and regulators. The mentioned respondents were sampled from the: University of Zambia (UNZA), University of Lusaka, Cavendish University, Evelyn Hone College, Chainama Hills Colleges, Commercial banks, regulators: such as Bank of Zambia (BOZ), Zambia Bureau of Standards (ZABS) and Zambia Information and Communications Technology Authority (ZICTA) and digital financial services agents and the study areas comprised Kaoma, Chongwe and Lusaka.

The significance of targeting the mentioned groups was meant to capture primary data from the mentioned areas and focusing on Lusaka, Chongwe and Kaoma through purposively sampling was done to embrace respondents from urban and rural areas. Purposively sampling signifies how the researcher sees sampling as a series of strategic choices about whom, where and how one does one's research [88].

3.2.4 Sample size

A total number of 130 respondents were randomly selected for interviews. The sample size was manageable and wide enough for valid generalization to the entire digital financial services ecosystem in Zambia.

3.2.5 Data collection tools

3.2.5.1 Self-administered questionnaires

The self-administered questionnaires were used to collect information from all the respondents. The use of questionnaires was not only simple to administer, but questionnaires were also relatively inexpensive to analyse [89]. As a matter of fact, when alternative replies are provided in the questionnaires, respondents are able to understand the meaning of questions more clearly [89].

3.2.6 Data analysis

Data analysis for the study was done by computer based software known as Public Social Private Partnership (PSPP). PSPP is a free software application used to analyse sampled data and it's a free alternative for IBM SPSS with permission for everyone to copy, modify and share [90].

3.2.7 Ethical consideration

We sought permission from the places where the research was conducted from, by means of introductory letters which were given to authorities and respondents. Similarly, all questionnaires administered, did not allow respondents to disclose their names or any information that would review their status and ultimately compromise on confidentiality. Subsequently, all researchers need to be familiar with the basic ethical principles and have up-to-date knowledge about policies and procedures designed in order to ensure that there is safety of research subjects [91]. As such, this prevents sloppy or irresponsible research and any ignorance of policies designed to protect research subjects is not considered a viable excuse for ethically questionable projects [91].

3.2.8 Limitation of the baseline study

The ideal situation was to collect data from all the ten provinces of Zambia. However, it was difficult to achieve the intended purpose due to financial and time constraints. Moreover, financial constraints curtailed the initial plan of accessing gateway permission from the Mobile Service Providers to enable the prototype to demonstrate how the mobile application works on real mobile phone. The other limitation was from some target groups like: commercial banks and some of the digital service providers who entirely refused to take part in the survey for fear of disclosing their information to the general public. As a result, for this study, all the commercial banks that were disclosed as being paying points for students from higher education institutions will remain anonymous in order not to disadvantage them from other financial banking institutions.

3.2.9 Presentation of findings

Presentation of findings was done through summarized presentations in form of various tables and figures in order to facilitate understanding.

3.3 System design methodology

It is important to realize that the system requirements specification and model design phase of the research study employed, hinges on the use of qualitative data gathered through interviews of respondents in higher education institutions (i.e. students and accounts personnel from institutions). The other respondents which included: general users, commercial banks, DFS agents and regulators were interviewed in order to gather information concerning DFS ecosystem in Zambia. As such, all the respondents provided the qualitative data that is needed to specify requirements for the system, design models coupled with developing the system prototype for higher education institutions.

The methodology used for the analysis, design and development of the software system is the object-oriented systems development methodology (OOSDM). This research study utilized some of the diagrammatic representations that are present in the unified modeling language (UML) in order to visualize the system from various perspectives.

The object-oriented system development (OOSD) approach that was used in the system development process is one that is use case driven. The object-oriented system development life cycle (OOSDLC) was used for the system development in this research study in order to show multiple iterations to be carried out throughout the entire development cycle for the system to be gradually built in small modular increments.

3.3.1 Commercial banks, payment systems and sampled higher education institutions

This section describes the sampled commercial banks, type of payment systems and the sampled higher learning education institutions of Zambia. For the sake of anonymity and the gesture of

upholding confidentiality and not disadvantaging all the four recommended banks for students' remittance of funds, all the recommended banks are named as: Bank A, Bank B, Bank C and Bank D.

Commercial banks like Bank A and Bank B have pre-printed deposit forms/slips which allow students to fill in their particulars manually. As such, these slips are given to the bank teller for them to enter this information in the bank system

Payments that students make in recommended commercial banks relate to tuition fees and other fees (i.e. Student ID, detailed transcripts of results, penalty fees, library fees and medical fees etc.)

All the sampled students from the five institutions (i.e. University of Zambia (UNZA), University of Lusaka, Cavendish University, Evelyn Hone College & Chainama Hills Colleges) indicated that they deposit all tuition fees and other fees (e.g. penalty fees, student identity card fees and library fees etc.) in commercial banks.

Except for the UNZA undergraduate students who are able to register online on their institutional website following the remittance of tuition fees in commercial banks, all students from the mentioned higher education institutions take the printed receipts from the banks to their respective institutions for exchange with institutional receipts from the accounts department.

3.3.2 Current business process between commercial banks and higher education institutions

It is mandatory for all students from the five institutions (i.e. University of Zambia, University of Lusaka, Cavendish University, Evelyn Hone College & Chainama Hills Colleges) to deposit their tuition fees and other fees in the recommended banks (e.g. Bank A, Bank B, Bank C and Bank D).

Some of the recommended banks have specific deposit slips meant for students remitting payments in the bank. See Figure 18 and Figure 19 for illustration.

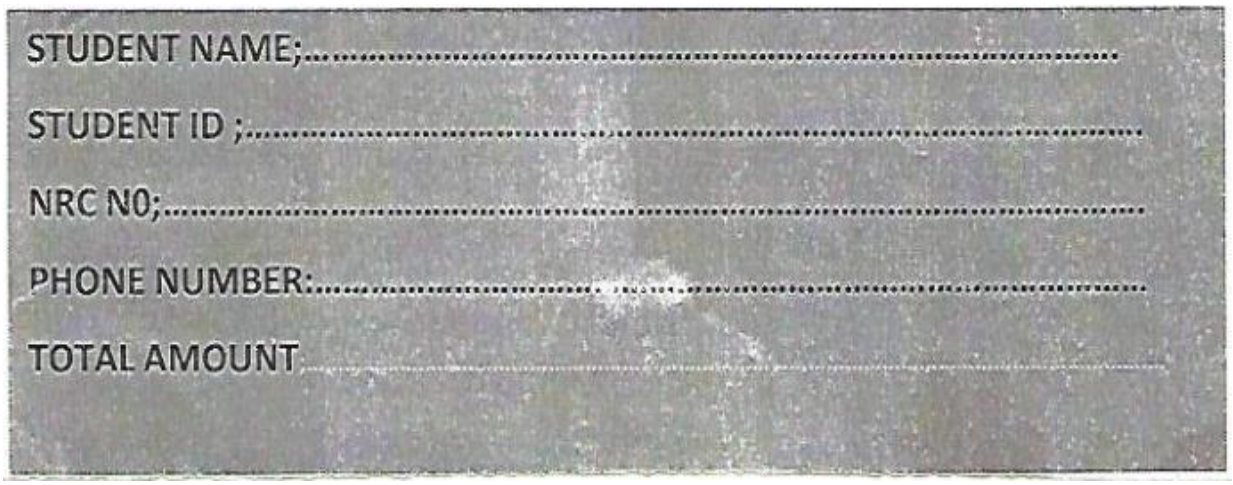


Figure 18: Student deposit slip

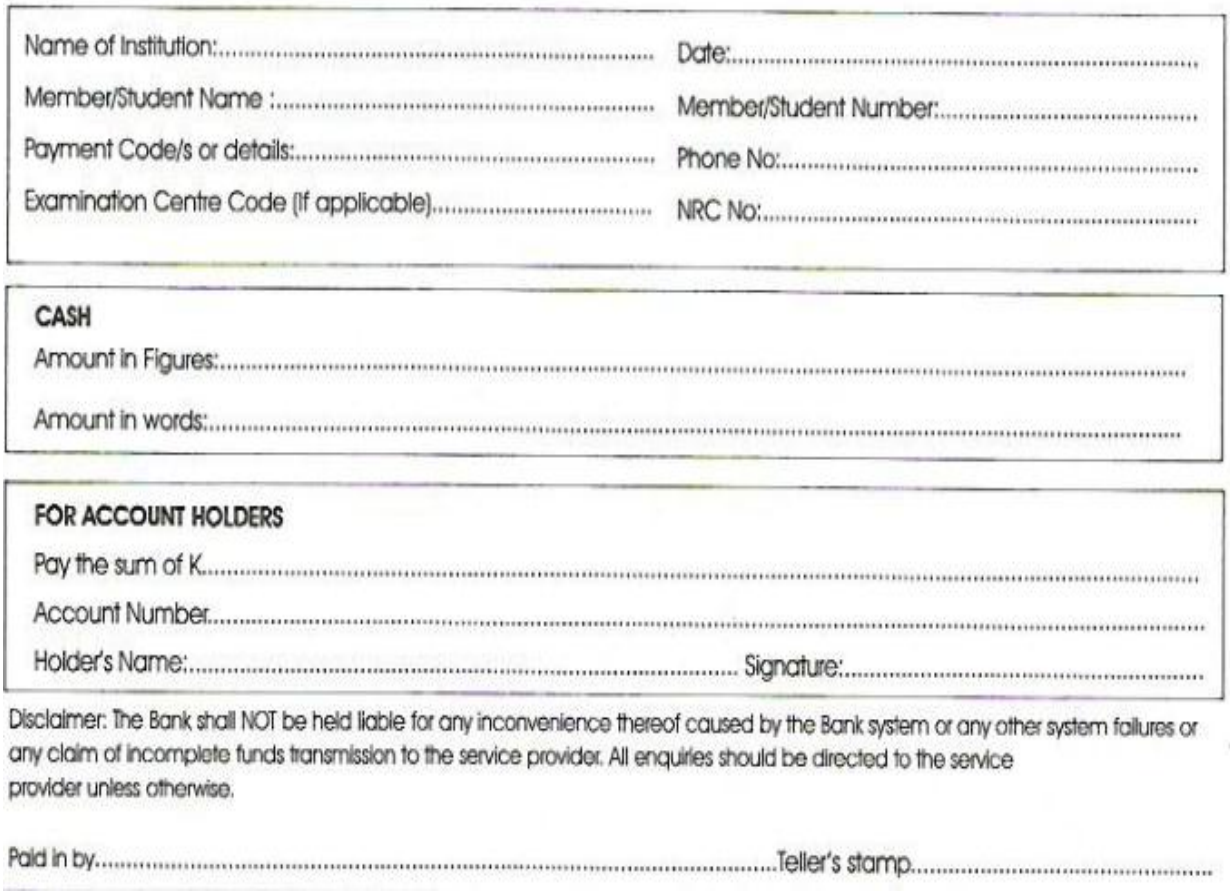


Figure 19: Student deposit slip

When students have filled in their particulars in the slips mentioned in Figure 27 and Figure 28, the students queue together with the general public. The process of remitting the money in the bank is dependent upon how long the queue is and how fast the bank system is processing

transaction. On the contrary, when the queue is long and when the bank system is slow it implies the students will take a lot of time in the bank before they make deposits. After payments are made in the bank, students are given computer generated receipts by the bank tellers. As such, the students take the bank receipts to their respective institutions in exchange for institutional receipts.

The issue of taking bank receipts for exchange with institutions receipts is cumbersome. If students arrive at almost the same time from the banks, it entails queuing up in order to be attended by accounts personnel from their respective higher education institutions. Subsequently, when they are few accounts personnel attending to all the students the process of exchanging bank receipts for institutional receipts is further delayed.

When deposits are made by students in commercial banks, the higher education institutions have no access to real time information concerning consolidated deposits made by students. All bank statements are charged. See Figure 20 for the overall process of depositing money in banks.

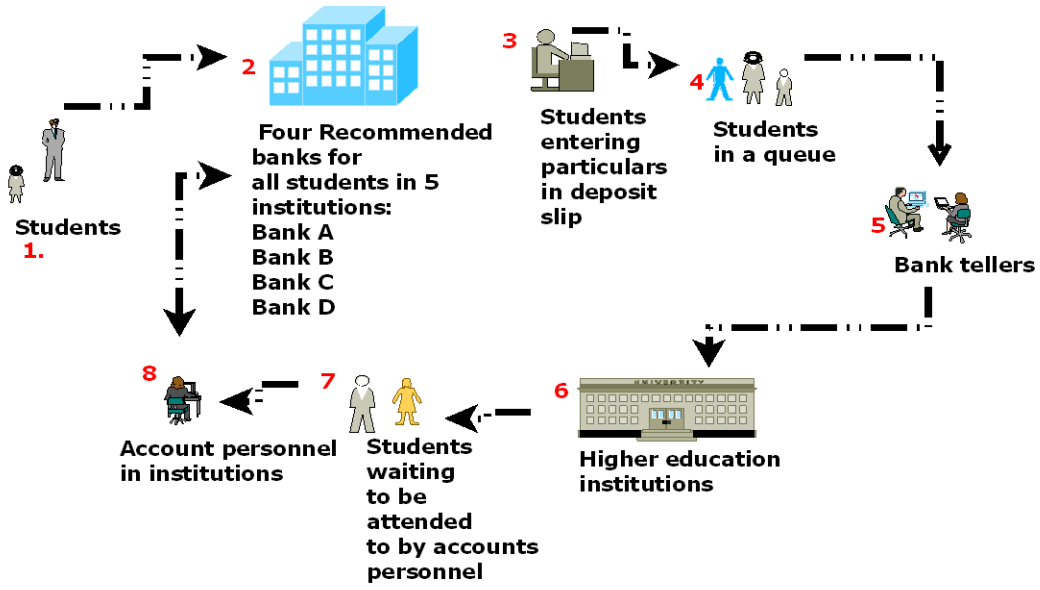


Figure 20: Current business process between banks and higher education institutions

3.3.3 Proposed higher education model payment system

The optional payment system for this study, involves the mobile phone payment system which is designed to be used on the mobile phone. The new system's objective is to address the drawbacks of the existing problem domain in the current payment systems in higher education institutions by attempting to automate the entire process by keeping the view of database integration approach through the following activities:

a) Provision of user friendliness in the application through various controls provided by the system's rich user interface;
b) Inclusion of secure registration and profile management of all users (i.e. students);
c) Provision for online recharge facility for all network users at certain points;
d) The storage of the user information files in a centralized database which can be maintained; by the system, such that security will be enhanced because data will not be in the client machine;
e) The mobile phone payment system will also provide authentication for the application;
f) The application will include report generation feature which will generate different kinds of data reports [92].

As a matter of fact, the optional mobile payment system for the higher learning institutions will include a number of advantages aimed at addressing the drawbacks identified in the current payment systems in higher education institutions in Zambia. Some of the advantages of this payment system are:

a) Enabling users to view and update their profile;
b) Allow users to have access to different services of different vendors (i.e. pay fees, transfer fees & top up airtime etc.);
c) And primarily, the advantages will concern access, time and factors compared to those incurred from attending to manual processes in the current payment systems in higher education institutions [92].

3.3.3.1 Overall business process flow for the proposed model

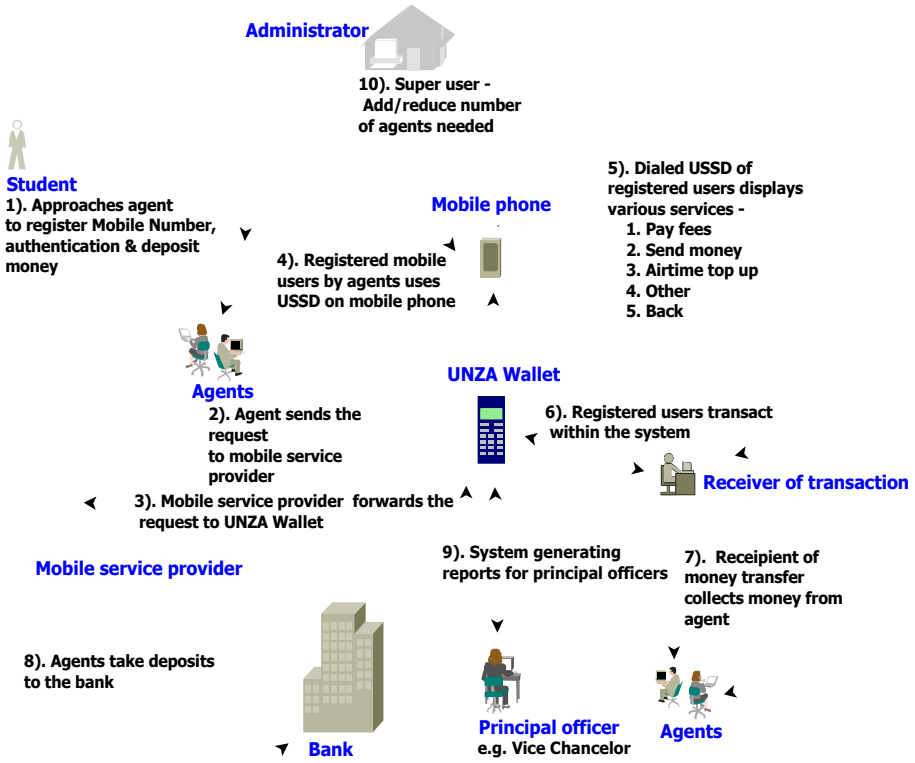


Figure 21: Proposed mobile phone payment system

This section, illustrates the transactions that will be carried out in the proposed mobile phone application system. Figure 21 describes the steps that would be involved from source (i.e. start) to end (i.e. stop) of transaction.

The beginning is where students decide to use an optional mobile phone application system to deposit non-tuition fees (e.g. student identity card, library fees, detailed transcript etc.) as opposed to going straight to the bank.

These students will be requested to deposit money in their mobile phone application system through the agents who will be found within the location of the institution and other agents found outside the institutions.

The role of the agents will be twofold: to register students mobile phone system and collect deposits for other fees from students and deposit in commercial banks. Registration for students by agents will involve a number of authentication measures such as: verification of the student identity card, National Registration Card (NRC) number, finger prints, face detection and location of registration place etc. The agents carrying out registration will also be required by the system to provide information to do with their: face detection, finger prints, location, Man number and place of registration etc. Subsequently, the overall system will have international security standards implemented to ensure that the system does not fail pry to any means of fraud.

However, there will be a limit on deposits allowed for any agent to handle (e.g. K2000.00 per day) in order to enhance security and avoid the agents from handling too much money on a daily basis. Similarly, in order to tighten security at the point of transactions the system will have an integrated geographic information system (GIS) in order to display booths (i.e. kiosks) and places of transactions.

Location of agents will not only be in education institutions but also in other strategic places such as public institutions like the post offices and different institution centres found in the different provinces of Zambia.

The client side (i.e. student profile on their mobile phones) will display various services once the student has logged into the system. The services that will be displayed are: pay fees (i.e. for printing, library fees, student identity card, library fees and detailed transcript), transfer money, airtime top up and checking their balance etc. The client side will be using the Unstructured Supplementary Service Data (USSD) provided by the service providers to carry out the various services as displayed on their mobile phones. The use of USSD is meant to fulfil session-based real time data communication needs for supplementary services that the system will be offering. As a matter of fact, USSD has several advantages such as [93]:

i. Cost Efficiency - whereas it is not much expensive to support Global System for Mobile Communication (GSM) networks with USSD because it uses existing network's protocols;
ii. Fast and responsive - The real-time capability of USSD enables the operator to provide fast and responsive services;

iii. Interactive Session-based property for USSD has provision for allowing the operator to create interactive applications, such as chat, mobile banking and Wireless Application Protocol (WAP) etc;

iv. Reduced Marketing cost – as such, a variety of USSD applications can be created and integrated easily because the protocol is not complex.

3.3.3.2 Areas of use

The use of USSD has wide areas which can be categorized into the list of three groups: Mobile Station (MS), Network (NW) initiated, Mobile ticket application & both of them [93].

i. MS initiated – entails having information check applications such as: news, weather, horoscope, balance check, Bank applications, such as money transfer, account check and Mobile ticket application, such as buying train and concert tickets;

ii. NW initiated - this implies providing advertisement applications like the operator advertising a product on the name of a company, subscriber information applications which allow subscribers to be informed after each call in order to indicate remaining balance;

iii. Both of them - entails providing subscription based applications in order for the subscriber to subscribe a sport event so that they are informed if any status change in the event occurs, provision of instant messaging applications which allow the subscriber to login/logout a chat application and send/receive messages [93].

3.3.4 System Architecture

3.3.4.1 Mobile phone payment system architecture

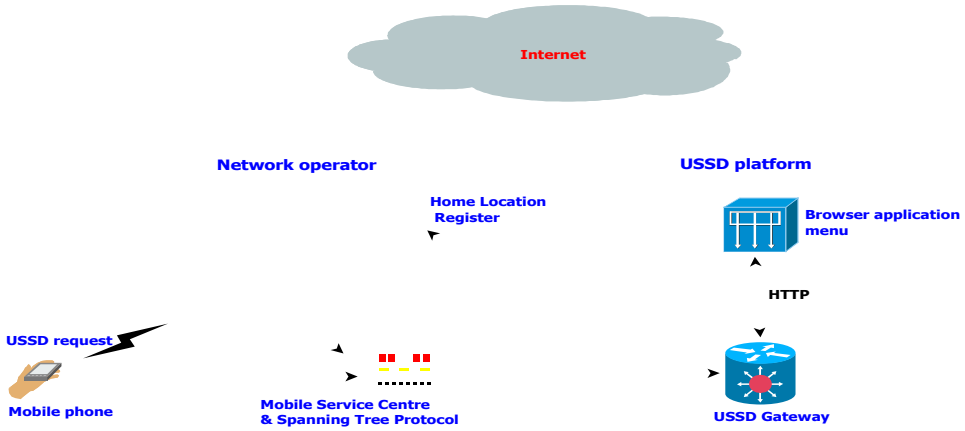


Figure 22: Mobile phone payment system architecture

The Figure 22 above shows how the user interacts with the system which uses USSD code on the mobile phone. As such, the message requested will go through the USSD gateway by making a request from the database. A USSD Gateway is essentially a platform which allows operators to introduce messaging services which have a menu-oriented service creation environment [94].

The role of the Mobile Service Centre (MSC) and Spanning Tree Protocol (STP) is to enable communication through a network which is managed by the network provider [94]. Similarly, the role of STP is to prevent more than one layer to path between two endpoints such that it ensures broadcast radiation in a network [94].

The home location register (HLR) houses a central database which contains details of every mobile phone subscriber who is authorized to use the GSM core network [94].

The role of the Hypertext Transfer Protocol (HTTP) is to establish data communication over the World Wide Web [94].

3.3.4.2 The operation of the USSD gateway

a) Step 1 – The student user sends USSD message from the mobile phone application wallet on their mobile phone;
b) Step 2 - The mobile service centre (MSC) enables communication between the user and the network such that it acts as the switching centre for mobile devices provided by the service provider;
c) Step 3 - The USSD platform will in turn contain a menu-oriented service for menu structures [94]. As the result, USSD gateway will allow operators to introduce messaging services with USSD as the bearer, in order to enable faster response times [94].

As a matter of fact, USSD uses the signalling channel in the global system for mobile (GSM) communication network [95]. Even though USSD could be very similar to SMS, USSD is not only session oriented but also well interactive [95]. In fact, when compared to SMS, USSD has a much faster response and real-time feature such that USSD is superior to SMS in extending mobile services [95].

Additionally, the service carrier is able to tailor the USSD service to satisfy the user requirements for the user with little modification to the original configuration parameters [95].

3.3.5 User interface specification

3.3.5.1 Introduction

The user interface specification is a complete description of the API and what the interface looks like to the user from the designers' point of view.

3.3.5.2 User interface description

As an illustration, the interface for the user incorporates an interface that is simple, perceptually salient and elegant in order to adhere to usability design principles.

The mobile phone application solution provides a simple interface which is not only, overloaded with text, graphics or flash animation but also makes it easy to find the desired functions. The Prototype application which was created initializes the MYSQLI.

The prototype involved using the simulator known as IdeaMart. The client side which in essence is the student side was developed using the programming language called PHP storm (i.e. for both UI and DB).

The administrator side was formulated using Hypertext Makeup Language (HTML) for user interface while PHP was used to connect to the database. The database was developed by DB language called Mysqli.

3.3.5.3 How the user interface looks

The main part of the mobile phone application system for the higher education institutions is to ensure that the application runs on the users' mobile phones. The users of the mobile application will be requested to download the application into their mobile phone. As such, the mobile application will be made available on Google play store, institutional website and other related platforms just to mention a few.

The aspect of interoperability in the mobile application will be taken care of to ensure users having different platforms like Android, Windows, Linux and Apple etc, are able to access the mobile application. Figure 23 is the demonstration of how the users' interface will look after the user has registered their account with the agent. Agents will either be within the institutional premises or outside the institutions. Moreover, institutions could use other established enterprises located in different parts of the country to play the role of agents. This will enable easier access to agents for either depositing or withdrawing of funds from different geographical dispositions.

Figure 23: Mobile phone user interface

3.3.5.4 How the user interface behaves

Figure 23 illustrates how the first user interfaces (UI) that the user interacts with after the application is opened. When the login screen is opened as shown in Figure 23 the user will be requested to enter a valid password for them to access the application for transaction. However, the different types of transactions on mobile phones can only be carried out by users whose accounts have money. All users will deposit money for other fees (i.e. student identity card, medical fees etc.) through an agent that will be found within the institution premises and some outside the institution.

3.3.6 System requirement specifications

The system requirements specifications phase in this research study used Object-Oriented Analysis. As an illustration, system requirements entail what the system is able to do, through provision of services and also constraints faced by its operation [96]. As a matter of fact, requirements involve the needs for the user of the system intended to serve a particular purpose. In fact, software system requirements are demarcated into two categories called: functional and non-functional requirements [96]. Functional requirements entail statements of services provided by the system coupled with how the system should react to certain inputs and how the system should behave in particular situations [96].

The system requirements specifications for the mobile phone payment system for higher education institutions will illustrate an overview of all the functionalities and specifications for the proposed model.

The mobile phone payment system for the higher learning institutions will comprise five modules namely: Administrator, Customer, Web Registration, Reports and Authentication as shown in Figure 24.

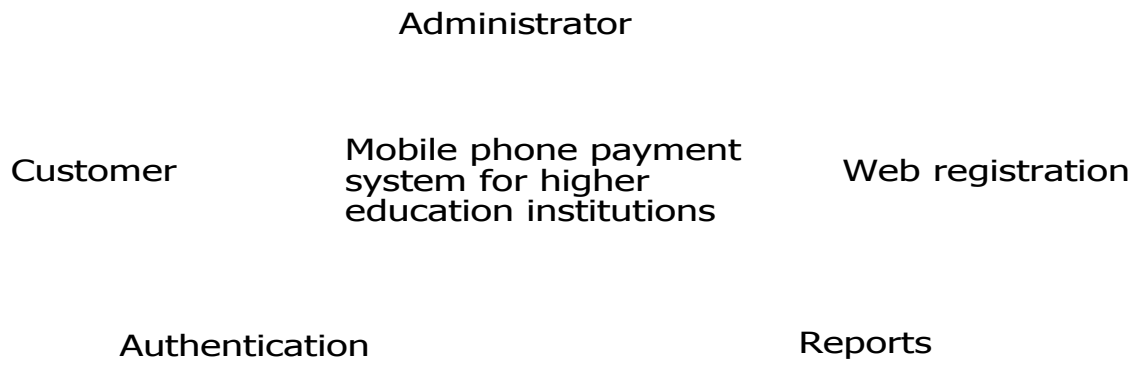


Figure 24: Full-fledged mobile phone application modules

3.3.6.1 Functional Requirements

Table 9: details the functional requirements required for all the modules for the mobile payment system.

Table 9: Functional requirements

FR 1	The system administrator shall create the new system user
FR 2	The system administrator shall be the super user and will have all the privileges for the entire system
FR 3	The system administrator blocks and updates agents of the system
FR 4	The system administrator shall generate log files, backup and recovery files for the system
FR 5	Users shall have relevant access rights to carry out different payment transactions
FR 6	Users with relevant access rights shall have the ability to view money reports
FR 7	Users will relevant rights shall have the ability to change their password anytime
FR 8	User with relevant rights shall be to send and receive messages
FR 9	Users shall be able to view text messages after each transaction

3.3.6.2 Non-functional requirements

Table 10: details the non- functional requirements required for all the modules for the mobile payment system.

Table 10: Non-functional requirements

NFR1	The system shall be easily maintainable in case of requiring forwarding criteria changes without stopping the whole system
NFR 2	The system failure shall not affect data integrity
NFR 3	All software application modules shall be debugged
NFR 4	The system shall be faster when multi-core central processing are used
NFR 5	The system shall start up/reload automatically in case of the crash that occurs during runtime
NFR 6	All local crash shall not disseminate to other parts of the system, as such crashes shall be isolated
NFR 7	The software system and application code shall be well documented, and this will be written in a familiar language
NFR 8	The system shall provide the documentation that shall have all functionality and any user maintenance for the system administrators

3.3.7 System modelling and design

3.3.7.1 Introduction of unified modelling language (UML) diagrams

In this section, we used unified modelling languages (UML) to: visualize, specify, construct and document the dynamic aspect of the system [97]. As such, the behavioral diagrams are categorized as follows: Use case diagrams, interaction diagrams, state-chart diagrams and activity diagrams [97].

3.3.7.2 Use case diagrams

The use case illustrates the sequence of actions performed by a system in order to yield visible results [97]. In other words, the use case describes how outside things interact with the system itself such that it may be applied to the whole system as well as part of the system [97]. As the result, an actor represents the roles that users of the cases play and it can denote a person (e.g. student, customer), a device (e.g. workstation) or rather system (e.g. bank, institution) [97].

Table 11: Actors and description for UNZA wallet

Actor	Description
Student	The student is responsible to register their particulars with the agent and deposit fees
Agent	The agent is in charge of receiving fees from students, enter users in the system and deposit fees in commercial banks
Principal user	The principal user will have access to real time information concerning money reports
Administrator	The administrator is the super user of the system and shall have all the privileges for the system
Mobile service provider	The mobile service provider is responsible for providing USSD gateways for the system
Middleware	It is responsible for providing various computation for the system

The following Figure 25 is a diagrammatic representation of the actors and the respective use cases for the student client and middleware in the mobile phone payment system.

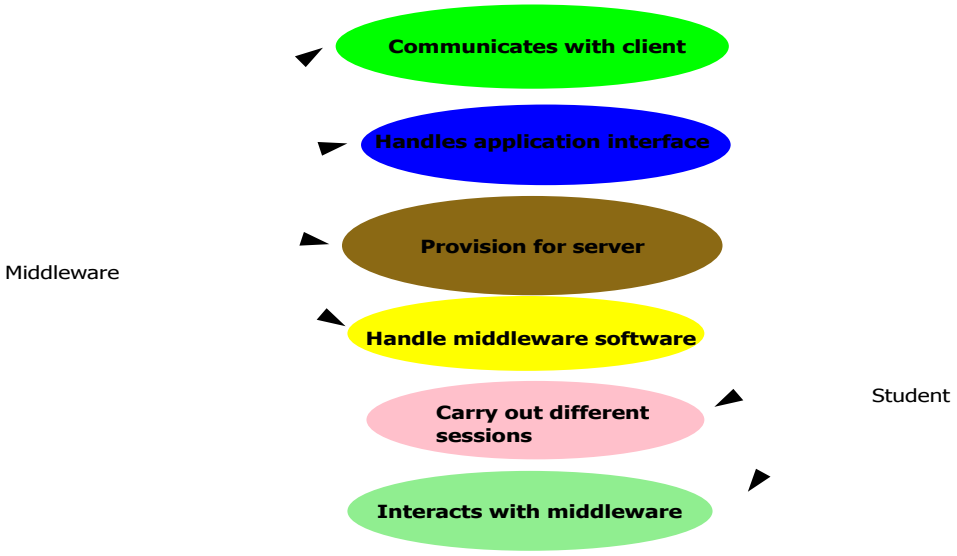


Figure 25: Student client and middleware interactions with the system

Table 12: Description of each case identified in the case diagram in Figure 25.

Actor	Description
Communicates with client	The middleware communicates with the client as it sits in between the backend and the client
Handles application interface	The middleware handles application interface to allow the client and the middleware to communicate
Provision for server	The middleware handles the central database for the entire system subscribers
Handle middleware software	The middleware has software that ensures efficient communication between the client and the backend
Carry out different sessions	The client sends various USSD requests to the Gateway for the user to have the requested transactions
Interacts with middleware	The client executes various functions through the interaction with the middleware

The following Figure 26 is the presentation of the actors and Use Cases that shall be involved in the user application interface of the mobile phone application system. Actors are: general user, student, agent, principal officer and Administrator (i.e. the super user)

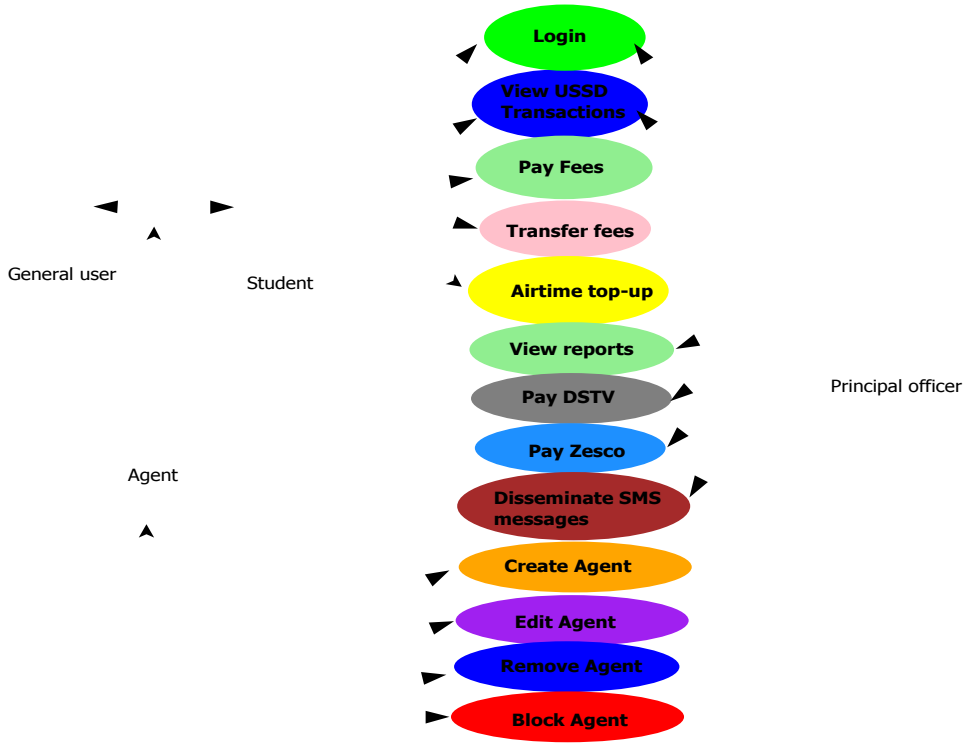


Figure 26: Users interacting with system

Table 13: Descriptions of each use case that was identified in the use case diagram in Figure 26 (above figure) for the mobile phone payment system

Use case	Description
Login	All registered users shall have password for executing transactions on the system
View USSD Transactions	All users shall view the USSD transaction in the system
Pay fees	Users with access rights shall have transact various payments using the system
Transfer fees	Users with access rights shall transfer fees for other fees apart from tuition fees
Airtime top-up	Users shall have access rights to top up their mobile phones using the system
Deposit fees	Users shall have access rights to transfer fees to users who are registered on the system
View reports	The principal users with relevant access rights shall view various reports on the system
Pay DSTV	The principal user shall have access rights to pay DSTV using the system
Pay Zesco	The principal users shall have access rights to pay ZESCO using the system
Institution	The principal user shall have access privileges to disseminate information to students
Create Agent	The system administrator shall integrate agents that join the system
Edit Agent	The system administrator shall edit an agent by updating their records in the database
Remove Agent	The system administrator shall remove the agent and update the database records
Block Agent	The system administrator block user when they no longer use the system or if they are implicated in fraud or mismanagement of funds

3.3.7.3 Interaction models – communication and sequence diagrams

3.3.7.3.1 Communication diagrams

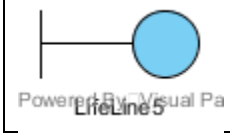
Communication Diagrams (CDs) do not only belong to the behavioural diagrams like sequence diagrams but also are used to understand and document the interactions between the objects and also show how the classes are working together to achieve a goal [98]. As a matter of fact, CDs are one kind of interaction diagrams which focuses on the elements involved in a particular behaviour coupled with what messages they pass back and forth [98]. As such, CDs emphasize the objects involved more than the order and type of the messages exchanges [98]. Similarly, CDs and Sequence Diagrams (SDs) are two views of the same scenario although CDs give structural view of the scenario while SDs gives the temporal one [98]. In essence, the CDs record the same information as SDs, but CDs provide a different view by focusing on the structural view of the object interactions as opposed to temporal view [98].

3.3.7.3.2 Sequence diagrams

Sequence diagrams are not only used to model the interactions between the actors and the objects in a system but also show interactions between the objects themselves [97]. As such, the sequence diagram is the interaction diagram which shows the dynamic side of the system [97]. As the matter of fact, the communication and sequence diagrams have three symbols which are used in the communication diagram and these are: Boundary class stereotype, control class and entity class stereotype [97]. See Table 14 for illustration.

In this section, the details for the communication and sequence diagrams for each use case in Table 13 will be described.

Table 14: Communication and sequence diagram symbols

Symbol	Description
	The boundary class stereotype models how a system interacts with is actors
	The control class stereotype enables coordination, sequencing, transaction and control of other objects
	The entity class stereotype models information and associated behavior of some phenomenon or concept like: an individual, a real life-event or a real life object

A) Login

Figure 27 shows how the login user interface (UI) is launched by instantiating the control object. As such, the control object prompts the user for login credentials in order for the user to be authenticated upon supplying correct login credentials. Subsequently, a request is sent to the user entity object to get the user account from the database. It is at this moment that the control object will finally ask the boundary object to display the welcome screen to the user at the application interface of their mobile phone.

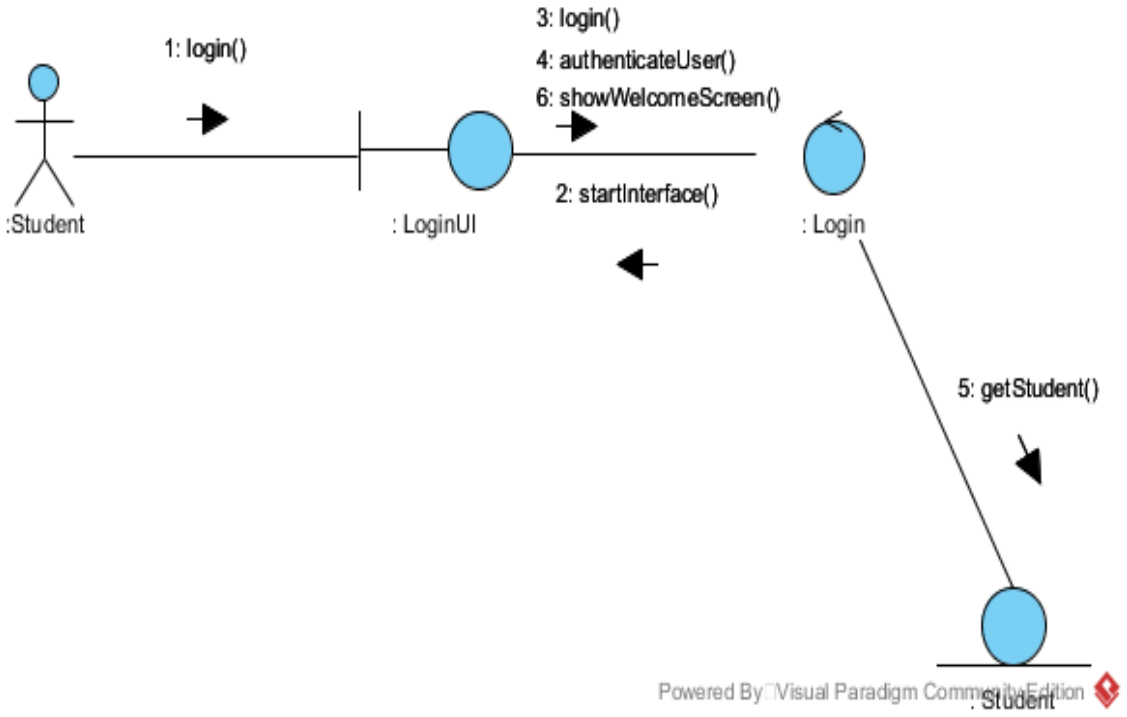


Figure 27: Login communication diagram

Additionally, the sequence diagram which follows in Figure 28 is the synchronization of the communication diagram shown in Figure 27 above. As such, the sequence diagram has included the sequence of events for the Login Use Case as shown below.

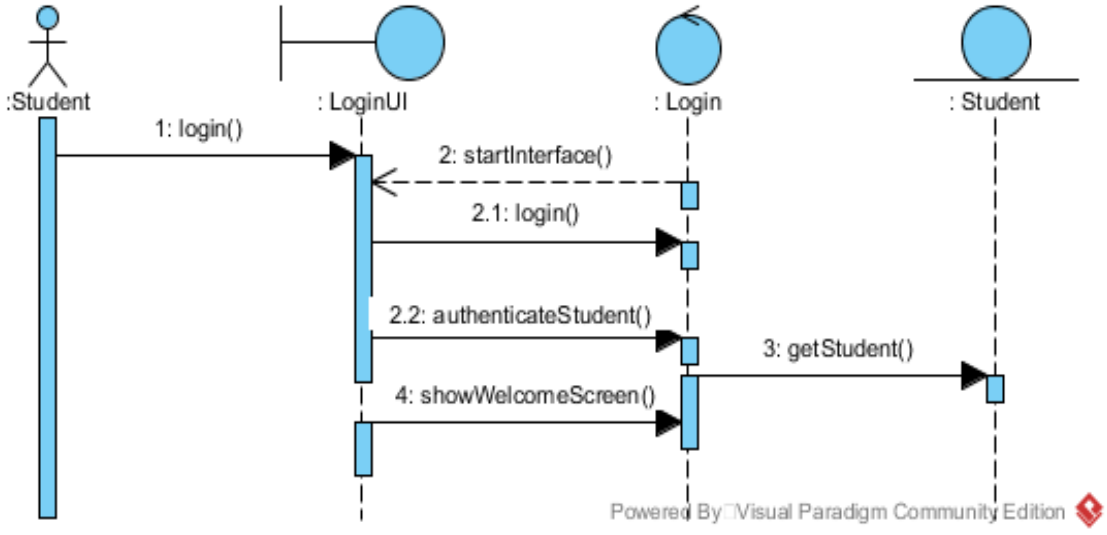


Figure 28: Login sequence diagram

B) View USSD transactions

The user interface (UI) is started in Figure 29 and then the control object is instantiated. The control object gets the transaction records from the transaction entity object. The User selects the transaction they want to make and then the control object executes the requested transaction. The control object finally asks the boundary object to display the transaction requested.

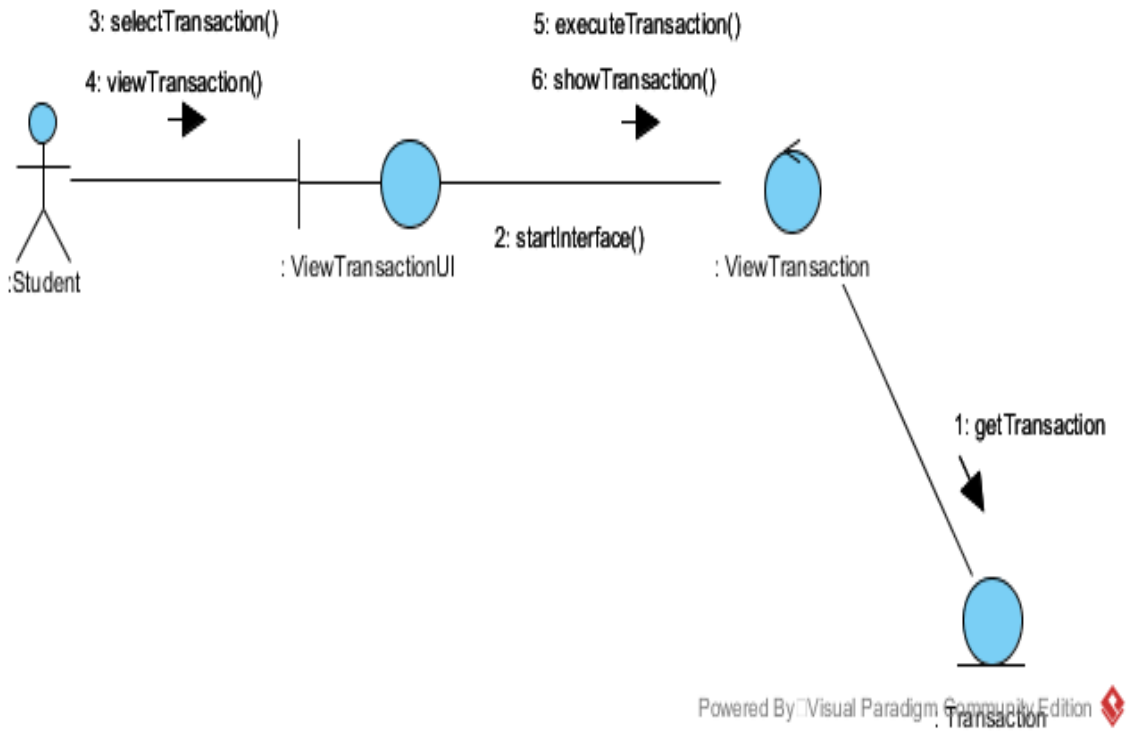


Figure 29: Communication diagram

The sequence diagram in Figure 30 is a synchronization of the communication diagram in Figure 29. The sequence of events for the events View USSD transaction Use Case is shown.

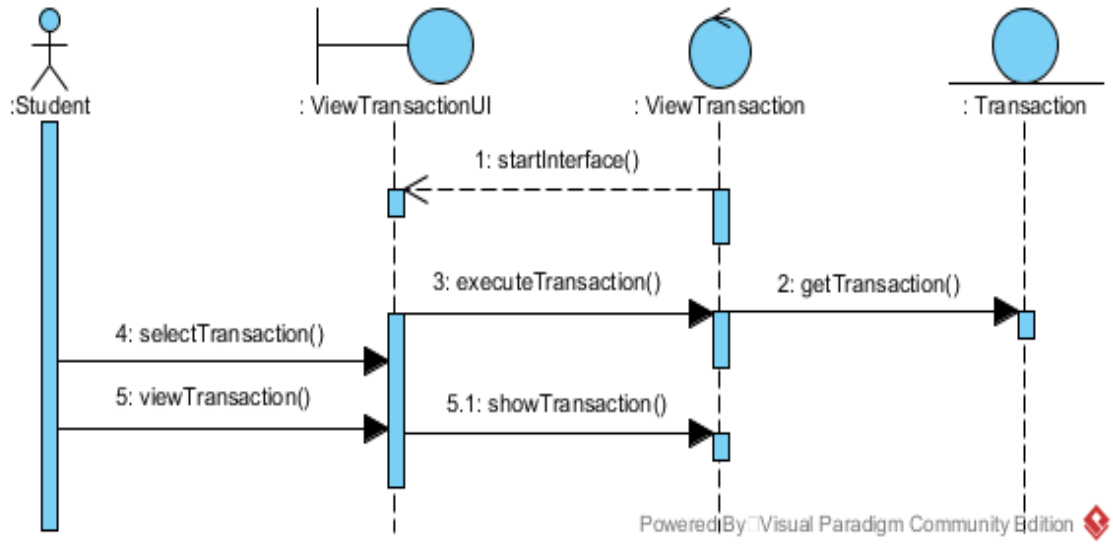


Figure 30: Sequence diagram

C) Pay Fees

Figure 31 is the user interface (UI) is started and then the control object is instantiated. The control object gets the transaction records from the transaction entity object to display pay fees.

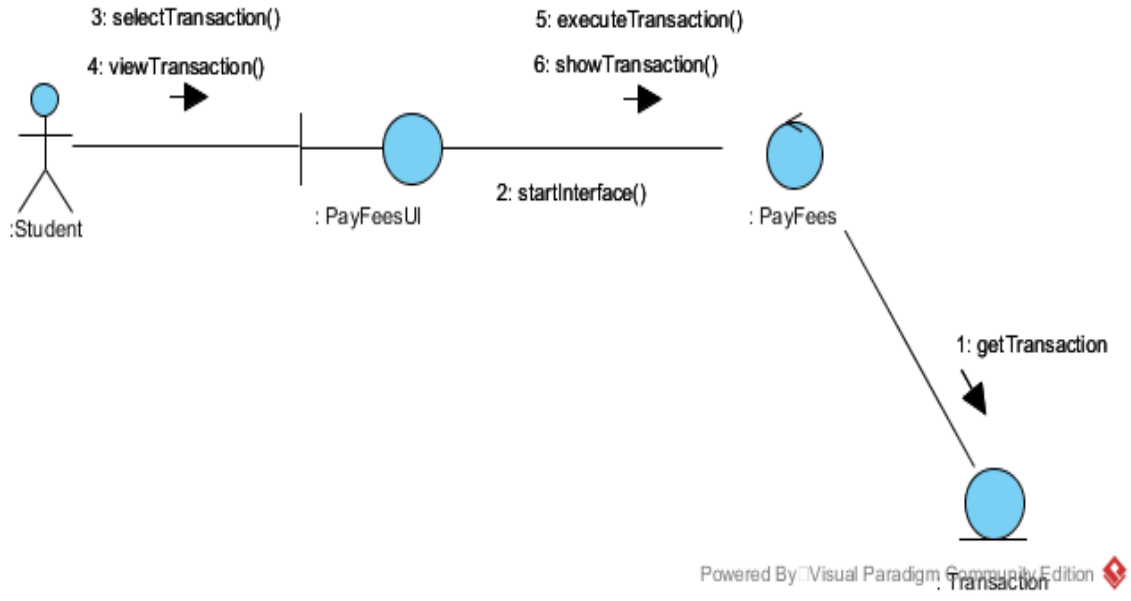


Figure 31: Communication diagram

The sequence diagram in Figure 32 is a synchronization of the communication diagram in Figure 31. The sequence of events is pay fees transaction.

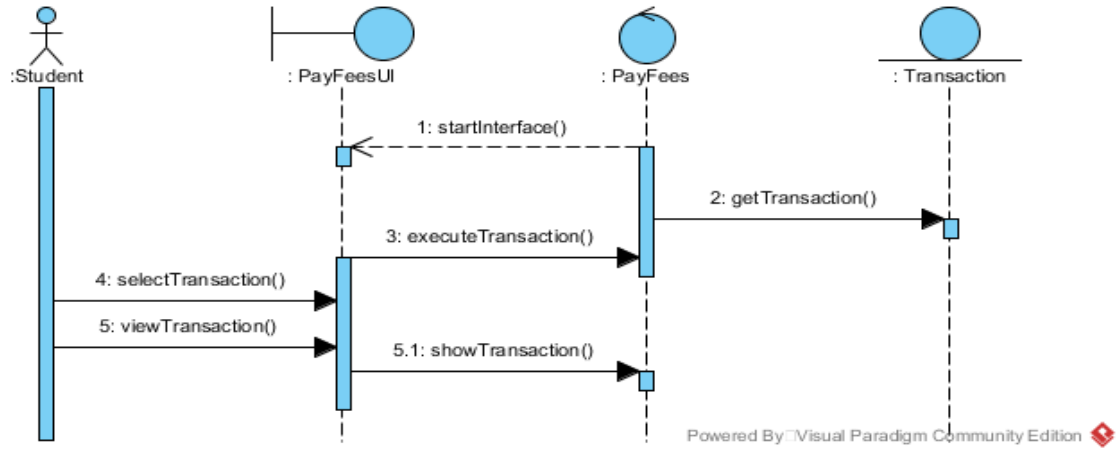


Figure 32: Sequence diagram

D) Transfer fees

Figure 33 shows the transfer fees interface (UI) is launched by instantiating the control object. The request is sent to the user entity object to get transfer fees from the database. It is at this moment that the control object will finally ask the boundary object to display the transfer fees to the user at the application interface on their mobile phone.

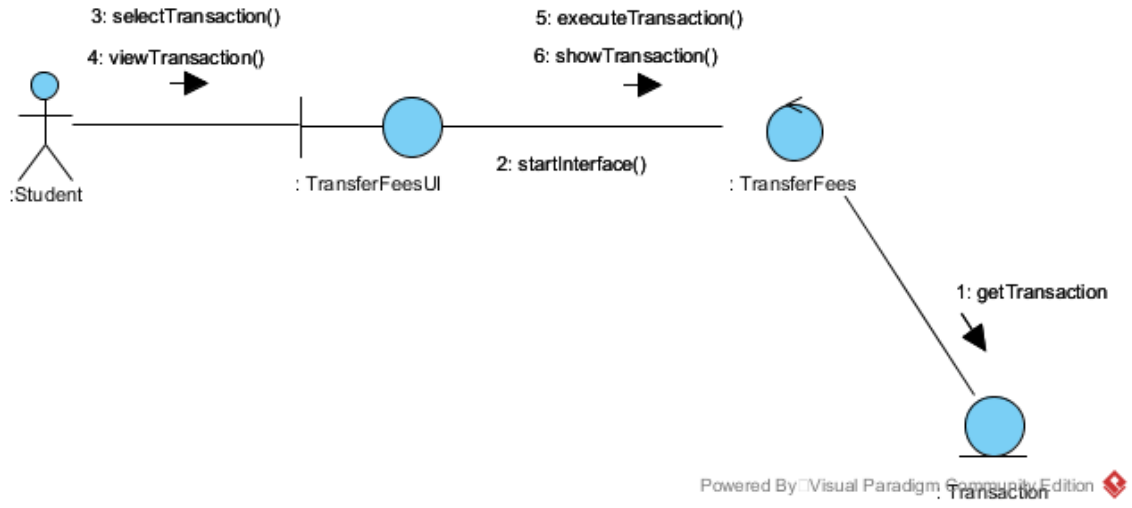


Figure 33: Communication diagram

The sequence diagram in Figure 34 is a synchronization of the communication diagram in Figure 33. The sequence of events for the events transfers fees transaction.

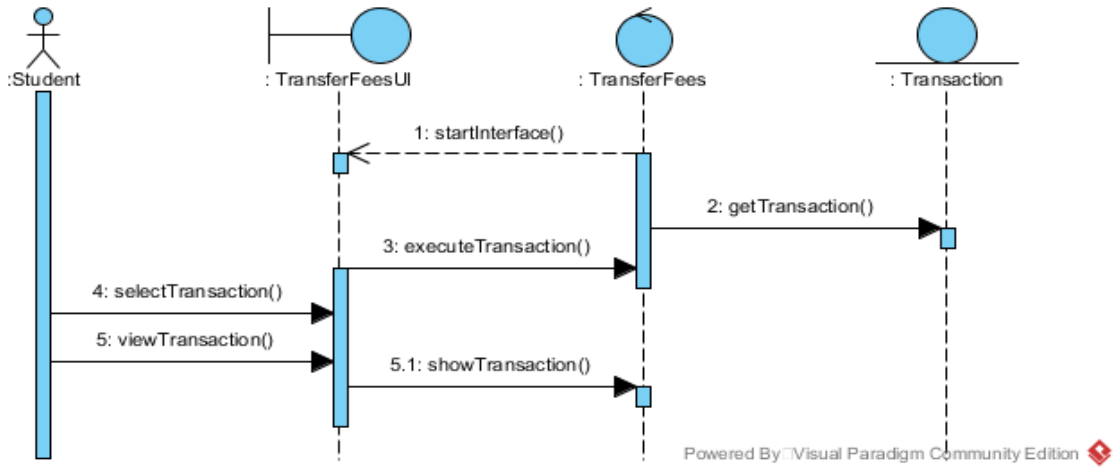


Figure 34: Sequence Diagram

E) Airtime Top-up

Figure 35 shows how the airtime top-up user interface (UI) is launched by instantiating the control object. The control object prompts the user for login credentials in order for the user to be authenticated upon supplying correct login credentials. A request is sent to the user entity object to get the user account from the database. It is at this moment that the control object will finally ask the boundary object to display the airtime top-up to the user at the application interface of their mobile phone.

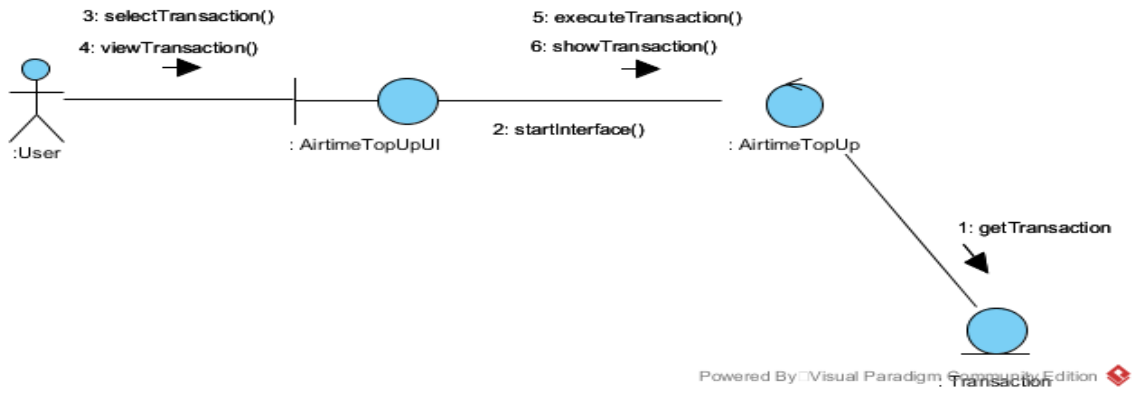


Figure 35: Communication diagram

The sequence diagram in Figure 36 is a synchronization of the communication diagram in Figure 35. The sequence of events view airtime top up transaction.

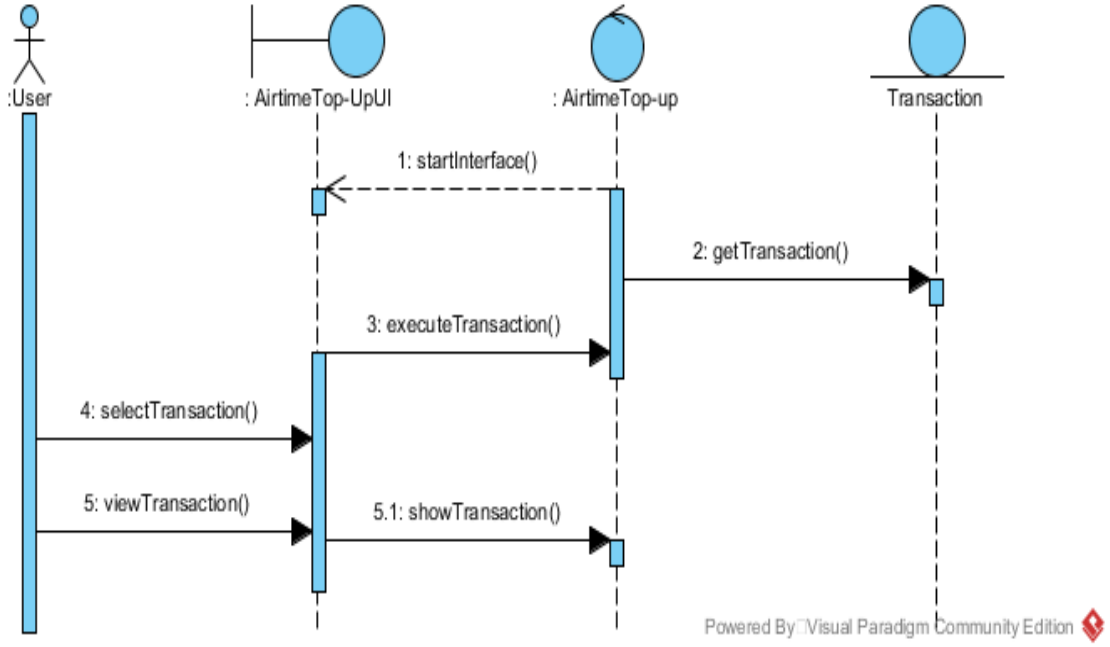


Figure 36: Sequence diagram

F) Deposit Fees

Figure 37 shows how the deposit fees user interface (UI) is launched by instantiating the control object. The control object prompts the user entity object to get the deposit account from the database. It is at this moment that the control object will finally ask the boundary object to display deposit fees to the user at the application interface of their mobile phone.

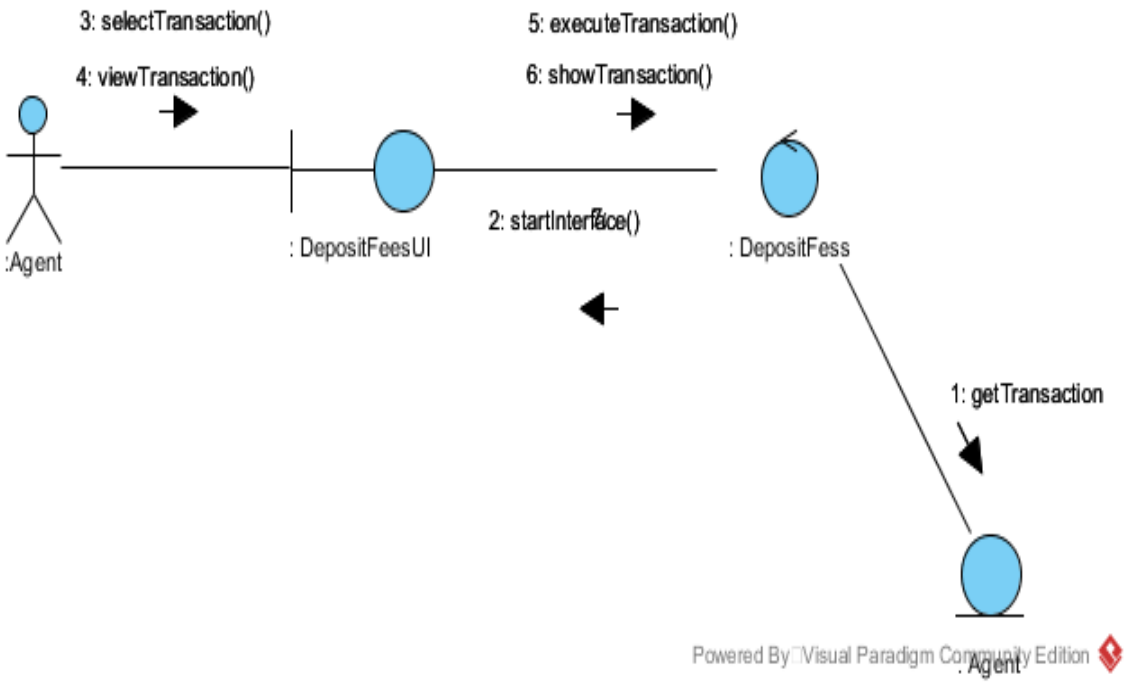


Figure 37: Communication report

The sequence diagram in Figure 38 is a synchronization of the communication diagram in Figure 37. The sequence of events for the events view deposit transaction.

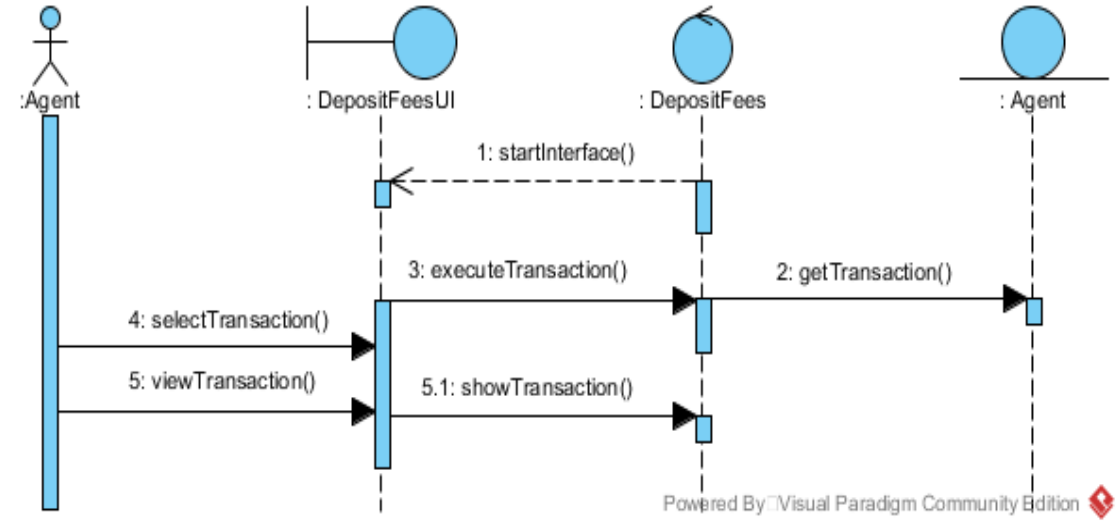


Figure 38: Sequence diagram

G) View Report

The user in Figure 39 selects the report type that they want to view. The user interface (UI) is started and then the control object is instantiated. The control object executes and generates the money report transaction for the daily transaction. The control object then asks money generated report to be viewed by the user. The control object finally asks the boundary object to display the money generated report.

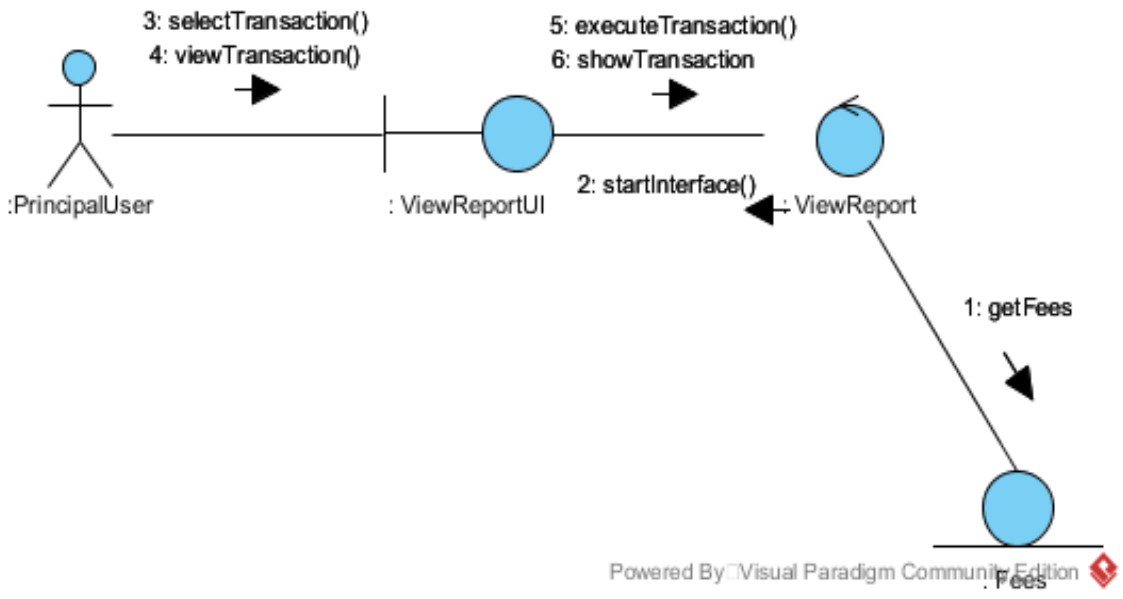


Figure 39: Communication diagram

The sequence diagram in Figure 40 is a synchronization of the communication diagram in Figure 39. The sequence of events for the events View Report transaction Use Case is shown.

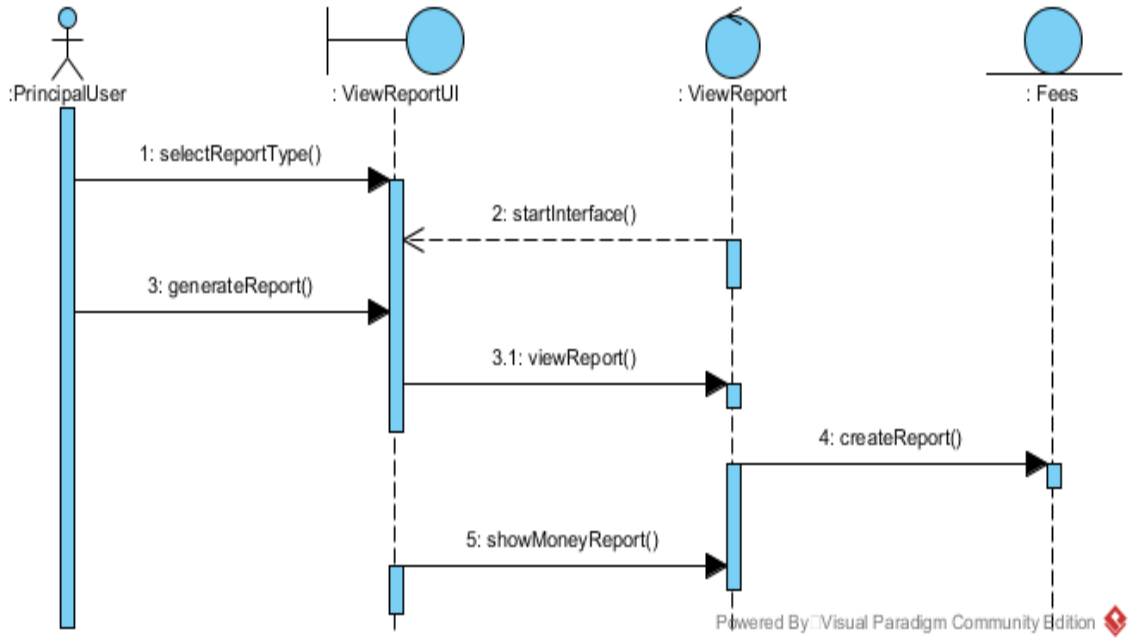


Figure 40: Sequence diagram

H) Pay DSTV

Figure 41 shows how the pay DSTV user interface (UI) is launched by instantiating the control object. The control object prompts the user for login credentials for the user to be authenticated upon supplying correct login credentials. Thereafter, a request is sent to the user entity object to get the user account from the database. It is at this moment that the control object will finally ask the boundary object to display the pay DSTV to the user at the application interface of their mobile phone.

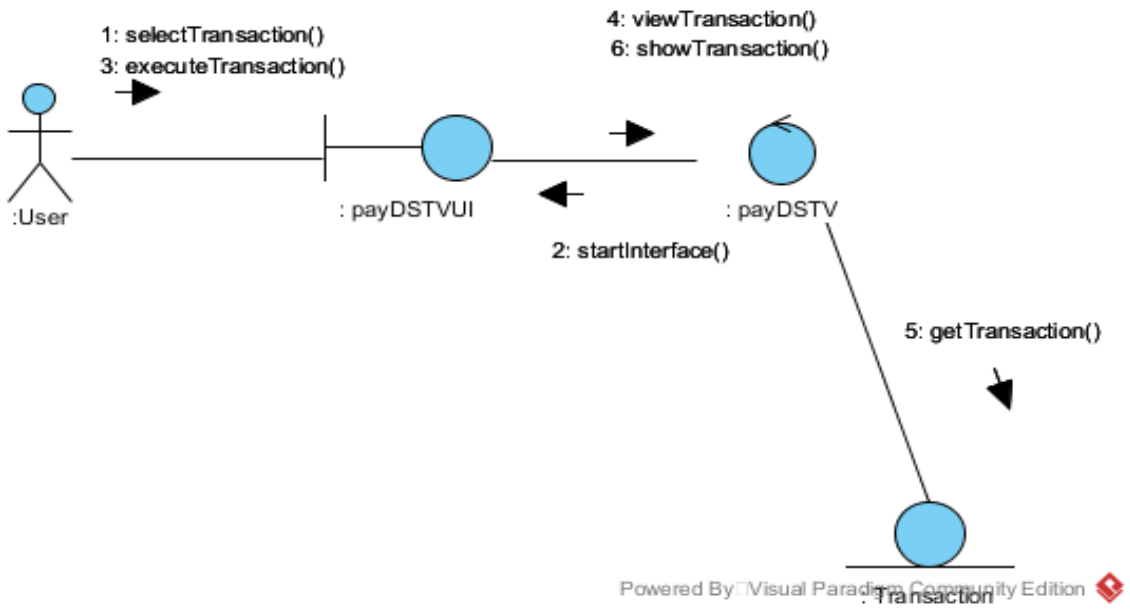


Figure 41: Communication diagram

The sequence diagram in Figure 42 is a synchronization of the communication diagram in Figure 41. The sequence of events for the events pay DSTV transaction Use Case is shown.

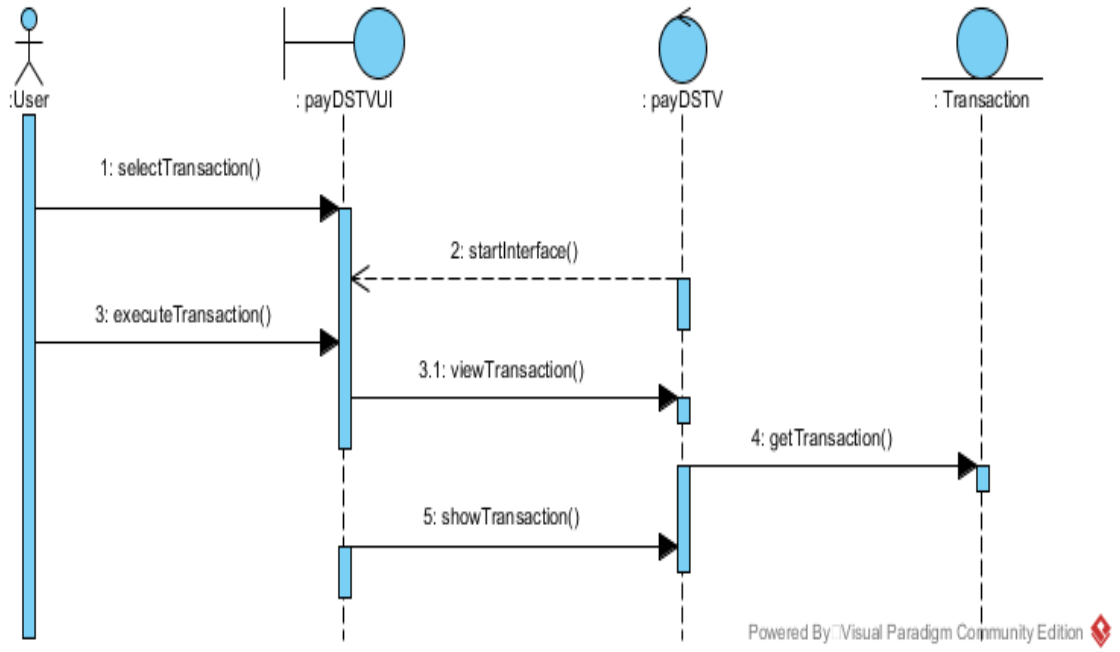


Figure 42: Sequence diagram

I) Pay ZESCO

Figure 43 shows how the pay ZESCO user interface (UI) is launched by instantiating the control object. The boundary objects subsequently display the pay ZESCO to the user at the application interface of their mobile phone.

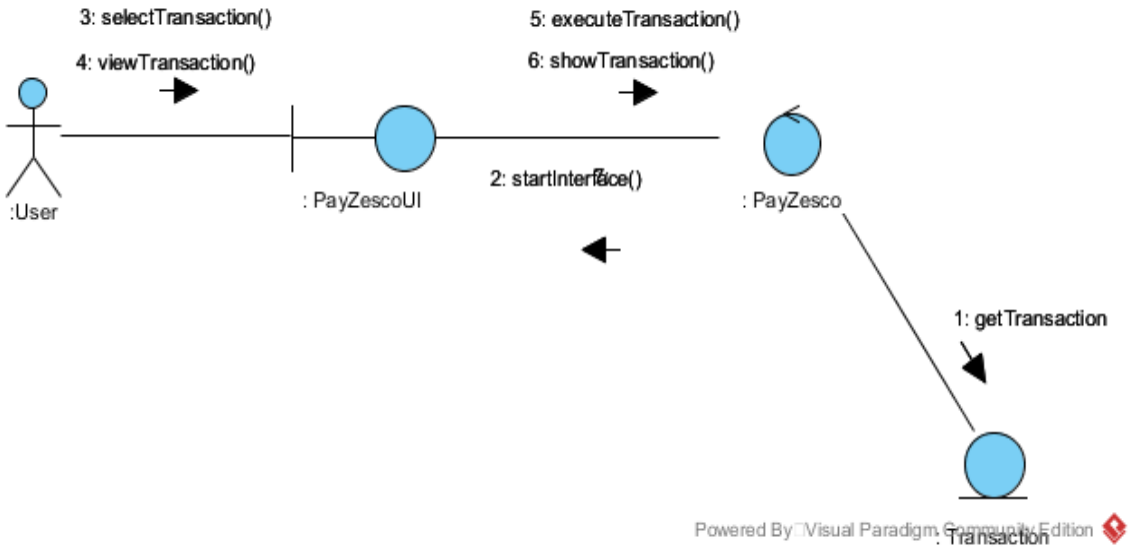


Figure 43: Communication diagram

The sequence diagram in Figure 44 is a synchronization of the communication diagram in Figure 43. The sequence of events for the events View pay ZESCO transaction Use Case is shown.

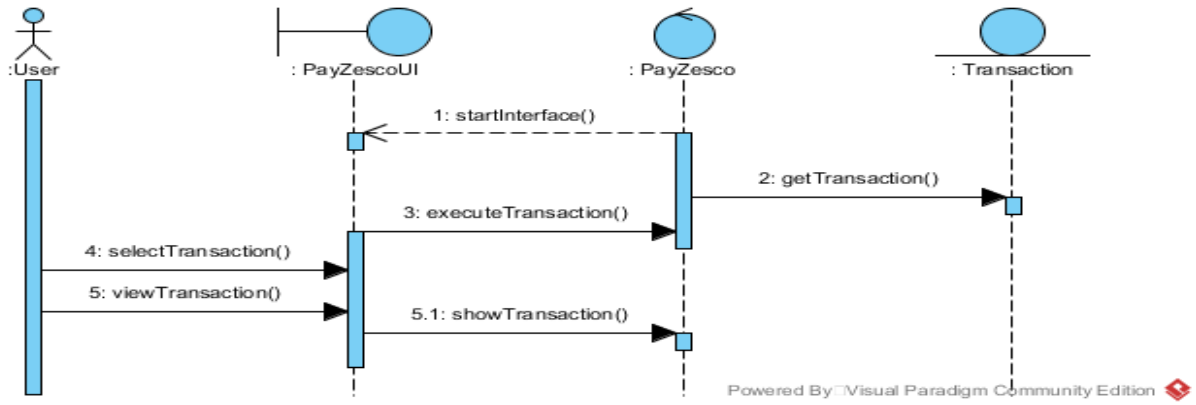


Figure 44: Sequence diagram

J) Institution

Figure 45 shows the user account from the database. It is at this moment that the control object will finally ask the boundary object to display the SMS transaction to the user at the application interface of their mobile phone.

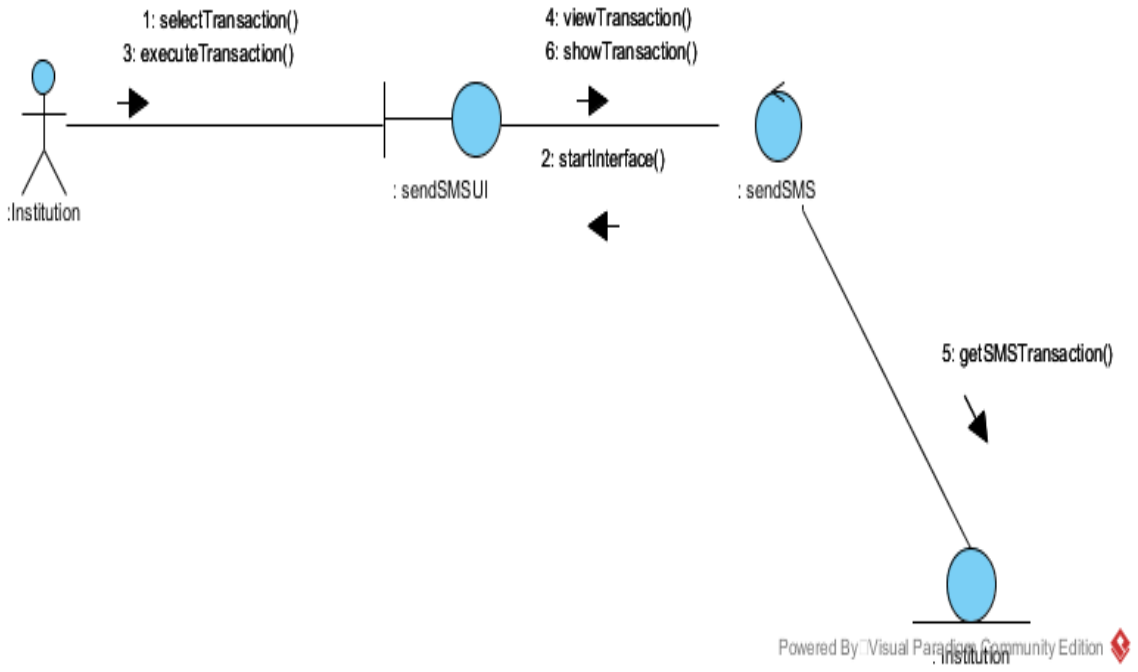


Figure 45: Communication diagram

The sequence diagram in Figure 46 is a synchronization of the communication diagram in Figure 45. The sequence of events for the events View USSD transaction Use Case is shown.

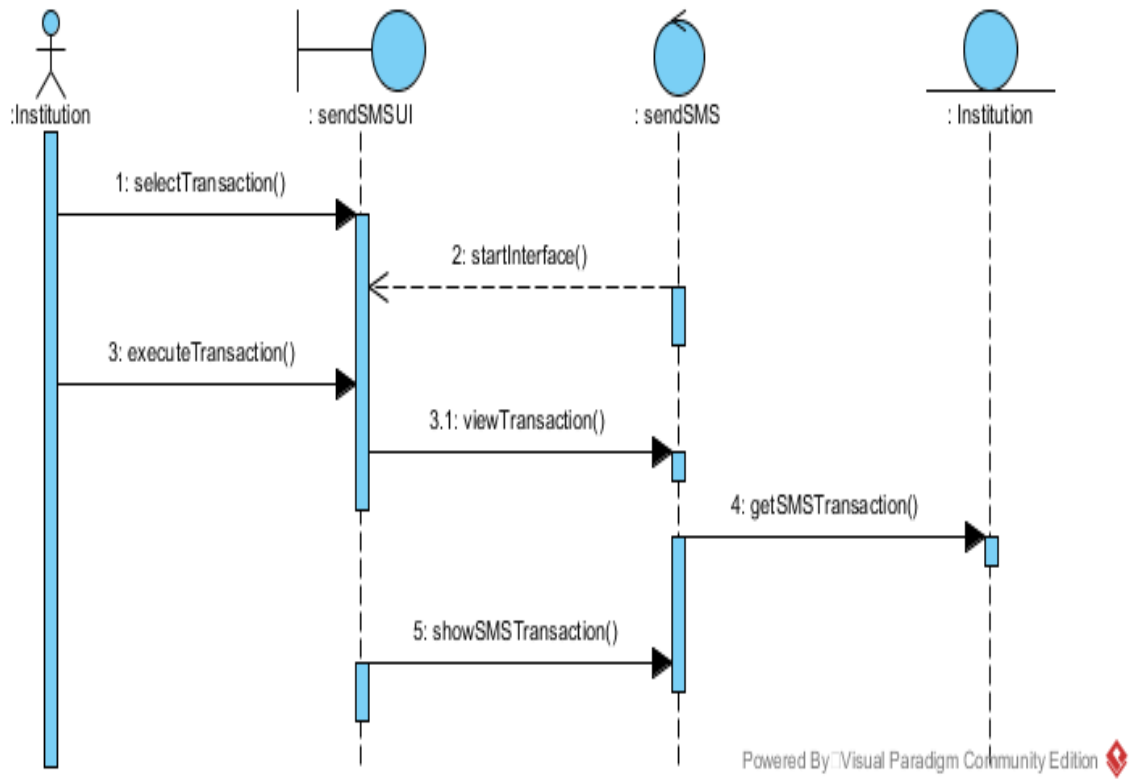


Figure 46: Sequence diagram

K) Create Agent

The administrator module in Figure 24 will request the user to enter the details and then the control object executes and creates the user record transaction. The control object then asks user to create a user record in order for the control object to ask the boundary object to display the created user record.

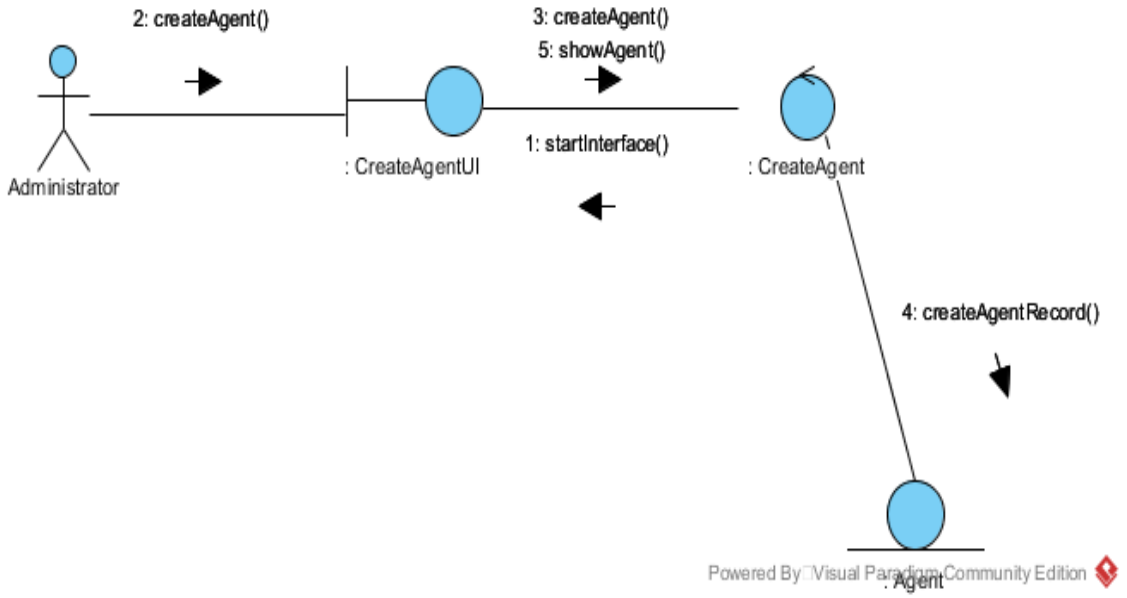


Figure 47: **Communication diagram**

The sequence diagram in Figure 48 is a synchronization of the communication diagram in Figure 47. The sequence of events for create Agent transaction Use Case is shown.

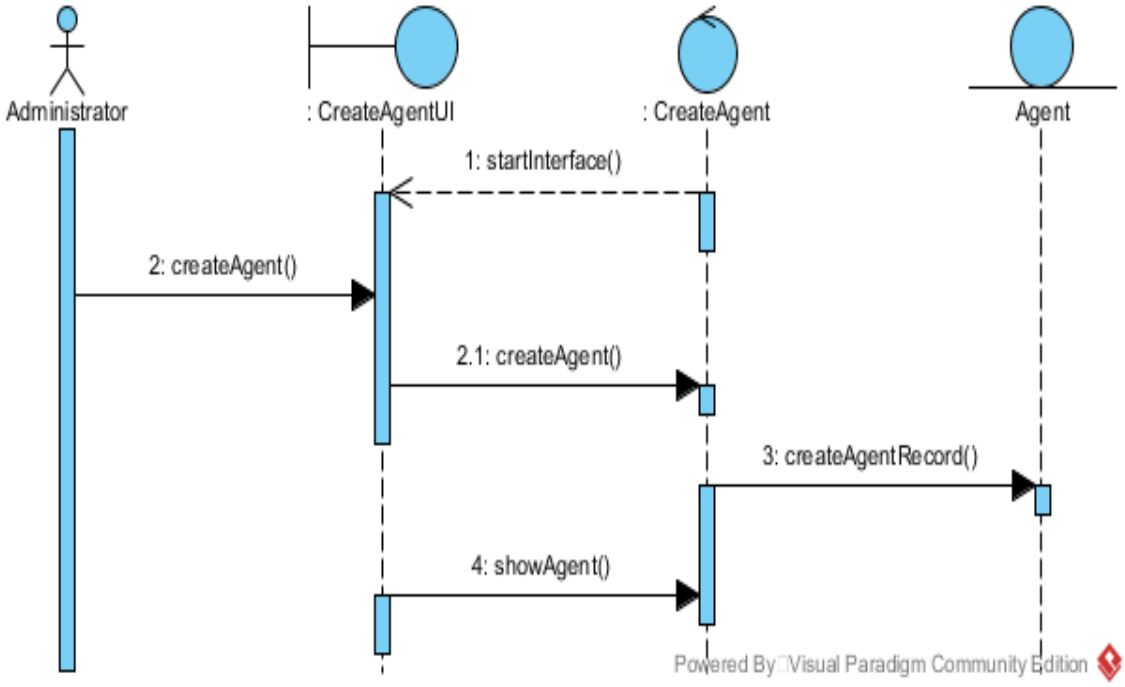


Figure 48: Sequence diagram

L) Edit Agent

The administrator module in Figure 24 will cause the user interface (UI) to be started and then the control object will be instantiated. In essence the control object will get the user records from the user entity object. The user selects the user record they want to edit thereafter the user will modify the details and then enable the control object to execute the edit user transaction. The control object then asks user to update the user record. The control object finally asks the boundary object to display the edited user record.

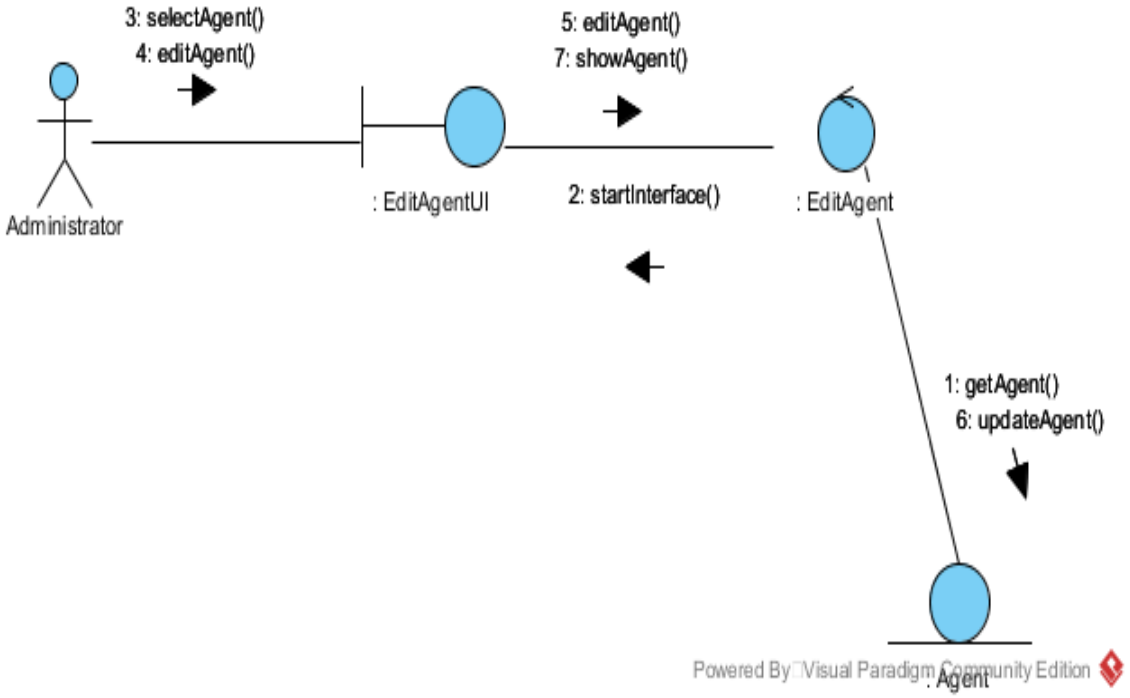


Figure 49: Communication diagram

The sequence diagram in Figure 50 is a synchronization of the communication diagram in Figure 49. The sequence of events for the edit transaction Use Case is shown.

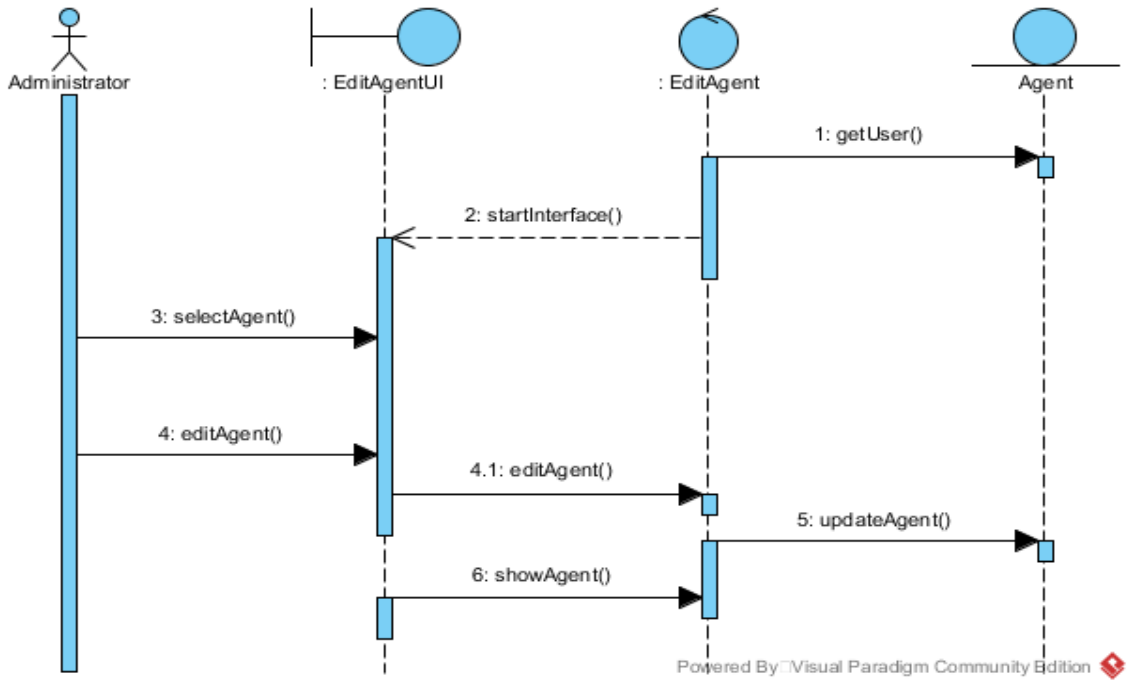


Figure 50: Sequence diagram

M) Remove user

In Figure 51 the user interface (UI) is started and then the control object is instantiated. The control object gets the user records from the User entity object. The User selects the user record they want to remove, and then the control object executes remove user transaction. The control object then asks user to update the user records. The control object finally asks the boundary object to display the user records.

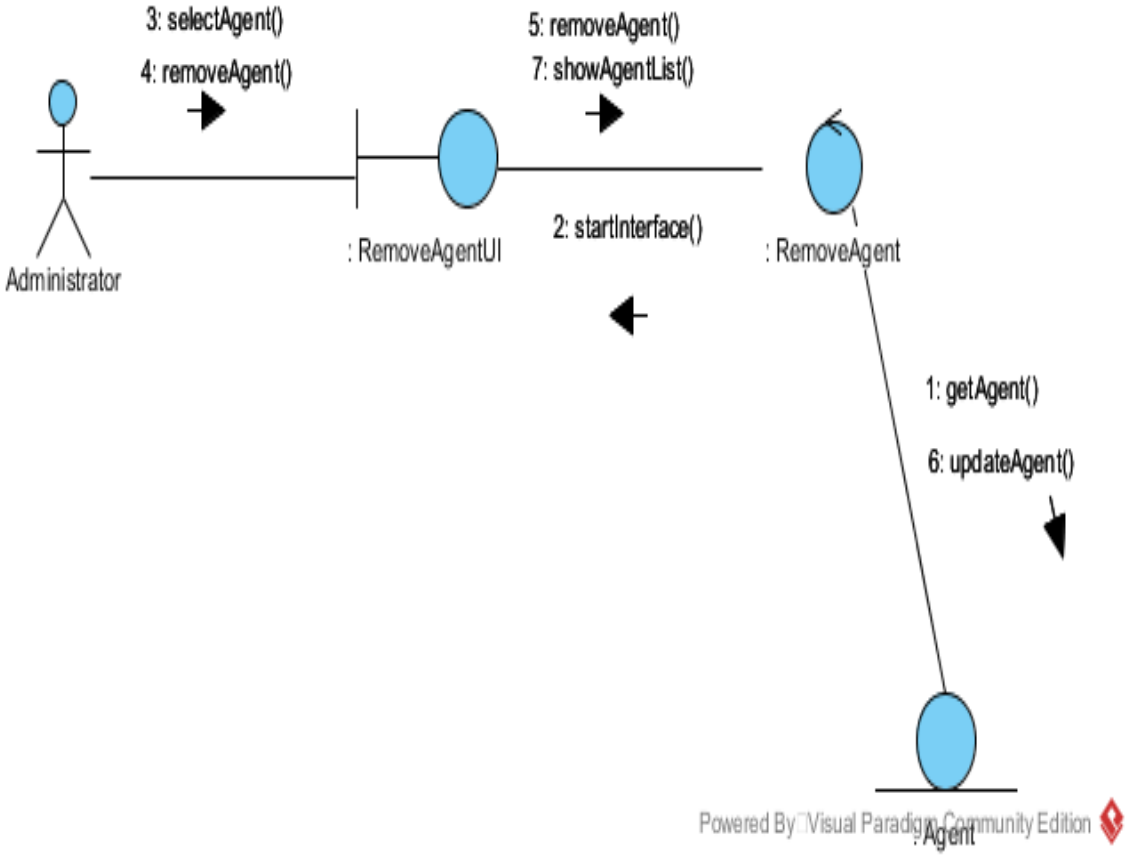


Figure 51: Communication diagram

The sequence diagram in Figure 52 is a synchronization of the communication diagram in Figure 51. The sequence of events for Remove Agent transaction.

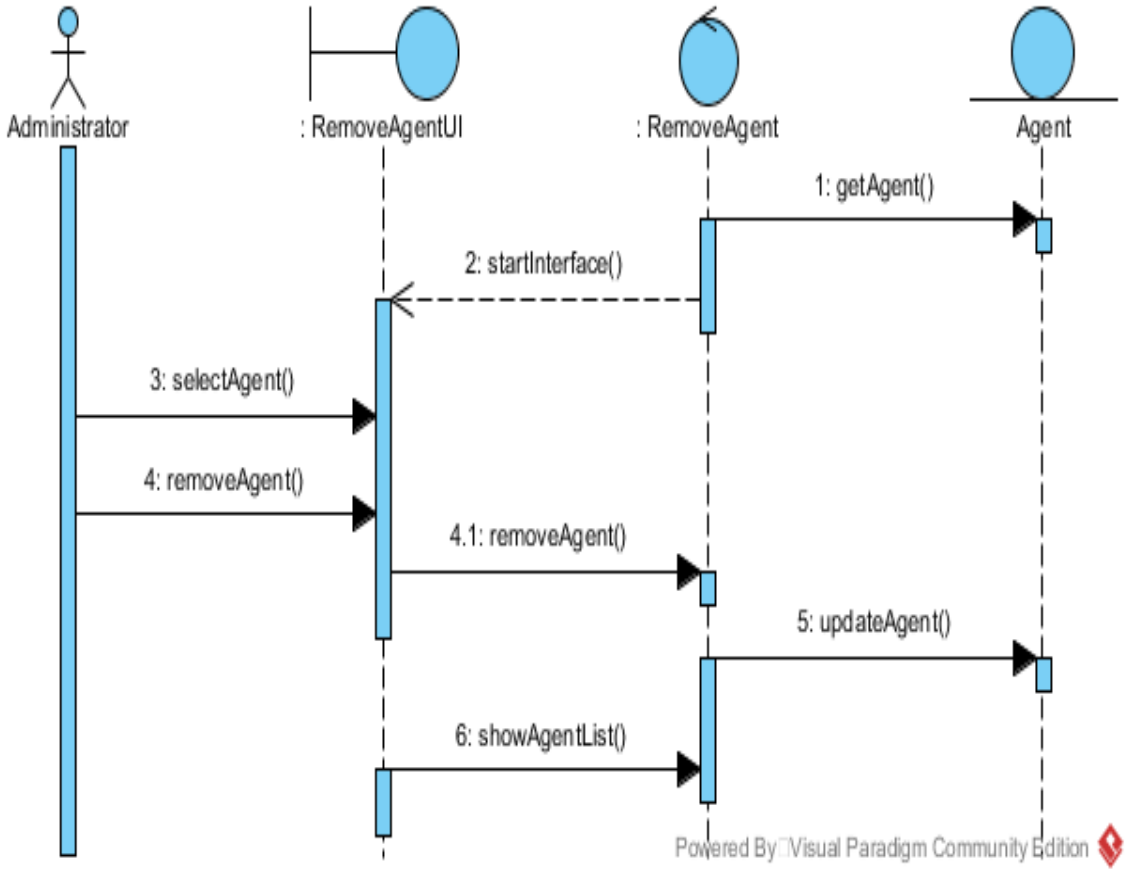


Figure 52: Sequence diagram

N) Block user

The administrator module in Figure 24 will cause the user interface (UI) to be started and then the control object to be instantiated. The control object gets the user records from the user entity object. The administrator selects the user record they want to block, and then the control object executes block user transaction. The control object then asks administrator to update the user records. The control object finally asks the boundary object to display the user records.

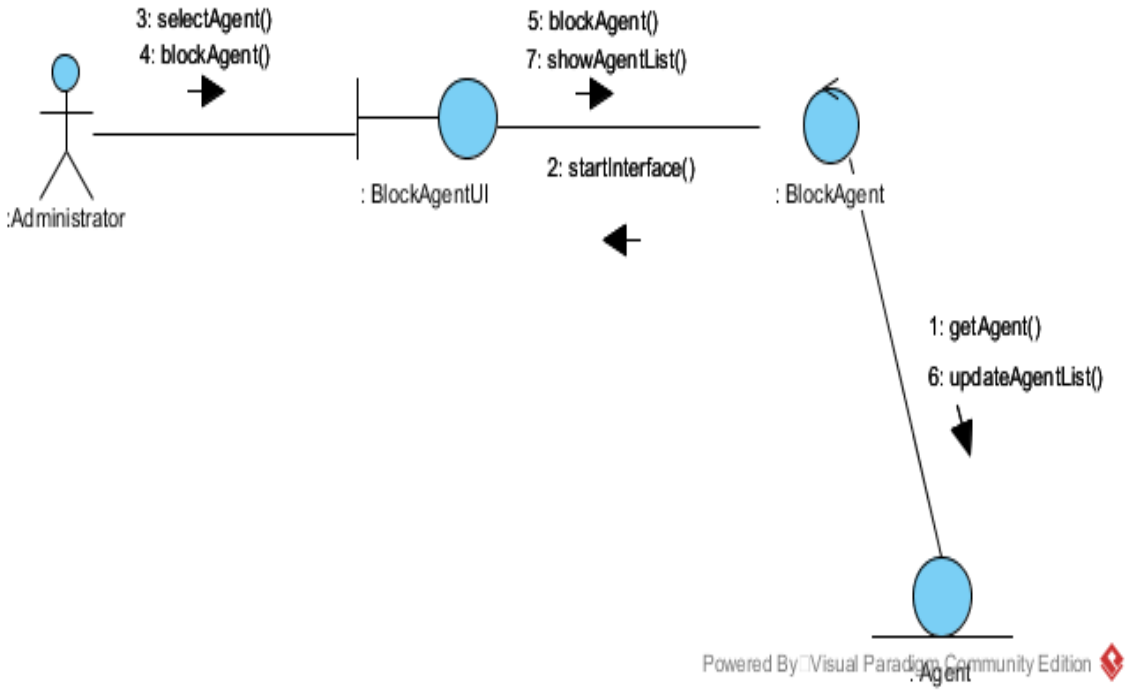


Figure 53: Communication diagram

The sequence diagram in Figure 54 is a synchronization of the communication diagram in Figure 53. The sequence of events for the events View USSD transaction Use Case is shown.

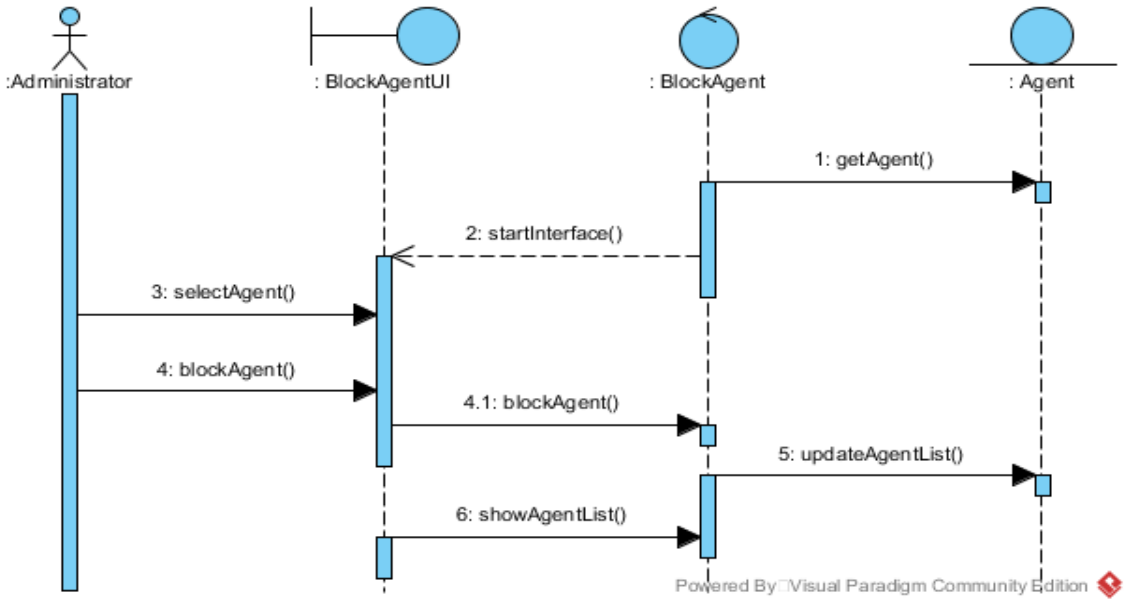


Figure 54: Sequence diagram

3.3.7.3.3 Structural models – class diagrams

Structural models involve class diagrams which show the classes in a system and the association between these classes [97]. As such, an object class can be a general definition of one kind of system object, whereas an association is a link between classes which shows relationship between these classes [97]. As the matter of fact, objects represent something in the real world, such as a person and a transaction just to mention a few [97].

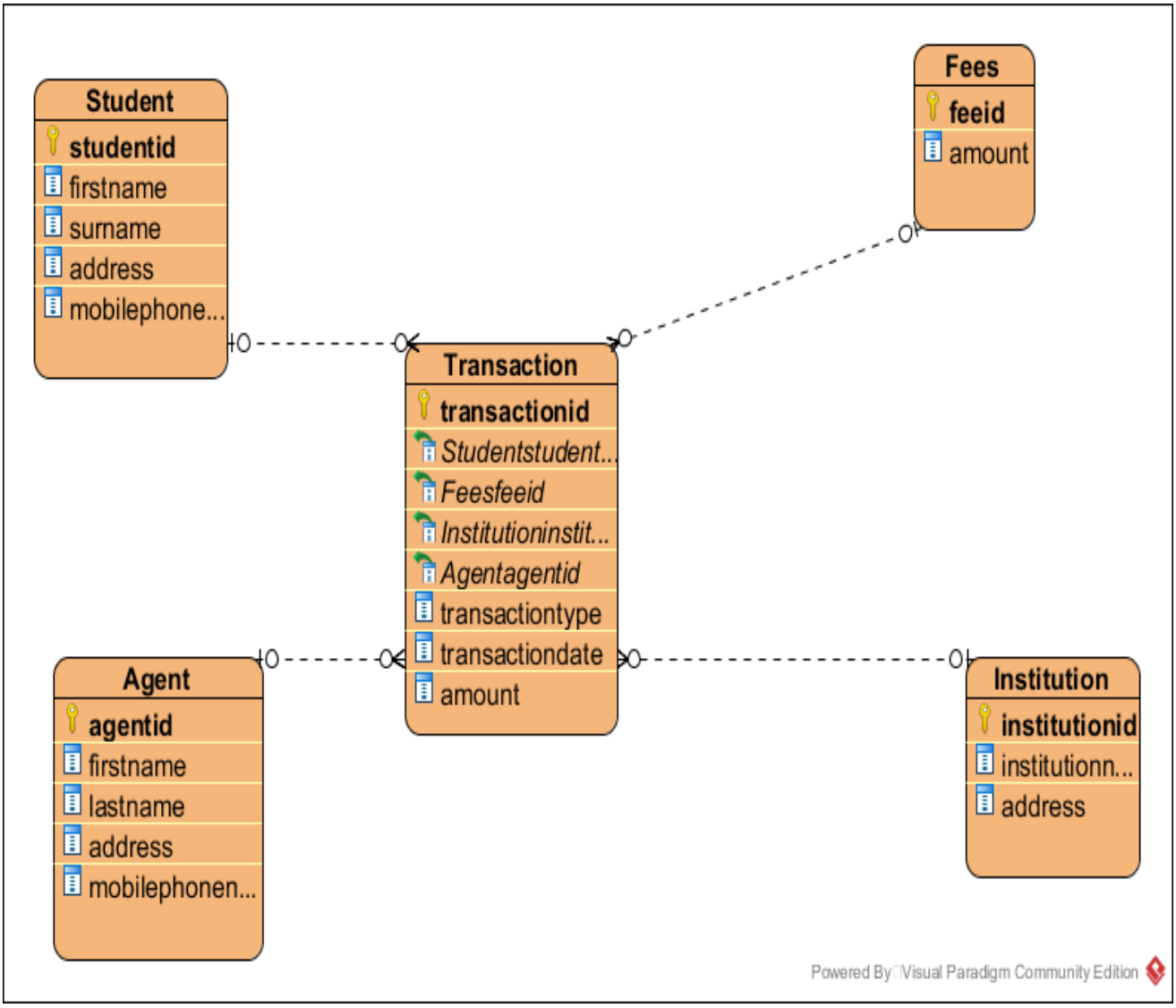


Figure 55: ERD Diagram

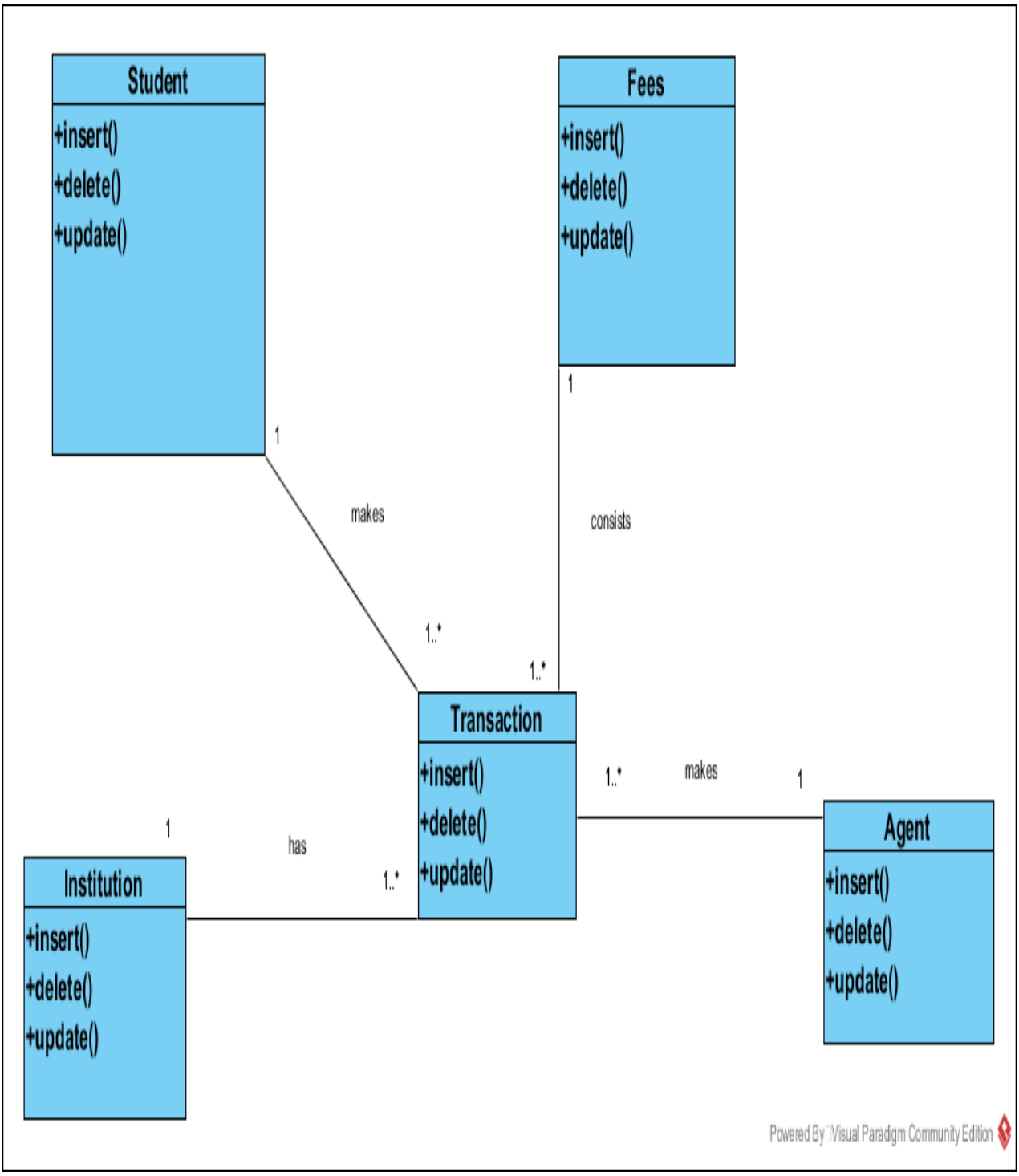


Figure 56: Class diagram

Table 15: schema

Entity	**Attributes**
Student	***studentid***, firstname, surname,address, mobilephonenumber
Agent	***agentid,*** firstname, lastname, address, mobilephonenumber
Transaction	***transactionid, studentid,feeid,agentid***,institutionid transactiontype,transactiondate,amount,
Fees	***feeid,*** amount
Institution	***Institutionid***,instituionname,address

3.3.8 System implementation

The system prototype for the user application interface and the administrator side was developed using the simulator. The name of the simulator is idea mart. Simulator is a freely available prototyping platform based on easy to use hardware and software. It is used to build interactive prototypes and experiments. Simulator has the ability to input gateways. Gateways are accessed from the mobile service providers and are relatively expensive.

The programming language used was php storm for both the user interface and the database. The database (i.e. MySQL) language is MySQLi. The administration side is made up of the hypertext markup language (i.e. HTML) for user interface. The php connects to the database. The hardware components used was the personal computer to implement the prototype.

3.3.8.1 Limitation of the prototype

The mobile phone application prototype is not the full-fledged application as shown in Figure 24. Financial constraints could not allow acquisition of Mobile Service Provider Gateway permission for the proof of concept to be demonstrated on the physical mobile phone. Time constraints could not allow all the modules shown in Figure 24 to be demonstrated.

3.3.9 Summary

The foregoing chapter made use for the results assimilated from the baseline study. The challenges identified formed a premise of developing an optional payment system in order to mitigate challenges faced by students, general users and accounts personnel in higher education institutions of Zambia. The use of DFS provides convenient transactions that positively impact on the unbanked and low income people like students.

CHAPTER FOUR

RESULTS

4.1. Introduction

In this chapter, we present results that were derived from the baseline study. The presentation of results is clustered among the target groups of respondents for this study which included: general users, students, institutional accounts personnel, regulators, commercial banks and DFS agents. Additionally, the chapter also presents results for the implementation of the system prototype by means of screenshots of the system application.

4.2 General user respondents

4.2.1 Introduction

The study sampled 20 respondents from: Lusaka, Kaoma and Chongwe. In this section, we present research findings for general users based on their: general information, banks and business processes, mobile phones and applications, challenges and recommendations. The presentation of the results is in form of frequency tables, bar charts and pie charts.

4.2.1.1 Banks and business processes

In this section, we describe banks and their business processes by illustrating the following: bank account ownership, name of bank where bank account is opened, use of bank account and how they feel about the current banking systems.

4.2.1.2 Bank account ownership

We used a frequency table to describe the results of respondents pertaining to whether they owned a bank account of not. The majority (65%) indicated that they have bank accounts while the minority 35% said they don't have bank accounts.

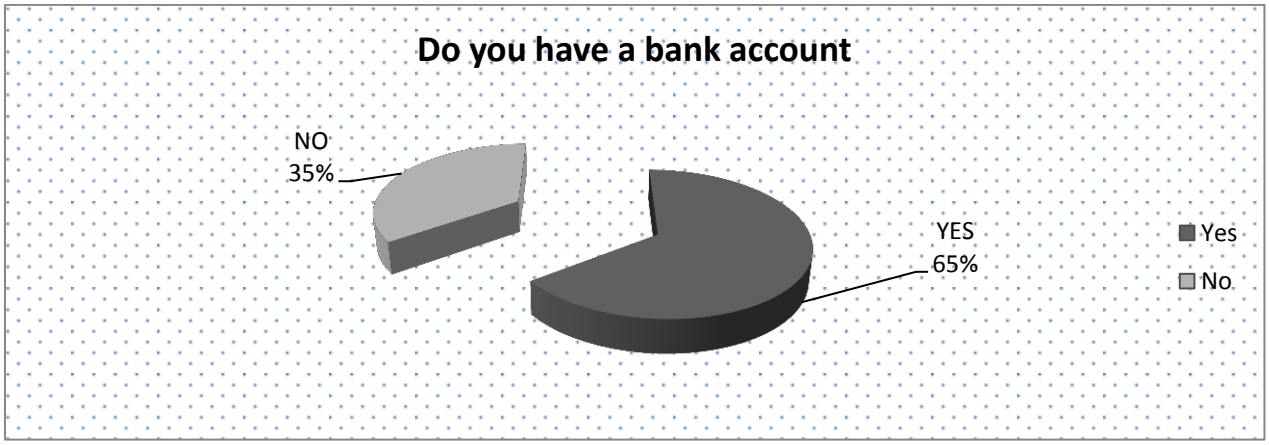


Figure 57: Respondents indicating whether they have bank accounts

4.2.1.3 Name of Bank where bank account is opened

The following distribution of respondents indicates which banks respondents have bank accounts with. The majority (40%) mentioned bank A while 35% of the respondents said they have no bank accounts.

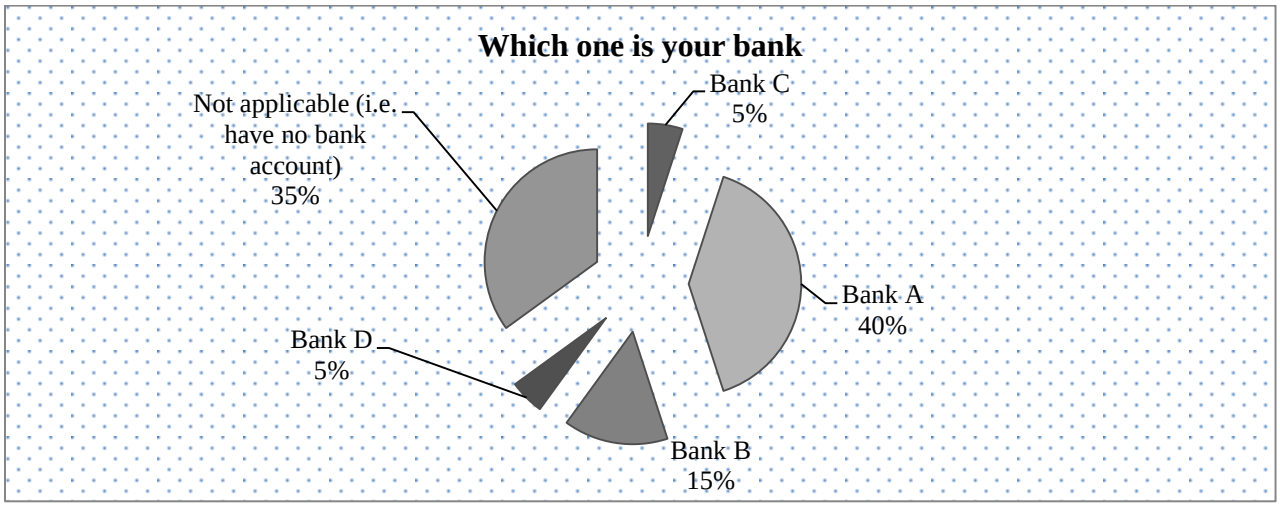


Figure 58: Respondents' bank

4.2.1.4 What do you use your bank account for

We used a bar chart to describe the results of respondents pertaining to how respondents used their bank account for. The majority 25% used the bank account for saving money, 20% used the bank account for receiving or sending money to friends or relatives while 20% said they used the bank account for receiving their income. However, 35% of the respondents did not respond to this question because they had no bank accounts.

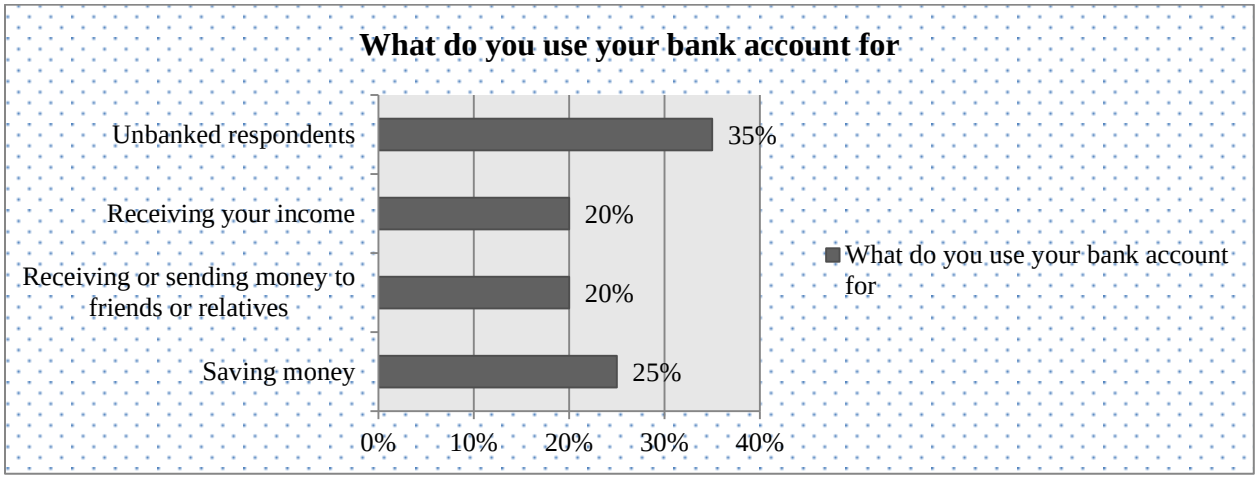


Figure 59: How bank account is used

4.2.1.5 Documentation requirements by banks hinder many people from opening bank accounts

The majority of the general user respondents (55%) disagreed that documentation requirements by banks hinder many people from opening bank accounts while 20% of the respondents agreed to the fact that documentation requirements by banks hinder many people from opening bank accounts.

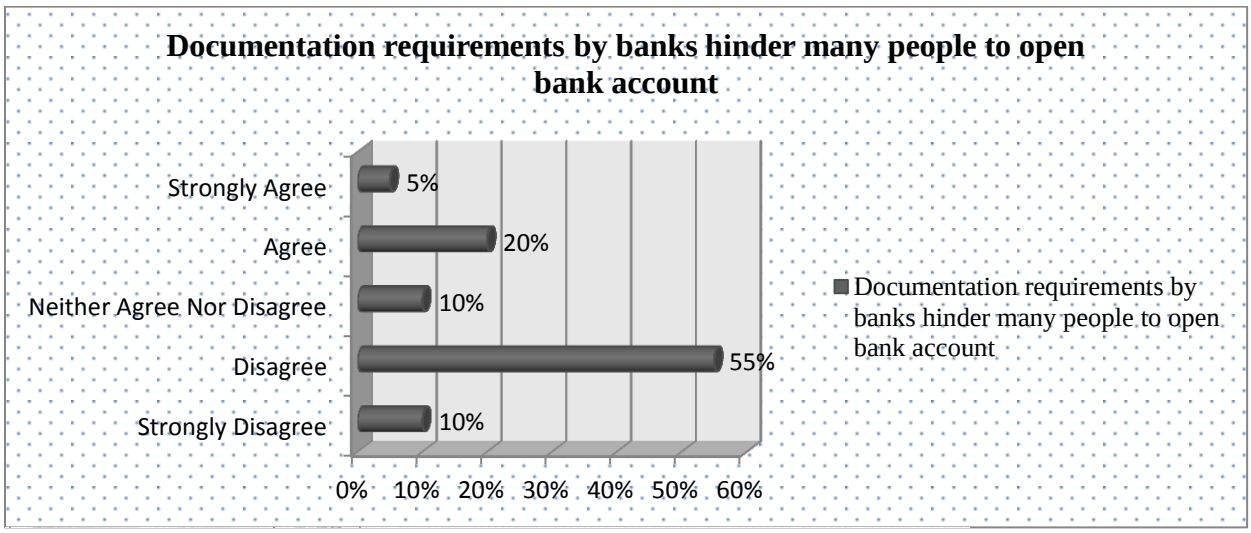


Figure 60: Respondents' responses to documentation requirements hindrances

4.2.1.6 Owning a bank account is very costly

The majority of the general user respondents (70%) disagreed by indicating that owning a bank account is not costly while only 10% of the respondents agreed by stating that owning a bank account is very costly.

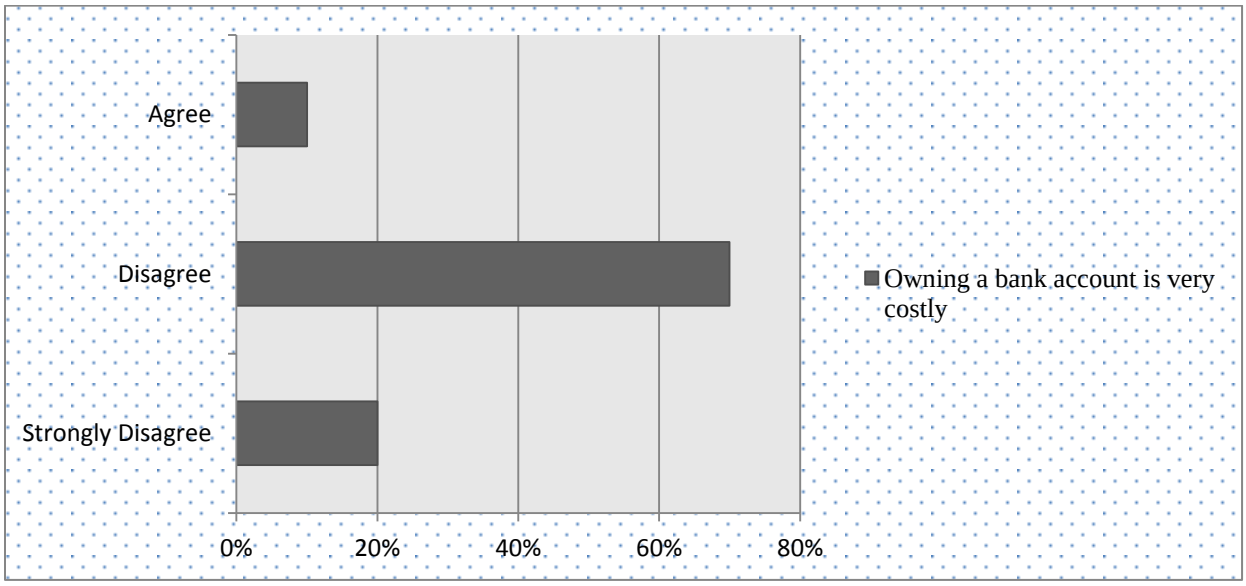


Figure 61: Bank account maintenance costs

4.2.1.7 Banks have limited infrastructure to attract more customers

We used a pie chart to describe how respondents feel about bank infrastructure in relation to how it can attract more customers. The majority (40%) of the sampled general users agreed that banks have limited infrastructure to attract more customers. However, 35% of the respondents disagreed followed by 25% of respondents who strongly disagreed by indicating that banks have adequate infrastructure to attract more customers.

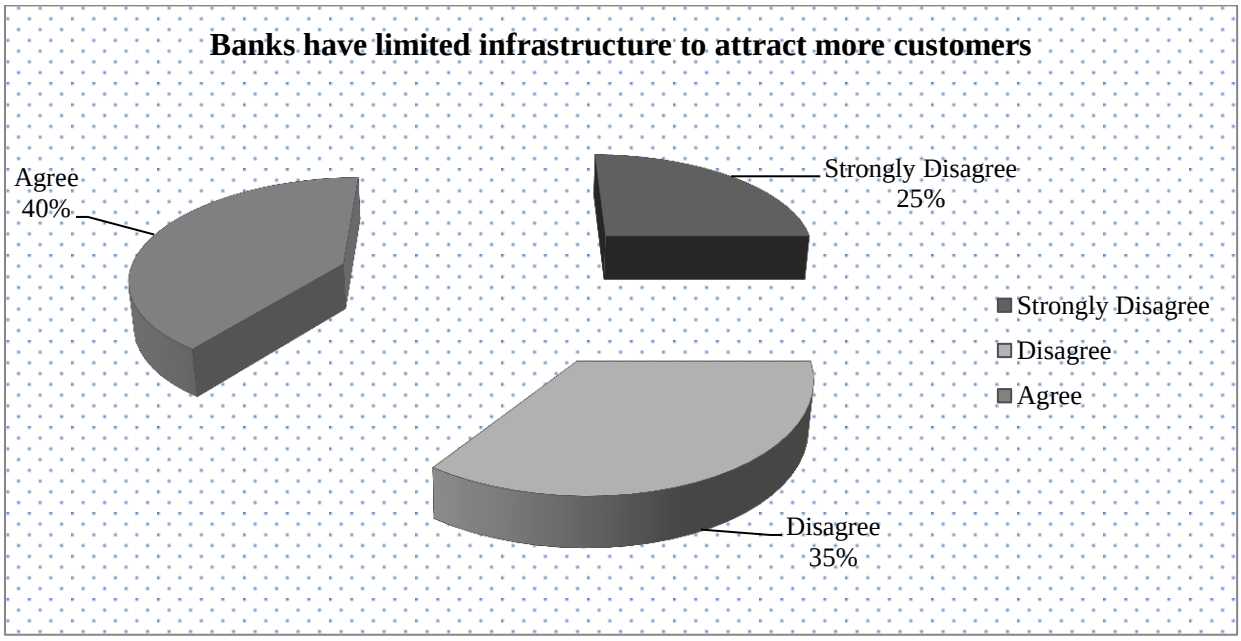


Figure 62: Banks' limited infrastructure

4.2.1.8 Banks are not evenly distributed in rural and urban areas

The following distribution of respondents indicates how banks are distributed in rural and urban areas. The majority (55%) agreed by stating that banks are not evenly distributed in rural and urban areas, followed by 35% of the respondents who strongly agreed. However, only 5% of the respondents strongly disagreed coupled with 5% of the respondents who disagreed.

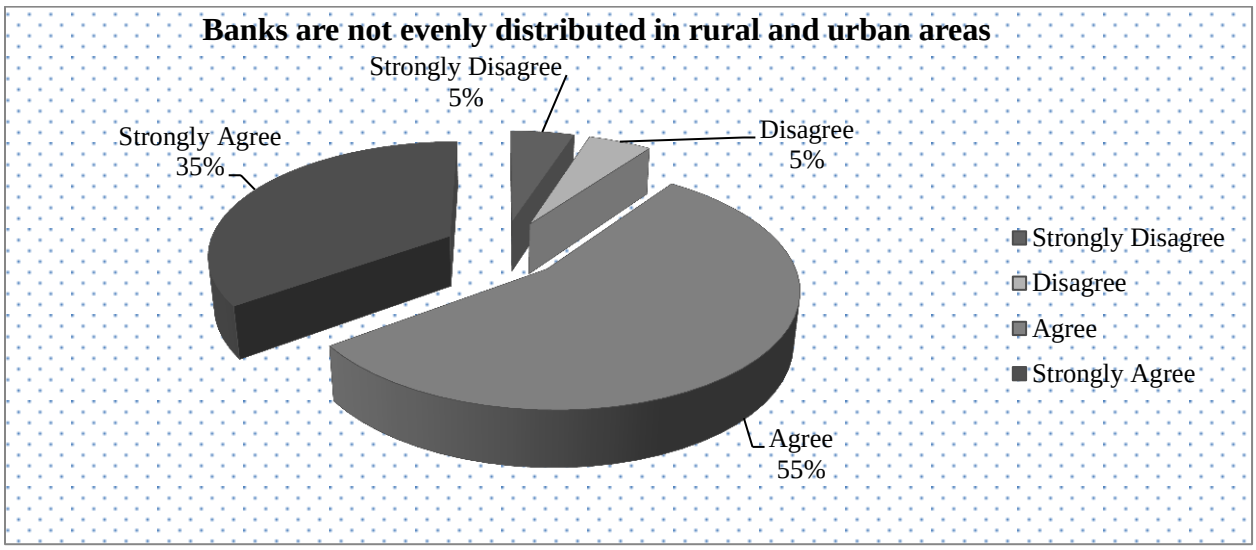


Figure 63: Banks' distribution in rural and urban areas

4.2.1.9 Recommended banks are within accessible areas

The majority of the respondents (45%) disagreed by indicating that recommended banks are not within the accessible areas. However, 35% of the respondents agreed to the fact that recommended banks are within accessible areas.

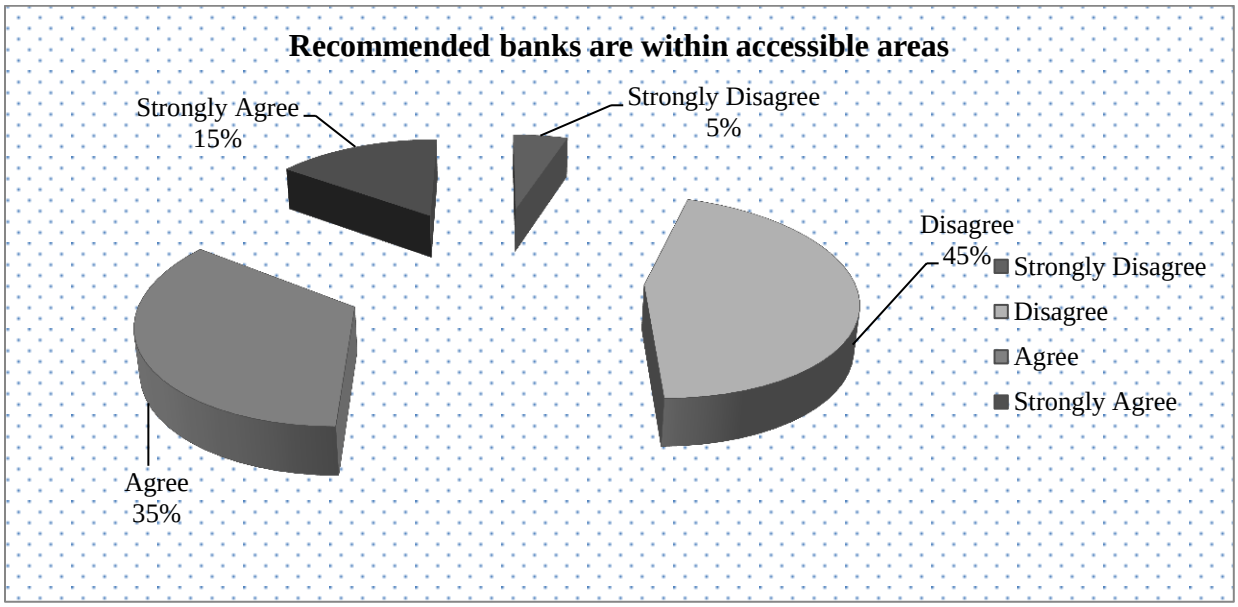


Figure 64: Banks' accessibility range

4.2.1.10 You have to travel long distance to access a recommended bank

The following distribution is a bar chart to describe the results of respondents pertaining to the distance required for one to access the recommended bank. The majority (45%) agreed with the fact that they travel a long distance to access a recommended bank, 35% of the respondents disagreed.

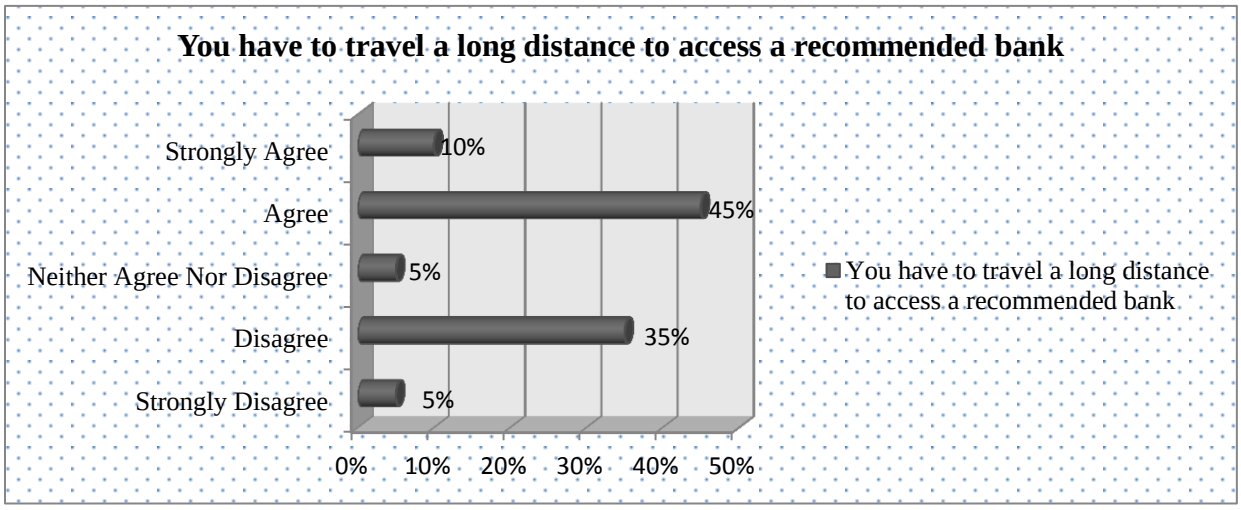


Figure 65: Recommended banks' distances

4.2.1.11 Recommended banks have limited infrastructure

The majority (40%) agreed by stating that recommended banks have limited infrastructure, although 30% of the respondents disagreed followed by 20% of the respondents who strongly disagree.

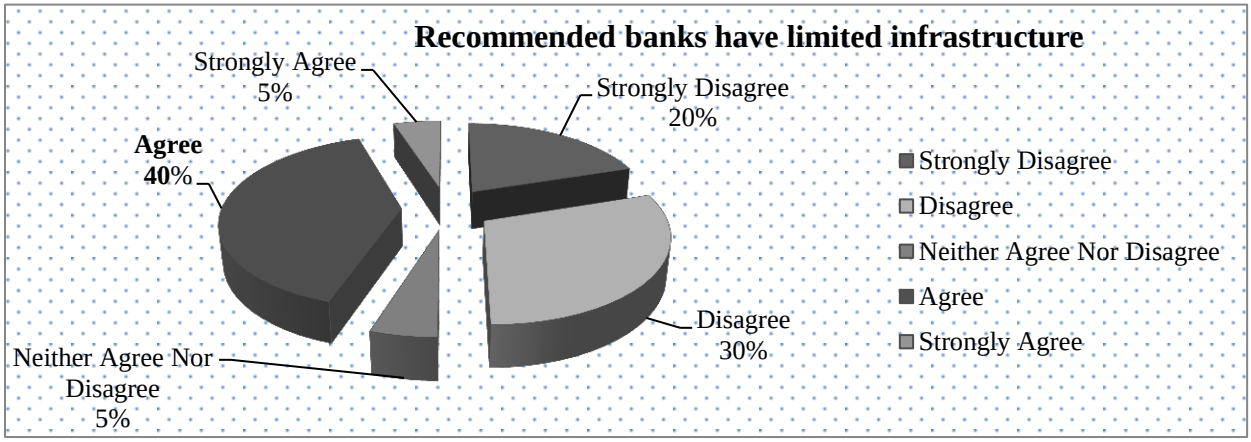


Figure 66: Efficiency of banks' infrastructure

4.2.1.12 Time spent to deposit fees in the bank is less

The majority of the respondents (60%) strongly disagreed with the fact that time spent to deposit fees in the bank is less, followed by 20% of the respondents who equally disagreed with the same sentiment. However, only 20% of the respondents agreed with the set statement.

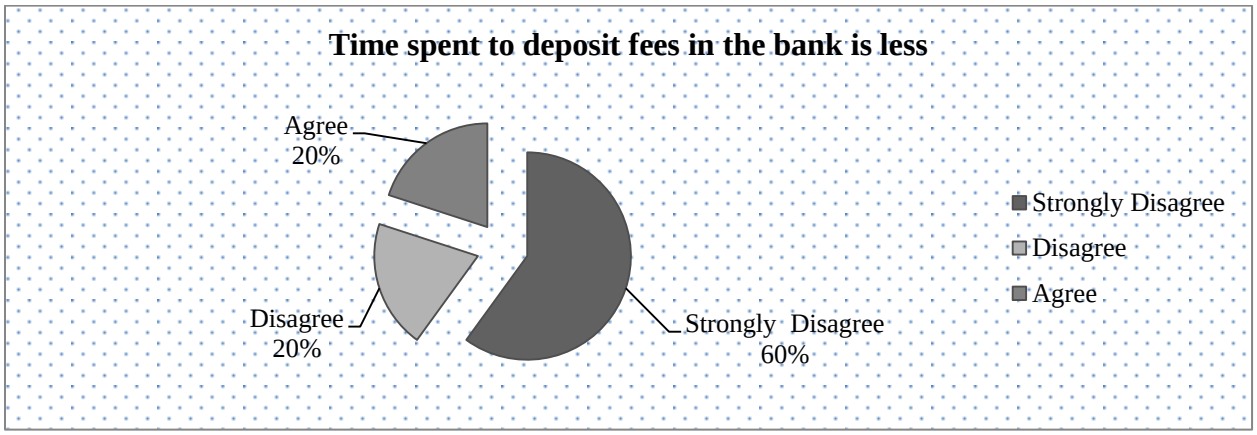


Figure 67: Customers' time durability in bank

4.2.1.13 Time spent to deposit fees in the bank is unbearable

The majority (40%) agreed with the statement, followed by 20% who strongly agreed. However, 20% of the respondents strongly disagreed coupled with 20% of respondents who disagreed.

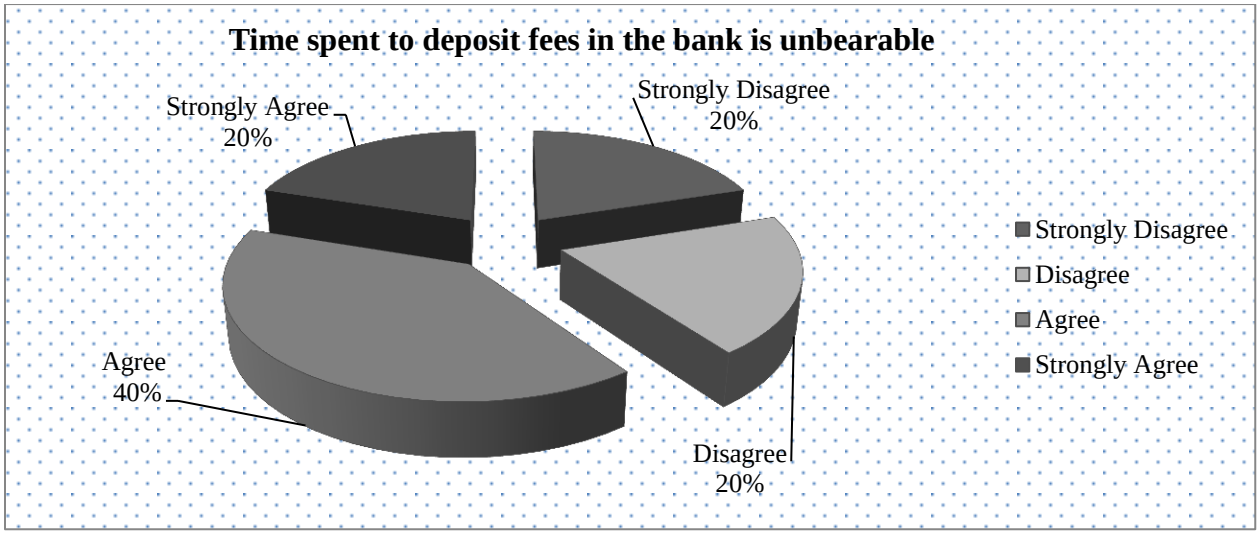


Figure 68: Respondents on time consumed in banks

4.2.1.14 State major challenges related with payment of tuition fees and other fees (e.g. for your children, guardians, relatives and friends)

We used a pie chart to state major challenges faced by respondents when making payments related to tuition fees and other fees in banks. The majority (50%) cited long queues, followed by 20% that mentioned congestion due and 15% of the respondents indicated time consuming when making payments.

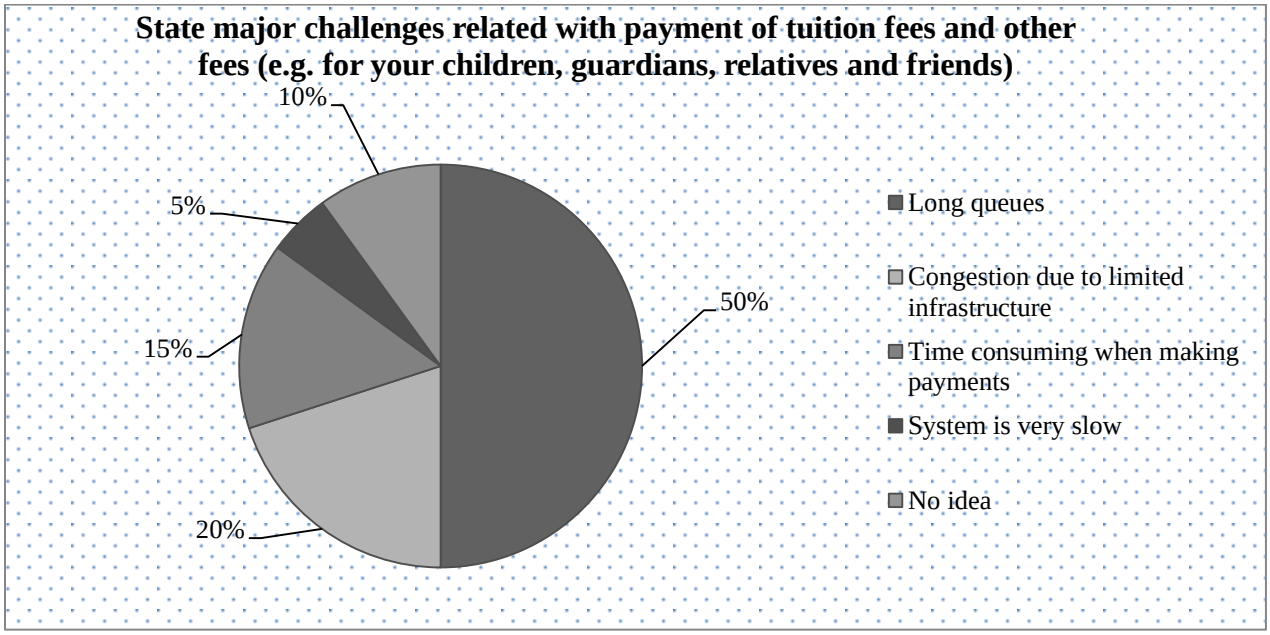


Figure 69: Major challenges for general users

4.2.2 Mobile phones and applications

4.2.2.1 Introduction

This section focused on knowing whether the respondents had mobile phones, followed by finding out the type of mobile phones they had; before we sought to understand what respondents knew about digital financial services.

4.2.2.2 Do you have a mobile phone

All the respondents (100%) indicated that they had a mobile phone.

Table 16: Do you have a mobile phone

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Yes	1	20	100.0	100.0	100.0
	Total	20	100.0	100.0	

4.2.2.3 What type of mobile phone do you have

We used a pie chart to describe the results of respondents in order to find out what type of mobile phones that had. The majority (85%) indicated that they had smartphones while 15% of respondents mentioned that they had feature phones.

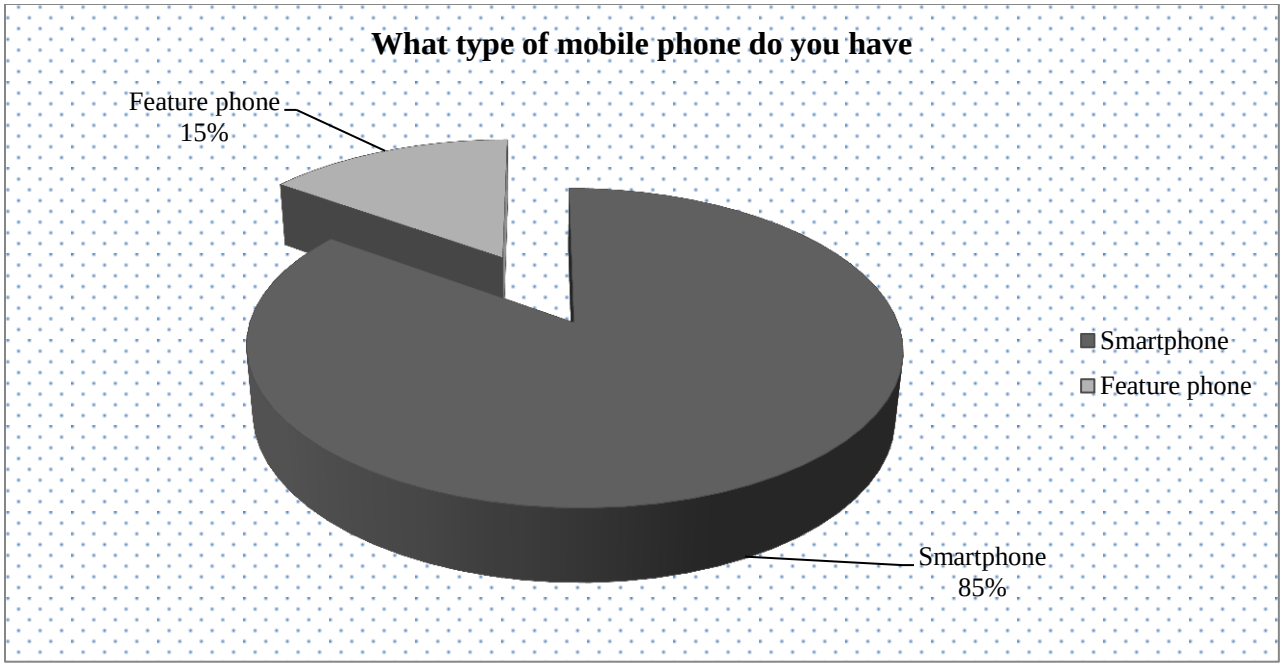


Figure 70: Type of mobile phones owned

4.2.2.4 Are you conversant with the mobile phone applications on your mobile phone

We used a bar chart to describe the results of respondents in order to find out whether they were conversant with the mobile phone applications on their mobile phones. The majority 75% said they were conversant with the mobile phone applications on their phones, but 25% of the respondents stated that they were not conversant.

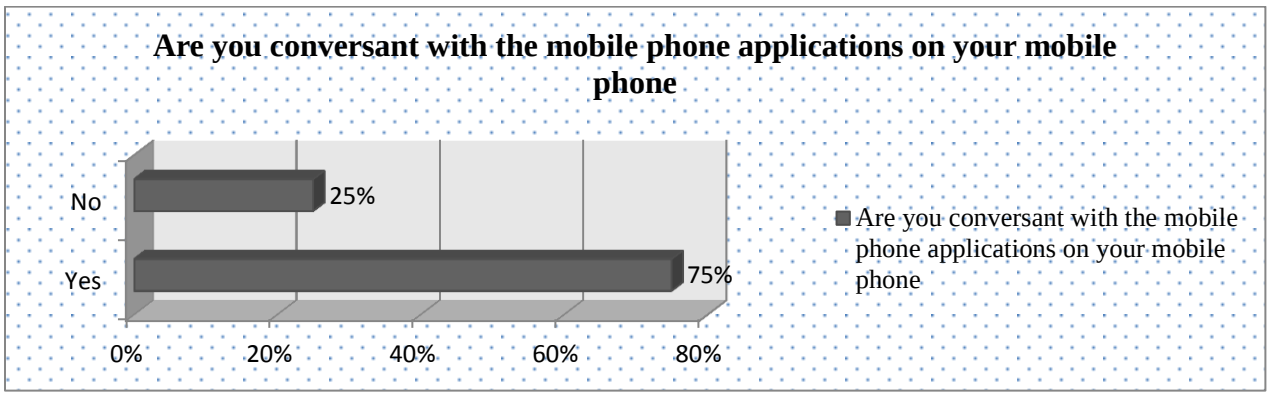


Figure 51: Respondents' response on use of mobile phone applications

4.2.2.5 Have you ever used digital financial services

A bar chart was used to describe the results of respondents so that we find out whether they have ever used digital financial services. The majority (90%) declared that they have used digital financial services although 10% of the respondents said they have never used digital financial services.

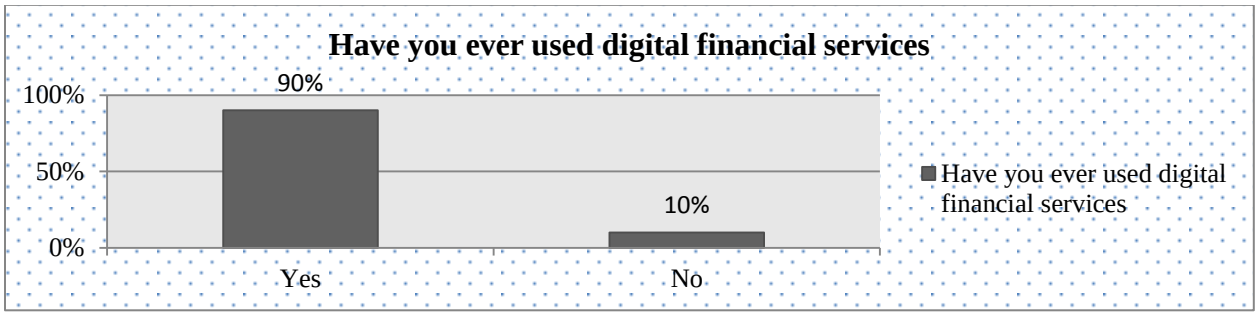


Figure 72: Use of digital financial services

4.2.2.6 Name digital financial services with quality service delivery in Zambia

We used a bar chart to get responses from the respondents in order to get views from them concerning which digital financial services had quality service delivery. The majority (40%) said it was Zoona, followed by 20% of the respondents who mentioned Zanaco Xapit and subsequently 15% of the sampled general users indicated Western union.

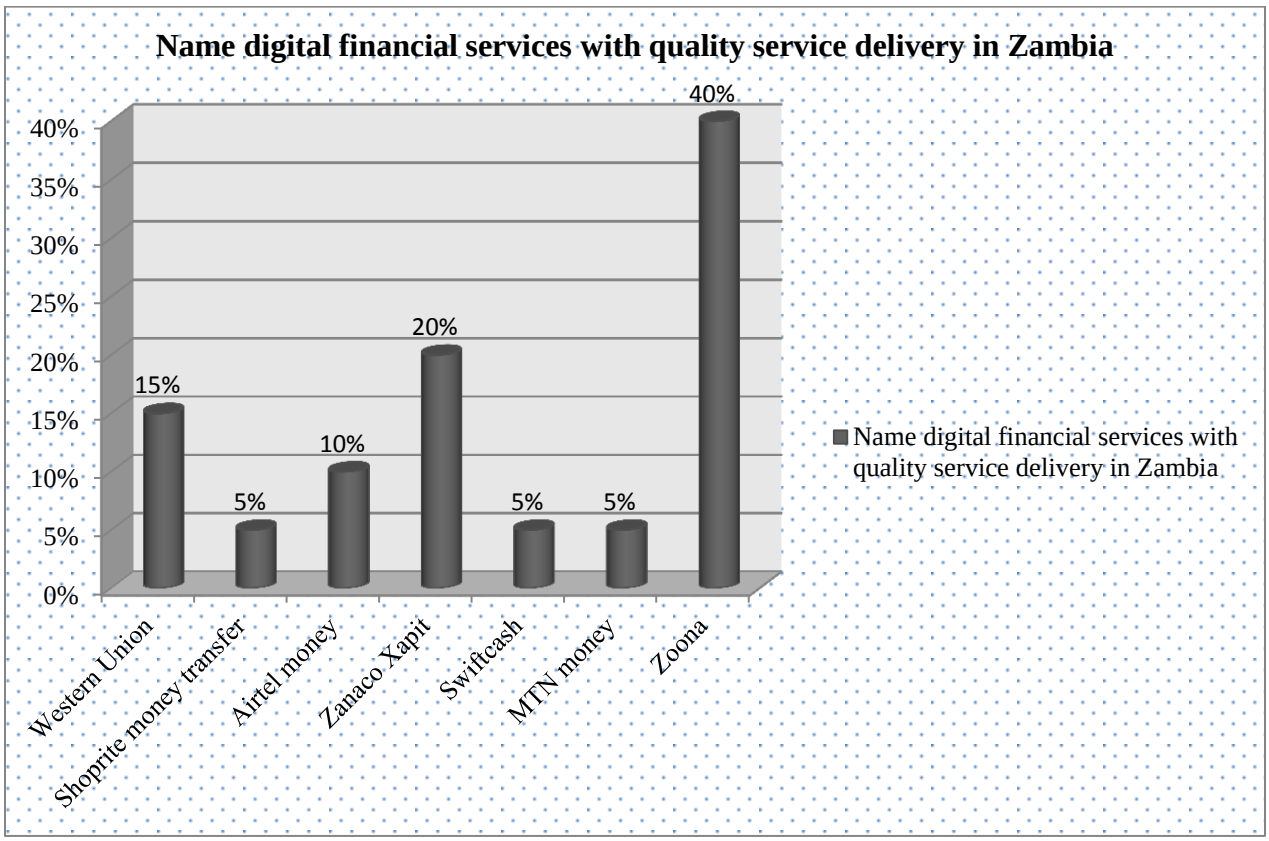


Figure 73: Digital financial services highly rated

4.2.2.7 State one digital financial service rated low in terms of service delivery in Zambia

The majority of respondents (35%) mentioned Shoprite money transfer as being low in terms of service delivery in Zambia.

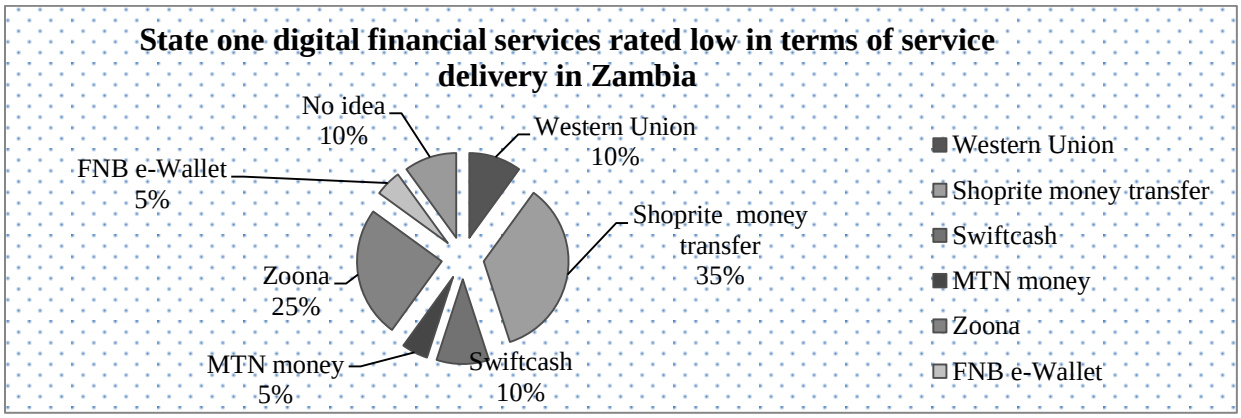


Figure 74: Low quality digital financial services

4.2.2.8 How is money sent to relatives/children/friends

The respondents were asked how they send their money to their relatives/children/friends. The majority (90%) mentioned sending money to their relatives/children/friends through digital financial services while the minority (10%) indicated through the bank.

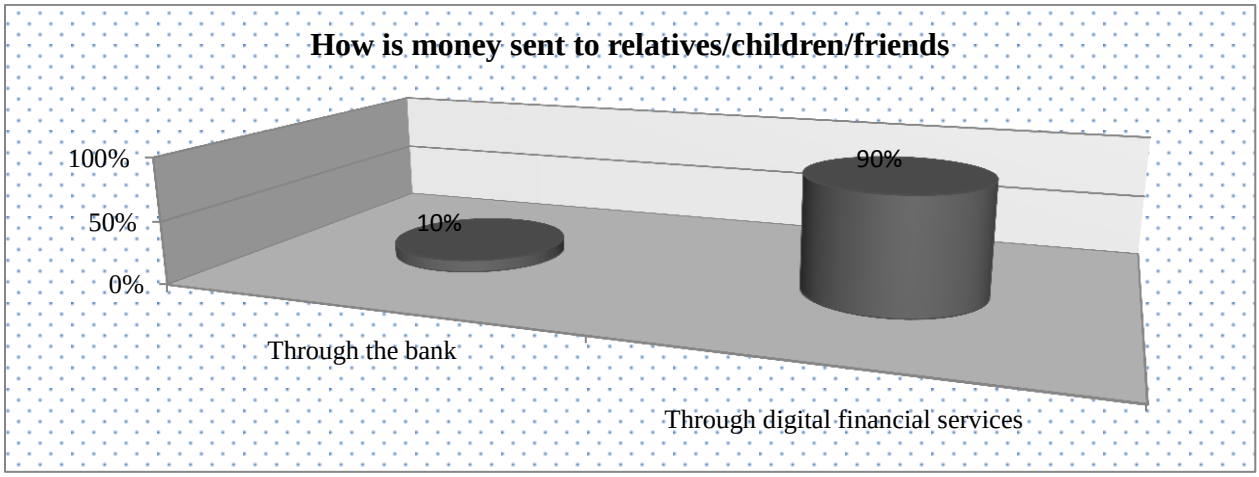


Figure 75: Medium for transferring money

4.2.2.9 Digital financial services are safe and secure to use

The majority of the respondents (75%) indicated that digital financial services are safe and secure to use. However, only 5% of the respondents strongly disagreed that digital financial services are safe and secure to use.

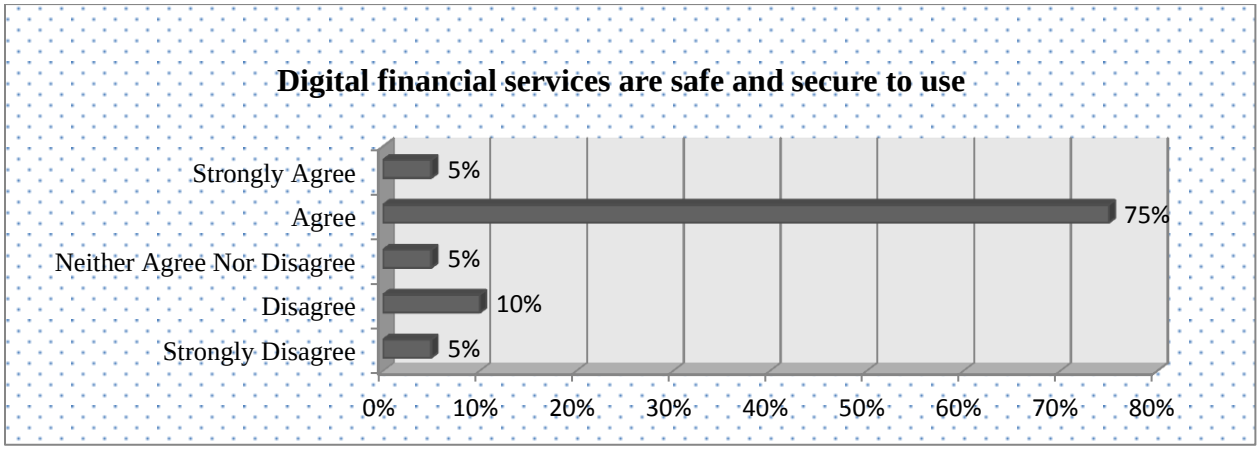


Figure 76: Safety and security of digital financial services

4.2.2.10 Digital financial services are efficient and transparent

We used a pie chart to get responses from respondents in order to find out how efficient and transparent the digital financial services are. The majority (65%) agreed to this statement followed by 20% of the respondents who strongly agreed by stating that digital financial services are efficient and transparent. Only 10% of the respondents disagreed to the statement.

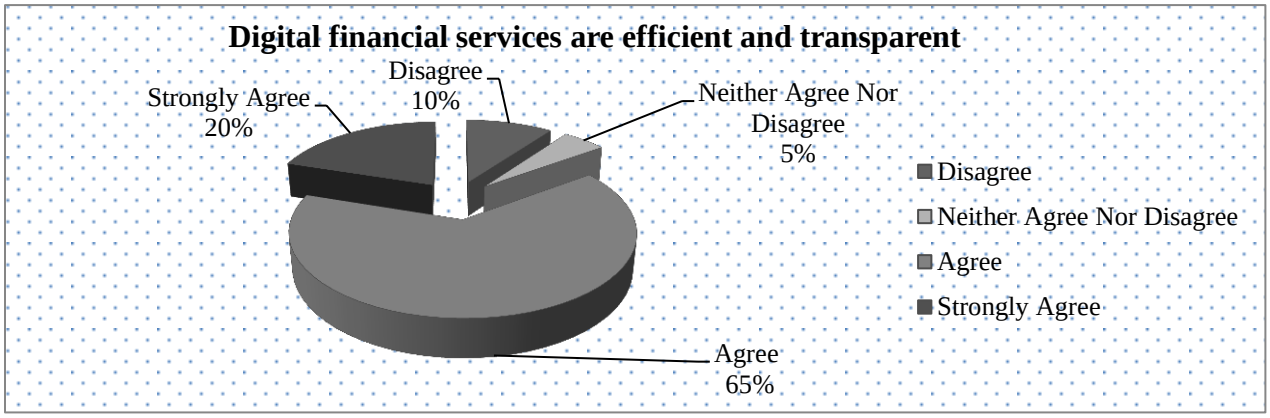


Figure 77: Digital financial services' efficiency and transparency

4.2.2.11 Digital financial services offer increased flexibility

The majority of respondents (70%) agreed by indicating that digital financial services offer increased flexibility, followed by 25% of the respondents who strongly agreed to the same statement.

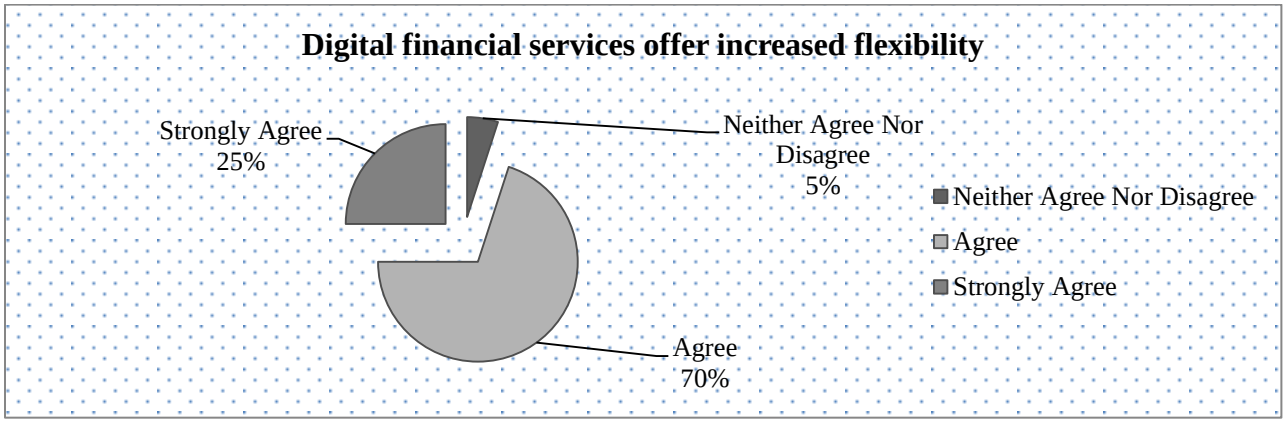


Figure 78: Digital financial services' flexibility

4.2.2.12 Digital financial services offer saving incentives

Most of the respondents (45%) agreed and 5% of the respondents strongly agreed to the fact that digital financial services offer saving incentives. However, the minority (5%) disagreed with the mentioned statement.

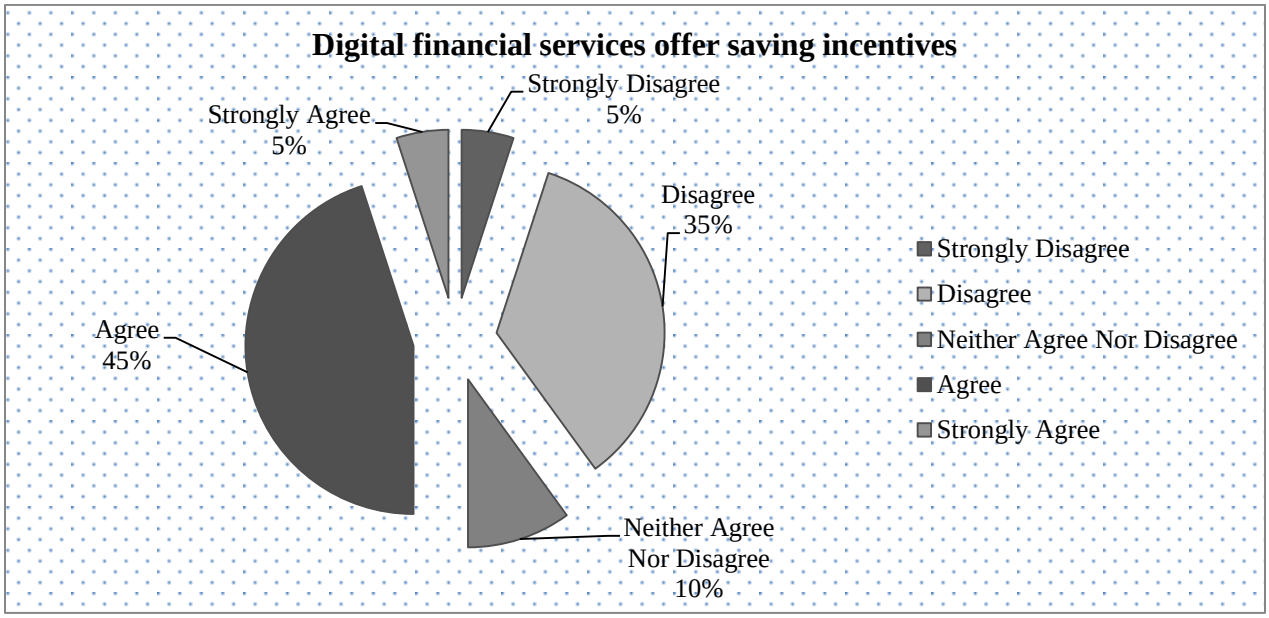


Figure 79: Saving incentives in digital financial services

4.2.2.13 Digital financial services give credit histories

A bar chart was used to get responses from respondents in order to find out whether digital financial services give credit histories (i.e. being able to trace history of a transaction). The majority (60%) agreed to this statement followed by 15% of the respondents who strongly agreed to the same statement. However, only 15% of the respondents disagreed with the mentioned statement.

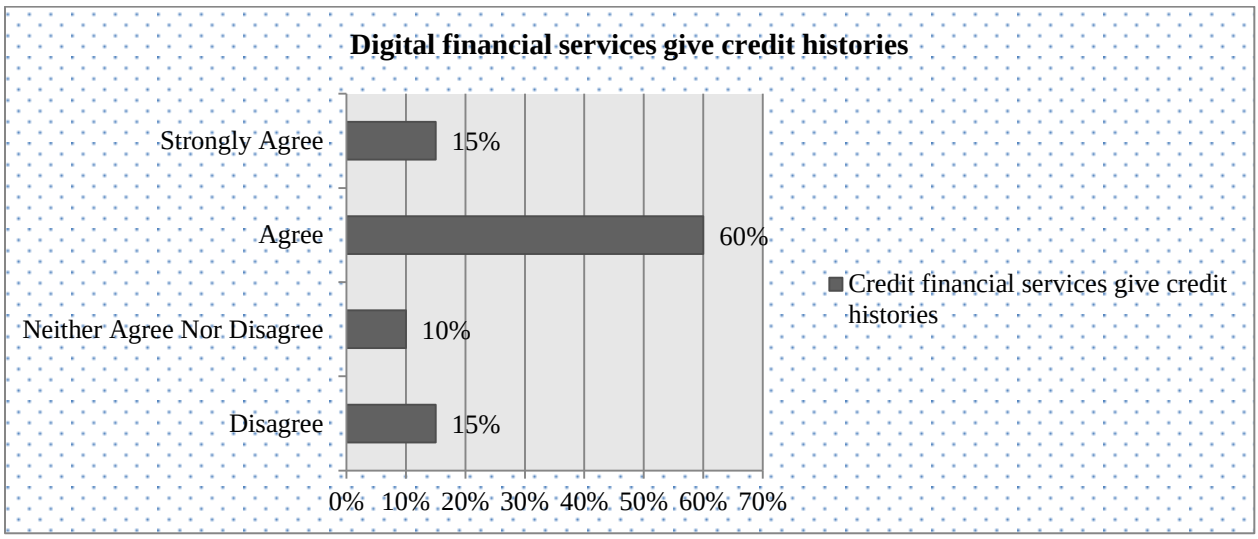


Figure 80: Credit histories in digital financial services

4.2.2.14 Digital financial services are important for integrating the unbanked

We used a pie chart to get responses from respondents so that we understand how important digital financial services are in integrating the unbanked (i.e. people without bank accounts). The majority (55%) agreed followed by 30% of the respondents who strongly agreed to the said statement. However, only 5% of the respondents strongly disagreed with the mentioned statement.

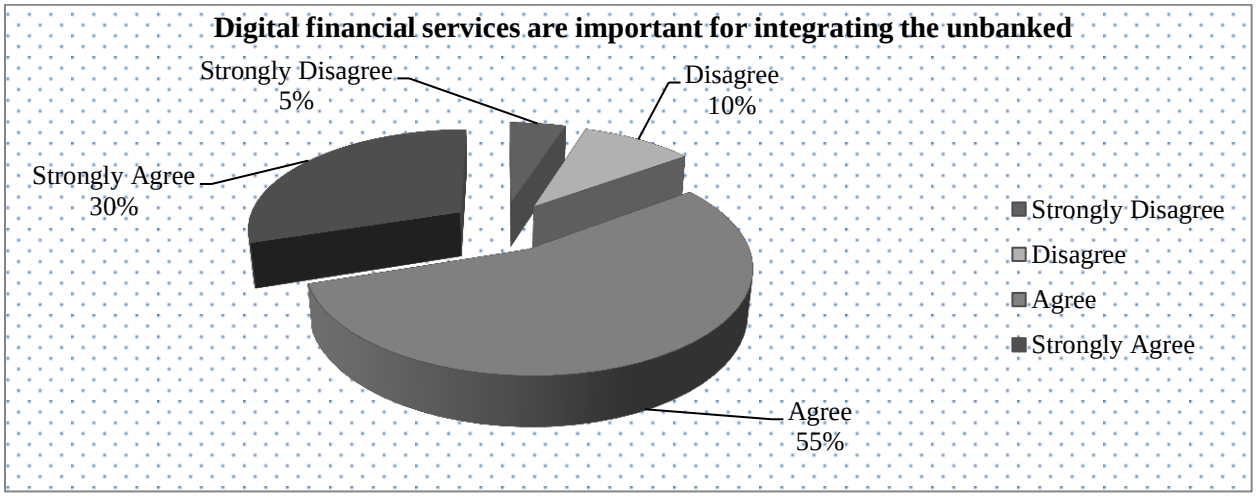


Figure 81: Unbanked integration in digital financial services

4.2.2.15 Recommendations

In this section, we wanted to get results from the respondents, with reference to recommendation of the digital financial services as an optional payment system for students in higher learning education institutions.

4.2.2.16 Can digital financial services complement banks

Most of the respondents (70%) recommended digital financial services to be used as an optional payment system for students in higher learning education institutions as opposed to only 30% of the respondents who disputed.

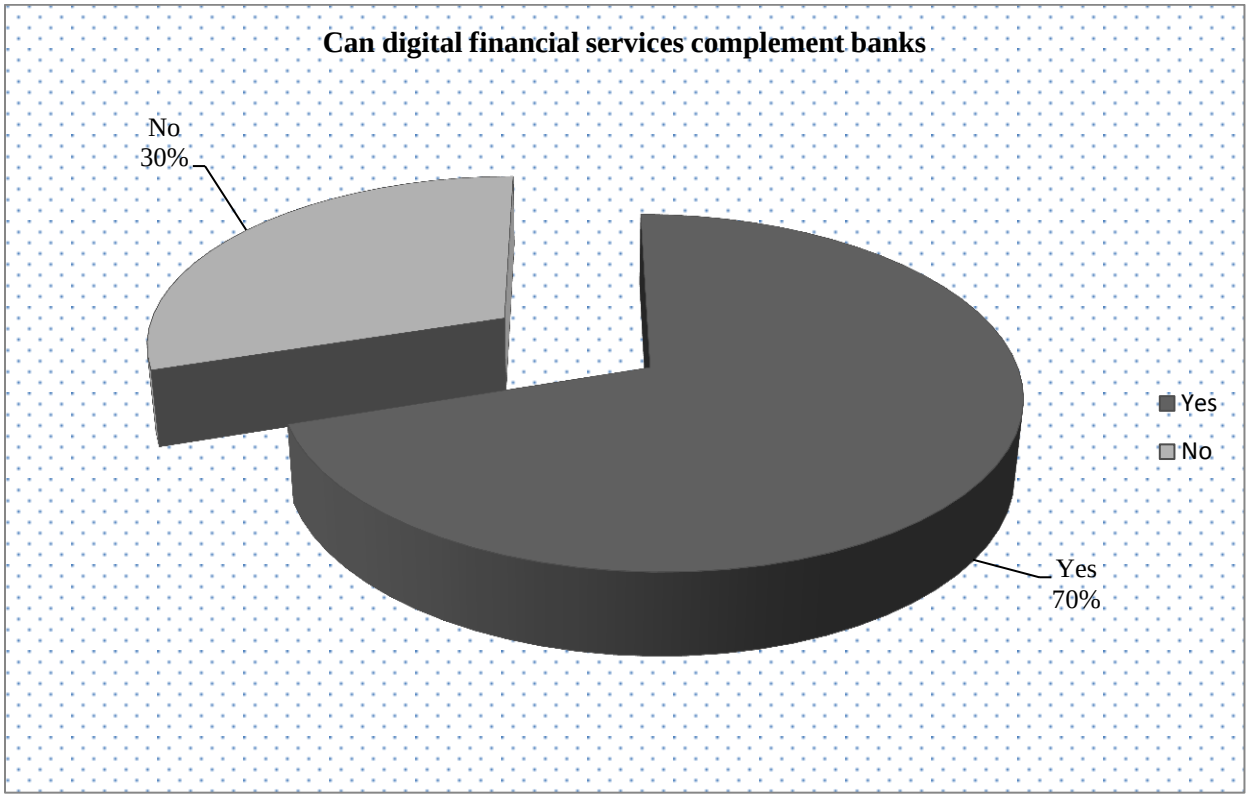


Figure 62: Digital financial services verses banks

4.3 Student respondents

4.3.1 Introduction

In this section, the study sampled 65 respondents from: The University of Zambia, Evelyn Hone College, Lusaka University, Cavendish University and Chainama College. As such, we present research findings for students based on their: general information, banks and business processes, challenges related to making payments in banks, mobile phones/Mobile money services and applications and recommendations. The format for the presentation of the results was by frequency tables, bar charts and pie charts.

4.3.2 Banks and business processes

This section describes banks and their business processes by illustrating the following: bank account ownership, name of bank where bank account is opened, use of bank account and how they feel about the current banking systems.

4.3.3 Name of Bank where bank account is opened

The distribution that follows describes respondents who indicated which banks they have bank accounts with. The majority (47.69%) said they have bank accounts with Bank A.

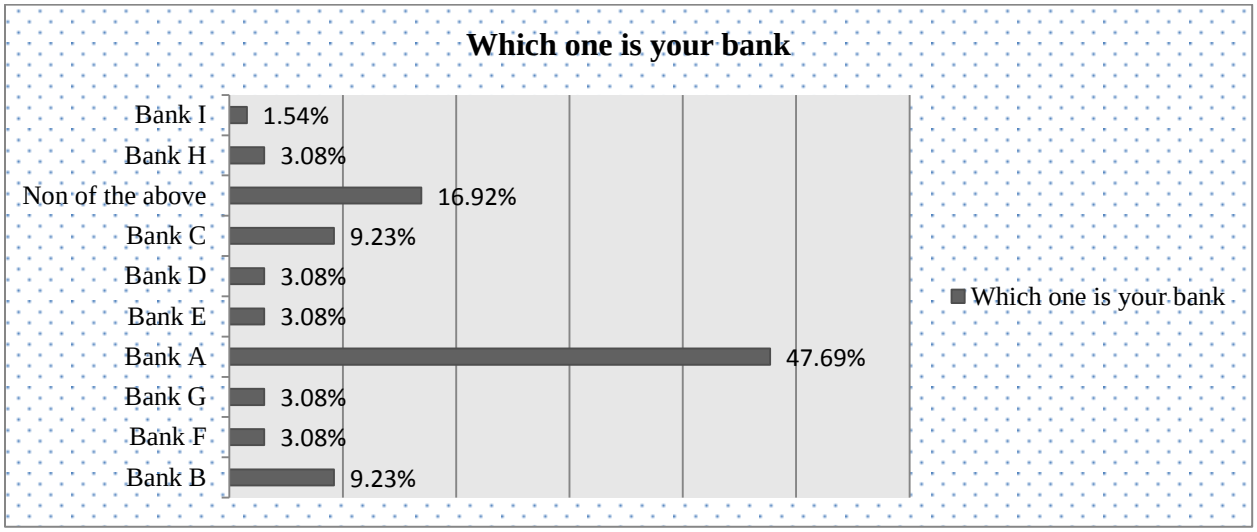


Figure 83: Name of banks students have accounts with.

4.3.4 What do you use your bank account for

A histogram was used to describe the results of respondents pertaining to how respondents used their bank account for. The majority 30.77% used the bank account for saving money, receiving or sending money to friends or relatives, cashing check deposits and receiving their income followed by 18.46% of the respondents who used their bank account for receiving their income. However, 20% of the respondents indicated none of the above because they had no bank accounts.

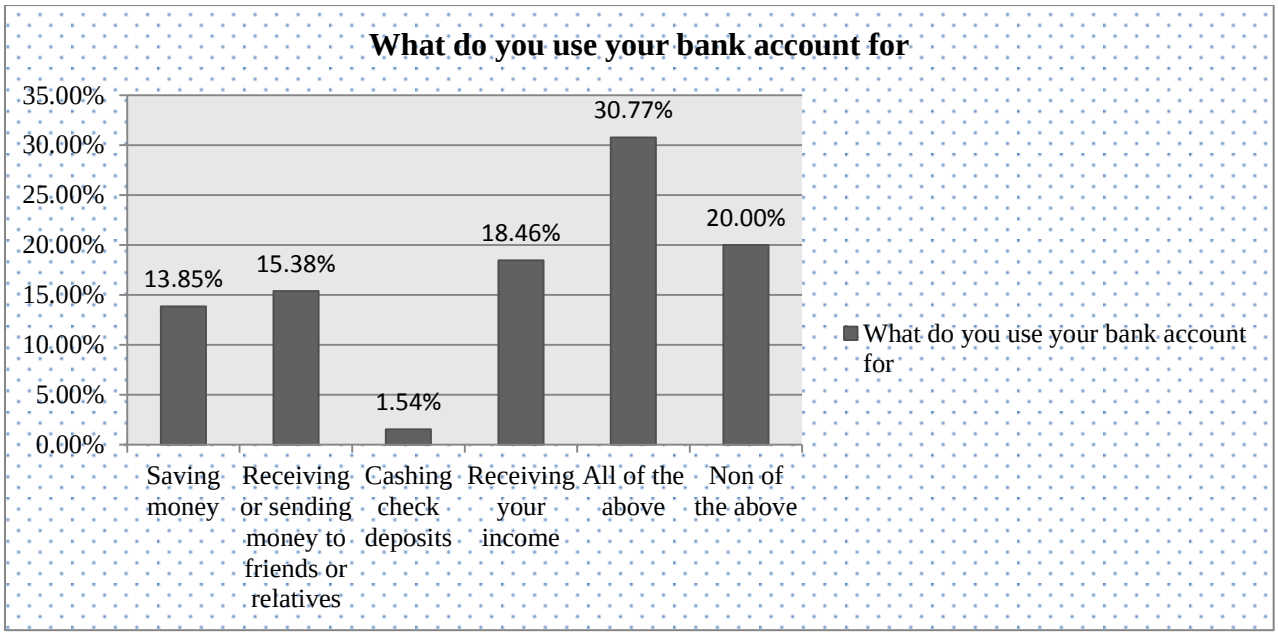


Figure 84: Role of bank account

4.3.5 Documentation requirements by banks hinder many people from opening banks accounts

The majority of student respondents (35.38%) agreed that documentation requirements by banks hinder many people from opening bank accounts. However, the minority 6.15% of the respondents strongly disagreed with the fact that documentation requirements by banks hinder many people from opening bank accounts.

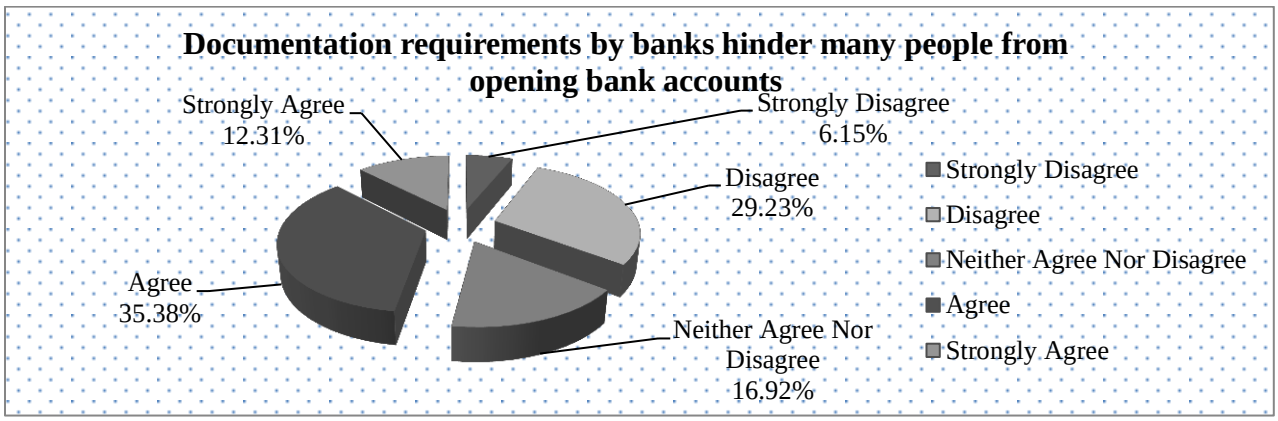


Figure 85: Documentation requirement hindrances

4.3.6 Owning a bank account is very costly

Most student respondents (32.31%) disagreed by indicating that owning a bank account is not very costly while the minority 10.77% of the respondents strongly agreed by stating that owning a bank account is very costly.

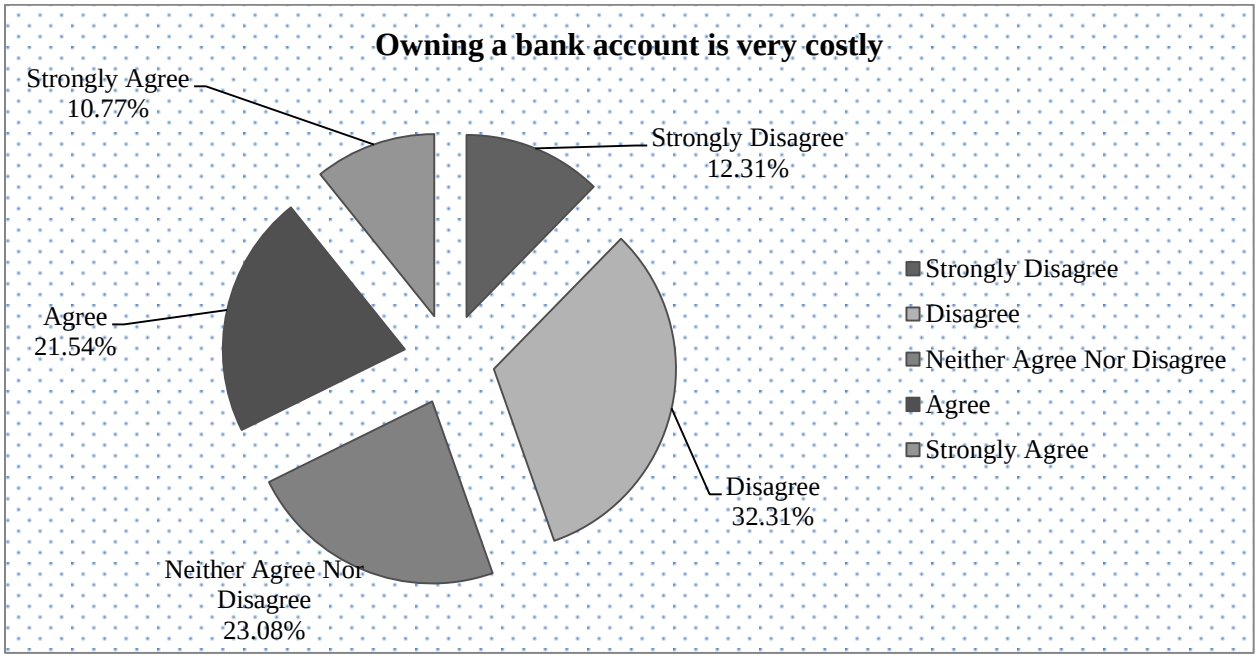


Figure 86: Bank account costs

4.3.7 Banks have limited infrastructure to attract more customers

A bar chart was used to describe how respondents feel about bank infrastructure in relation to how it can attract more customers. The majority (32.31%) of the respondents disagreed that

banks have limited infrastructure to attract more customers. However, 23.08% of the respondents agreed followed by 12.31% of respondents who strongly agreed by indicating that banks do not have adequate infrastructure to attract more customers.

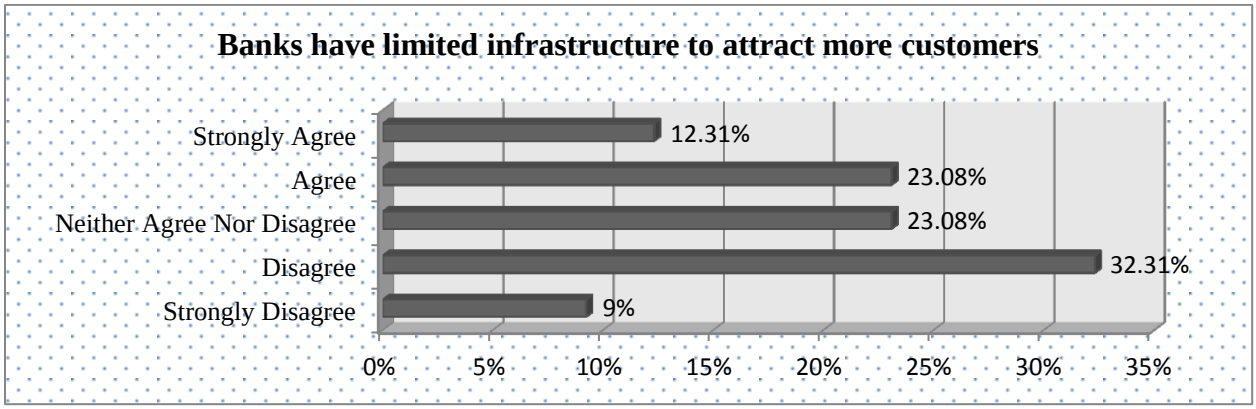


Figure 87: Limitation of bank infrastructures

4.3.8 Banks are not evenly distributed in rural and urban areas

The following distribution of respondents indicates how banks are distributed in rural and urban areas. The majority (46.15%) agreed by stating that banks are not evenly distributed in rural and urban areas, followed by 32.31% of the respondents who strongly agreed with the said statement. However, 4.62% of the respondents neither agreed nor disagreed with the statement.

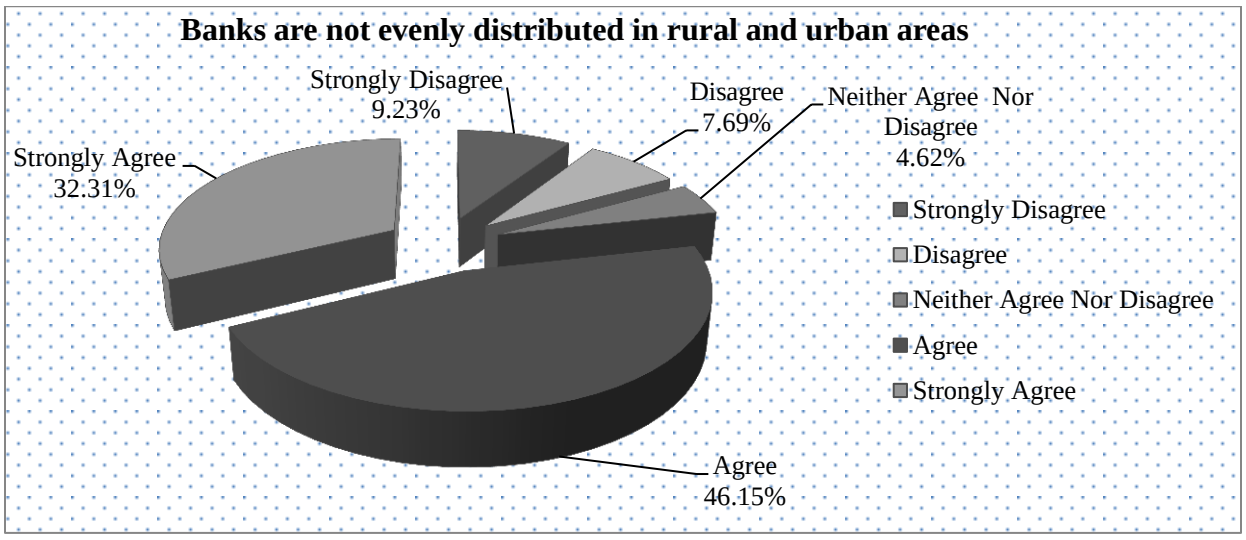


Figure 88: Distribution of banks

4.3.9 How do you pay your tuition or other fees in your institution

A larger proportion of respondents (96.92%) indicated that they pay their tuition or other fees through the bank. However, the minority (3.08%) of the sampled students mentioned that they pay their tuition or other fees by means of VISA/Debit Card.

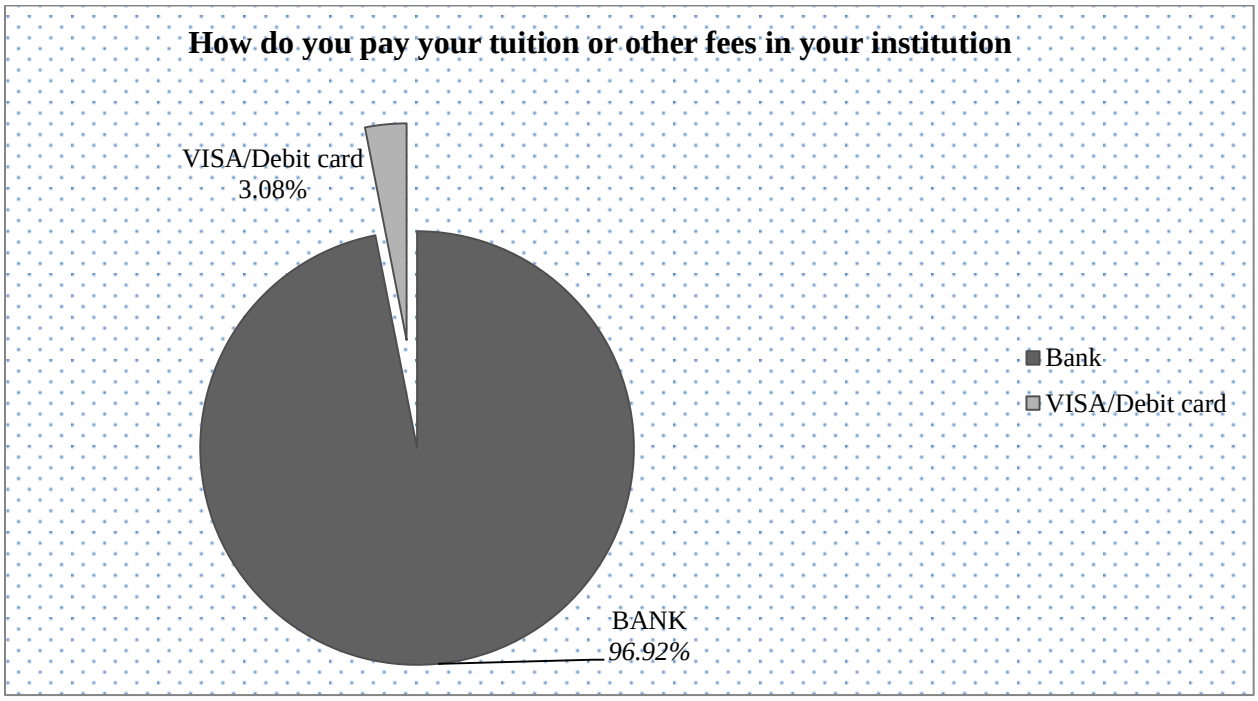


Figure 89: Tuition and fee payments

4.3.10 Feedback period for payment of tuition or other fees that does not involve cash

We used a bar chart to describe the results of respondents, with regards to the feedback period especially when payment of tuition or other fees that does not involve cash is made. Majority of respondents (89.23%) said they receive feedback period within 1 – 24 hours. However, the minority (1.54%) mentioned 1 – 2 weeks.

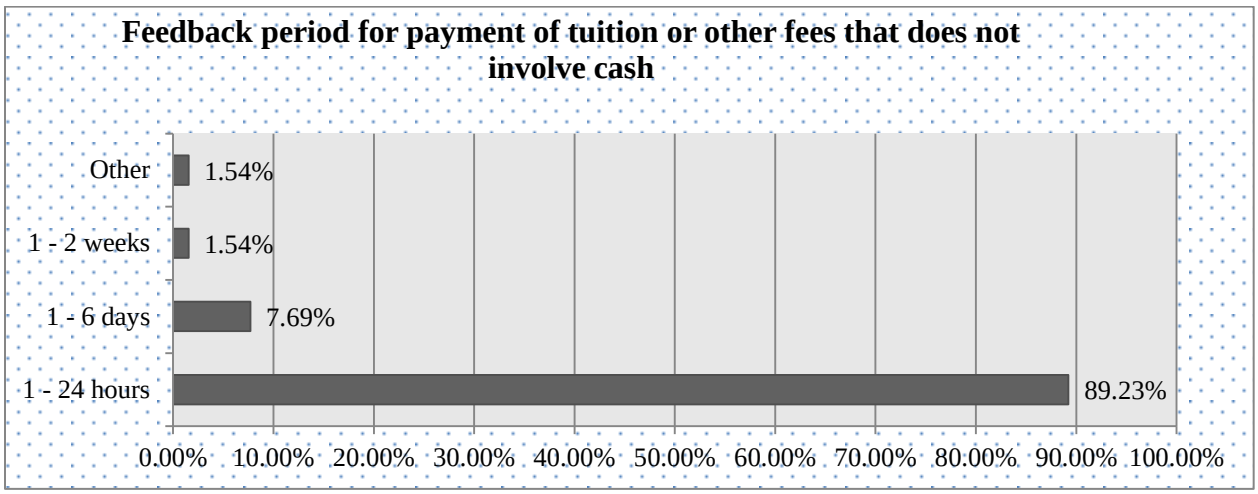


Figure 90: Payment feedback period

4.3.11 Type of form/document used to deposit money

A pie chart was used to describe the type of form/document that students use to deposit money in banks. The majority of the students (61.54%) indicated a general deposit slip, followed by 36.92% of the students who indicated using students' bill muster. However, the minority (1.54%) mentioned bank transfer method as a means of depositing money in the bank.

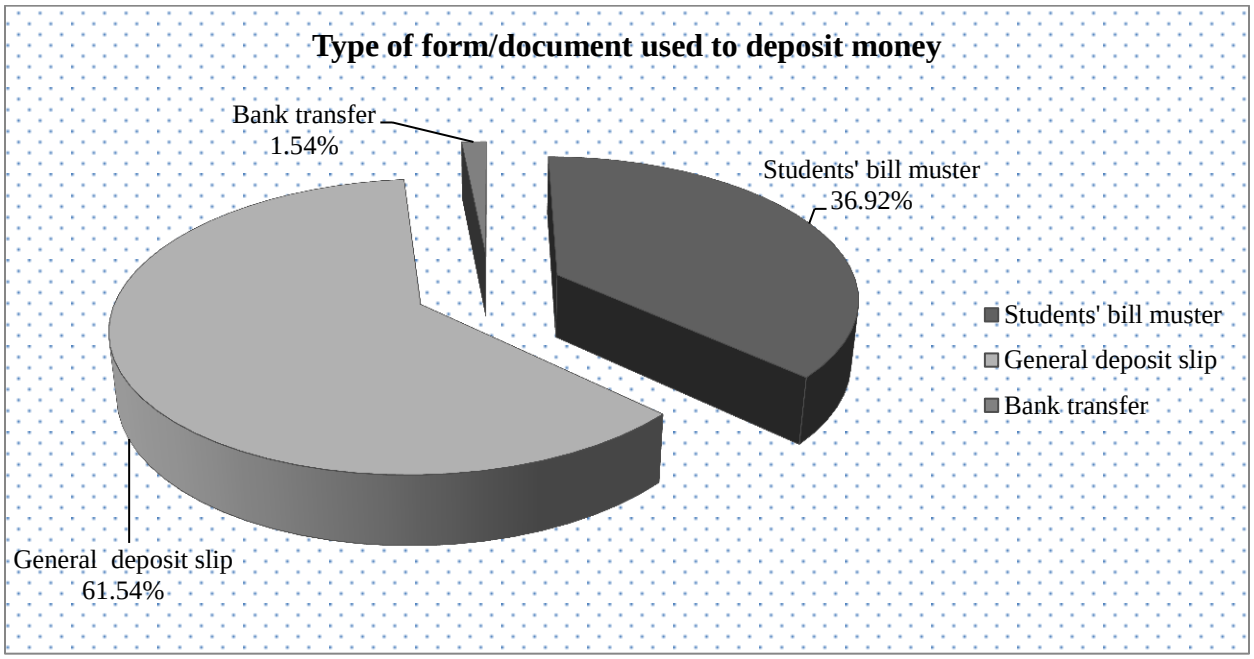


Figure 91: Type of deposit forms

4.3.12 Payment for other fees (e.g. institutions' bookshop & penalty fees)

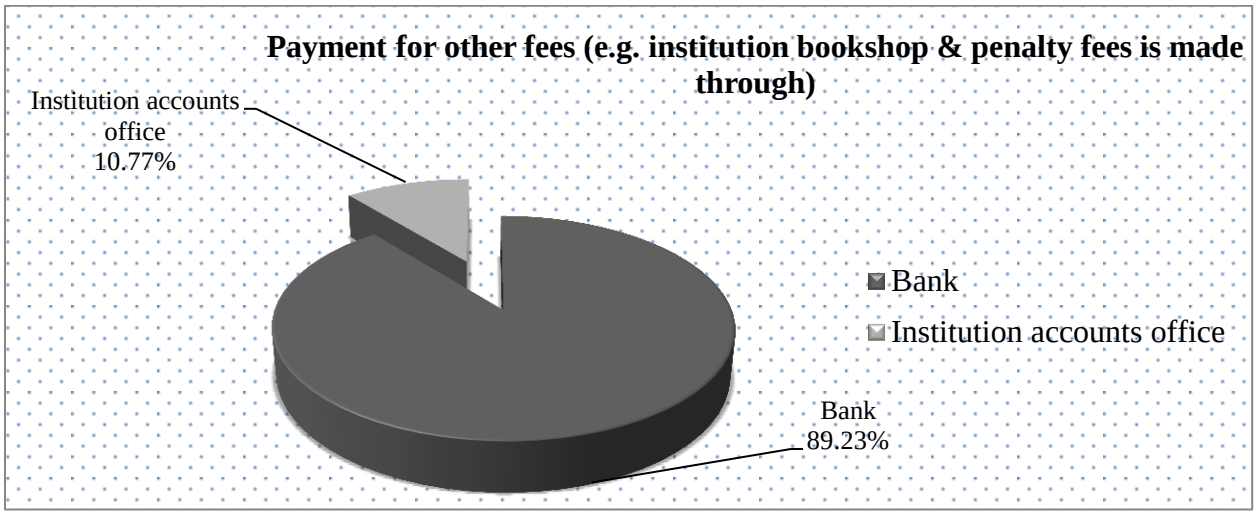


Figure 92: Remittance of all payments

4.3.13 You have to travel a long distance to access a recommended bank

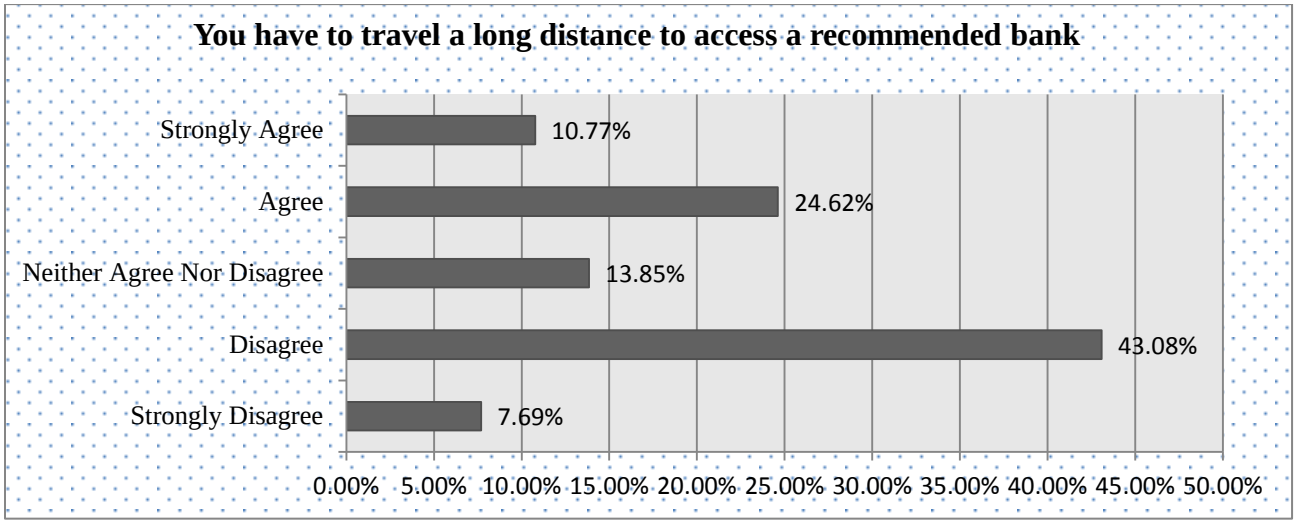


Figure 93: Travel distances to recommended banks

4.3.14 Recommended banks have limited infrastructure

The majority (30.77%) agreed by stating that recommended banks have limited infrastructure. However, the minority (6.15%) of the respondents strongly disagreed with the said statement.

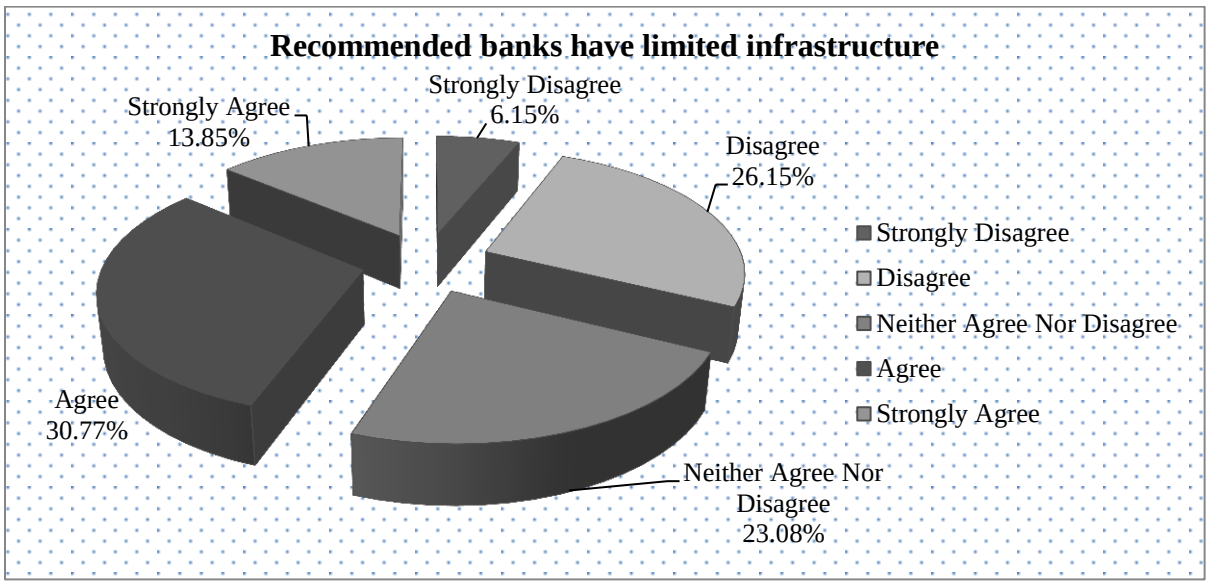


Figure 94: Bank infrastructure availability

4.3.15 Time spent to deposit fees in the bank is less

Most of the respondents (43.08%) strongly disagreed with the fact that time spent to deposit fees in the bank is not less, followed by 20% of the respondents who neither agreed nor disagreed with the said statement. However, the minority (3.08%) of the respondents strongly agreed that time spent to deposit fees in the bank is not adequate.

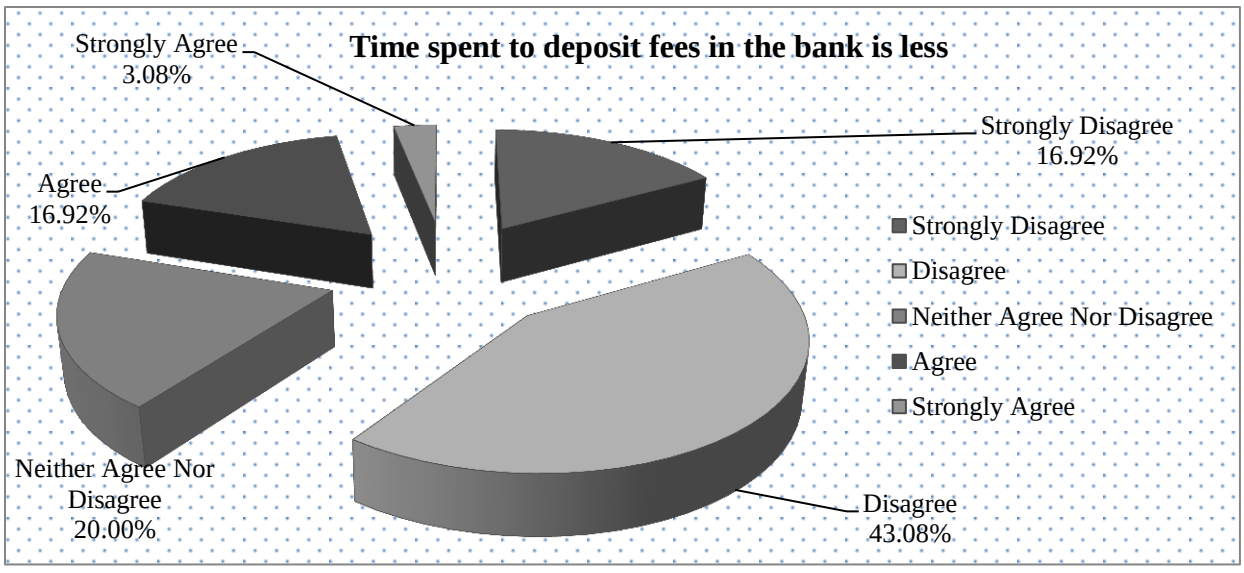


Figure 95: Time spent in banks

4.3.16 Time spent to deposit fees in the bank is unbearable

The majority (33.85%) strongly agreed with the statement, followed by 27.69% who agreed with the mentioned statement. However, the minority (6.15%) of the respondents strongly disagreed with the said statement.

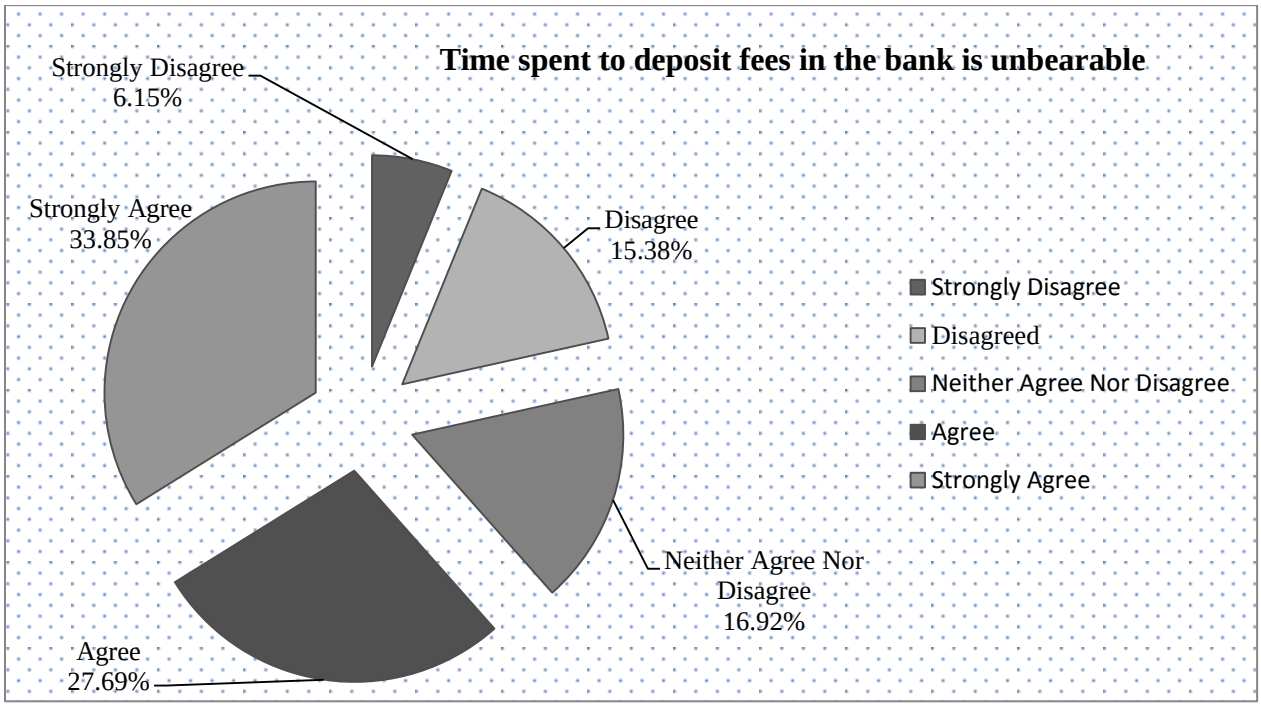


Figure 96: Unbearable time spent in banks

4.3.17 Major challenges students face related with payment of tuition fees and other fees

A pie chart was used to state major challenges faced by respondents when making payments related to tuition fees and other fees in banks. The majority (46.15%) said long queues, followed by 35.38% who indicated that the process was tedious and cumbersome and 12.31% of the respondents said recommended banks are few. However, the minority (6.15%) stated that learning institutions do not get instant update of payments made.

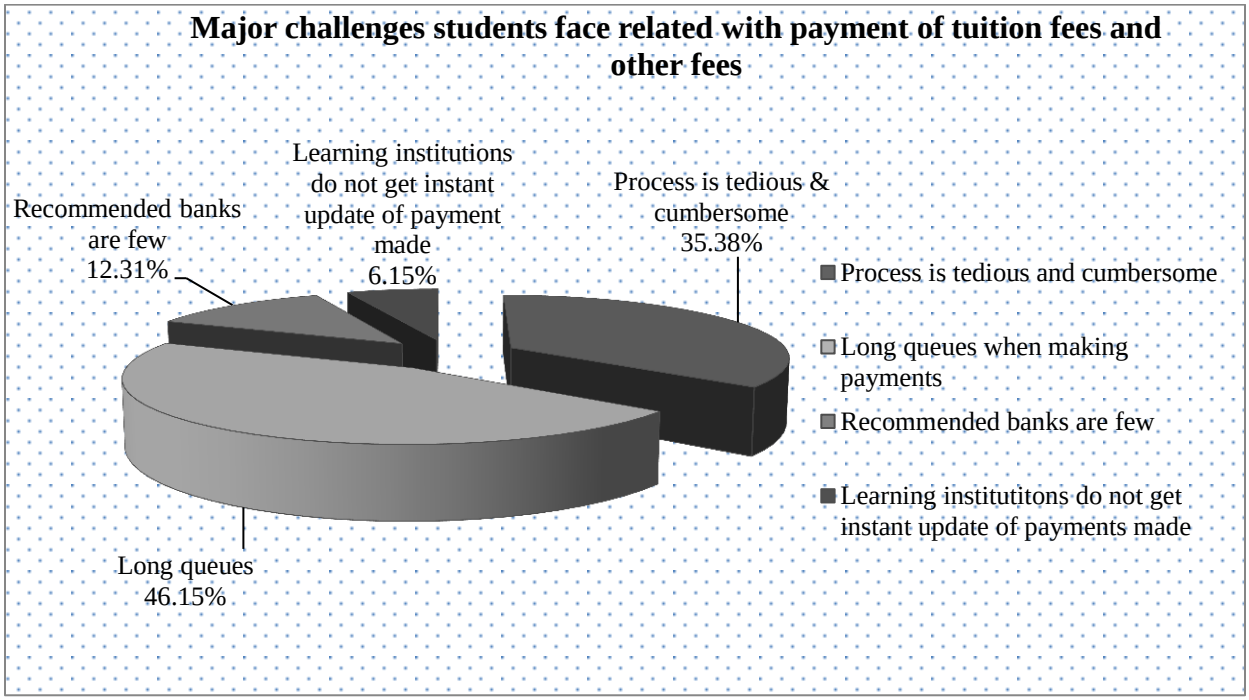


Figure 97: Students major challenges

4.4.1 Mobile phones/mobile money services and applications

In this section, we focused on knowing the type of mobile phones they had before we sought to understand what respondents knew about digital financial services.

4.4.2 What type of mobile phone do you have

A pie chart was used to describe the results of respondents in order to find out what type of mobile phones that had. The majority (81.54%) said that they had smartphones while 9.23% of respondents mentioned that they had feature phones. However, 9.23% of the respondents indicated none of the above because they had no mobile phones.

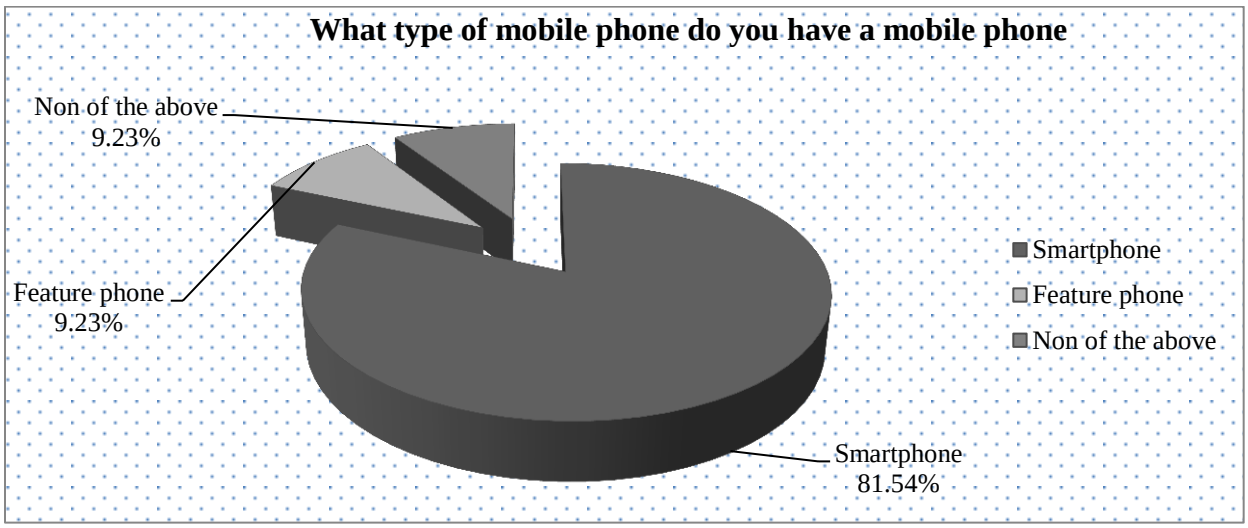


Figure 98: Type of mobile phone owned

4.4.3 Are you conversant with the mobile phone applications on your mobile phone

A bar chart was used to describe the results of respondents in order to find out whether they were conversant with the mobile phone applications on their mobile phones. The majority (92.31%) indicated they were conversant with the mobile phone applications on their phones, although the minority (7.69%) of the respondents said they were not conversant.

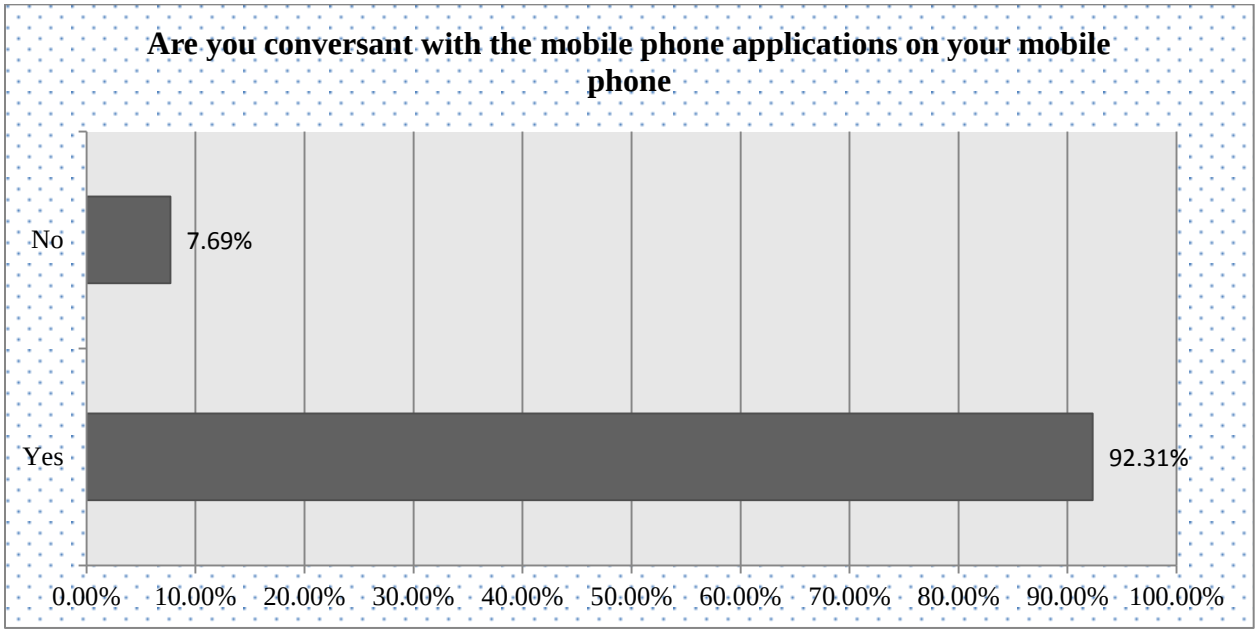


Figure 99: Mobile phone applications

4.4.4 Have you ever used digital financial services

We used a bar chart to describe the results of respondents in order to find out if they have ever used digital financial services. The majority (89.23%) said they have used digital financial services before, but the minority (10.77%) of the respondents said they have never used digital financial services.

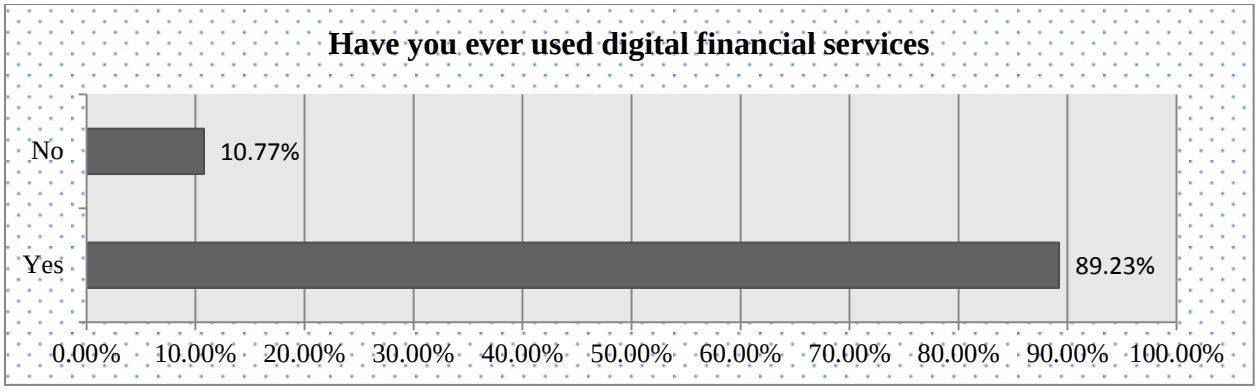


Figure 100: Digital financial services accessibility

4.4.5 Name digital financial services with quality service delivery in Zambia

We used a frequency table to get responses from the respondents in order to get views from them concerning which digital financial services had quality service delivery. The majority (27.69%) indicated it was MTN money, followed by 23.08% of the respondents who mentioned Zoona and subsequently 15.38% of the respondents who indicated Zanaco Xapit.

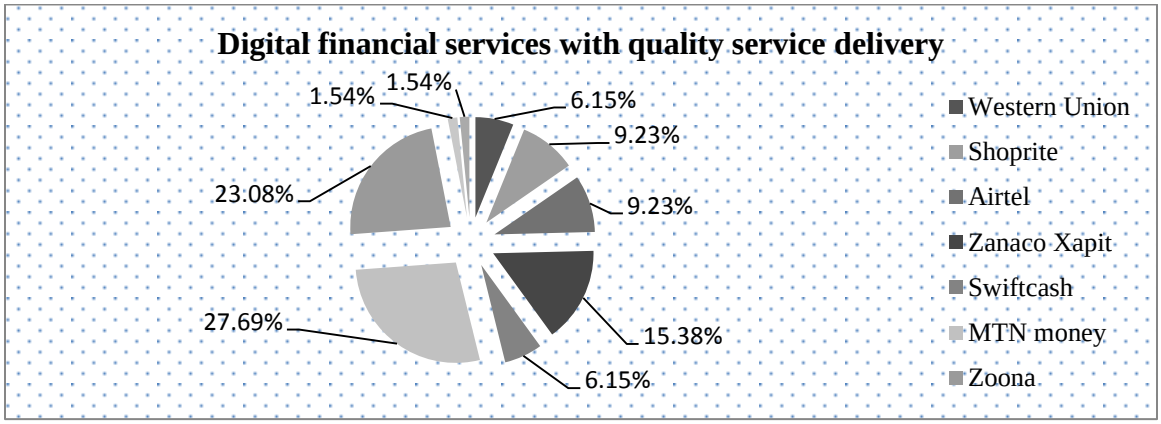


Figure 101: Digital financial services' performance

4.4.6 State one digital financial service rated low in terms of service delivery in Zambia

The majority of respondents (35.38%) indicated they were not sure, followed by 18.46% who mentioned Shoprite money transfer.

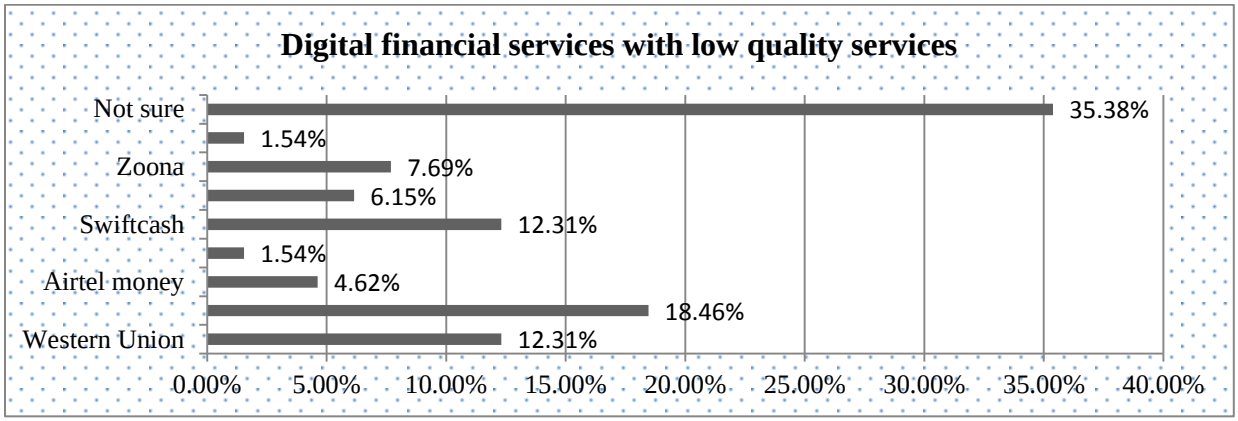


Figure 102: Digital financial services rated low

4.4.7 Digital financial services are safe and secure to use

Most of the sampled students (58.46%) agreed with the fact that digital financial services are safe and secure, followed by 18.46% of the respondents who strongly agreed to the said statement. Only the minority (4.62%) strongly disagreed to the mentioned statement.

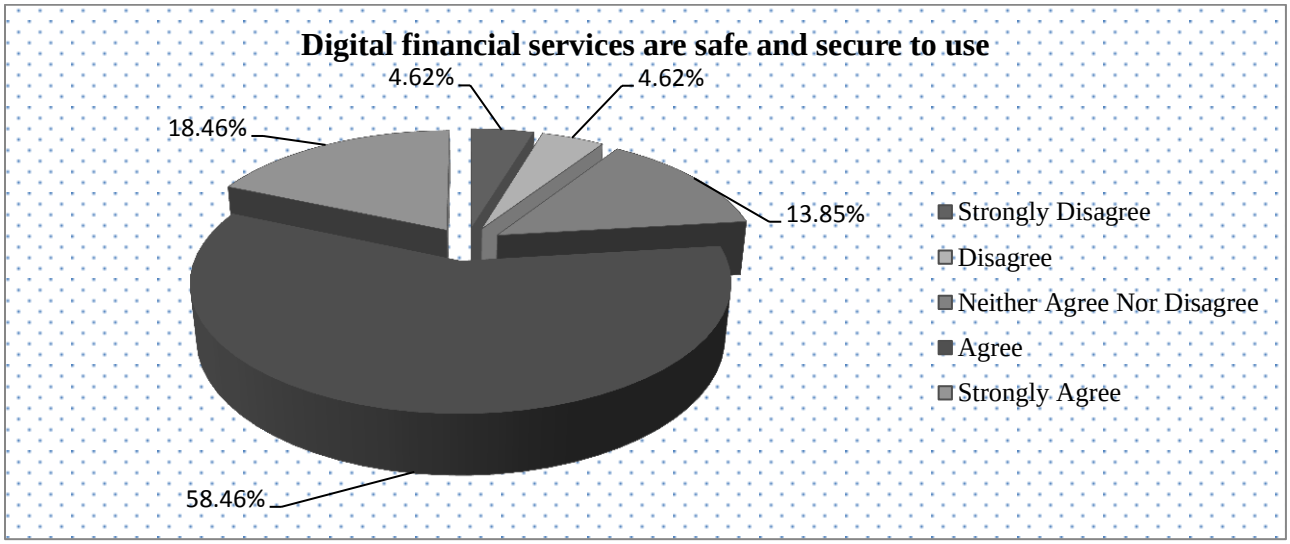


Figure 103: Digital financial services' safety and security

4.4.8 Digital financial services are efficient and transparent

The majority (60%) agreed that digital financial services are efficient and transparent. The minority 1.54% of the respondents strongly disagreed with the said statement.

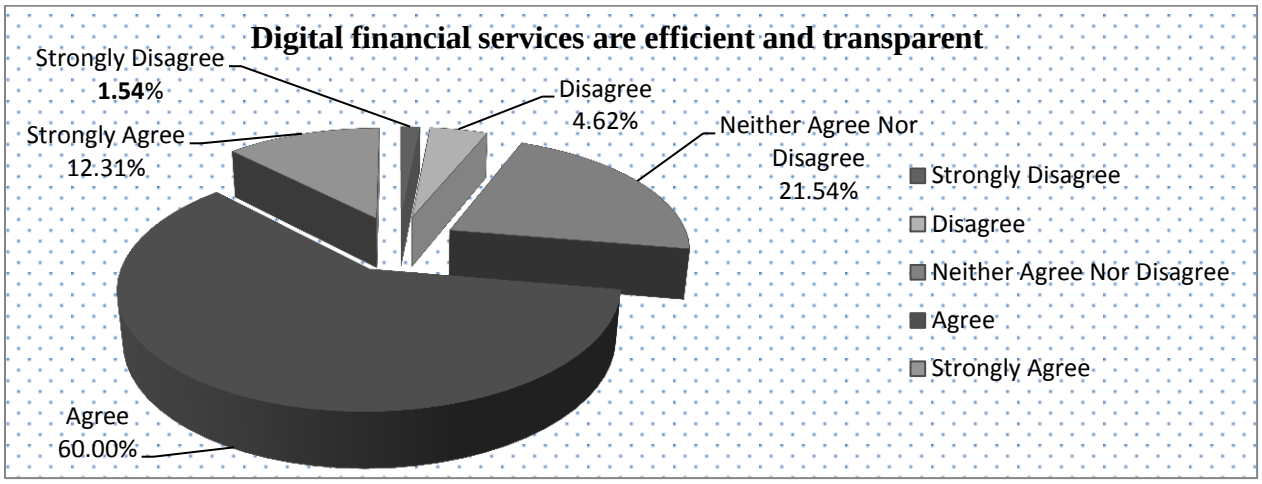


Figure 104: Digital financial services' efficiency and transparency

4.4.9 Digital financial services offer increased flexibility

We used a pie chart to describe the results of the respondents. The majority (49.23%) agreed to the mentioned statement, followed by 24.62% of respodents who strongly agreed, while the minority (4.62%) strongly disagreed with the statement.

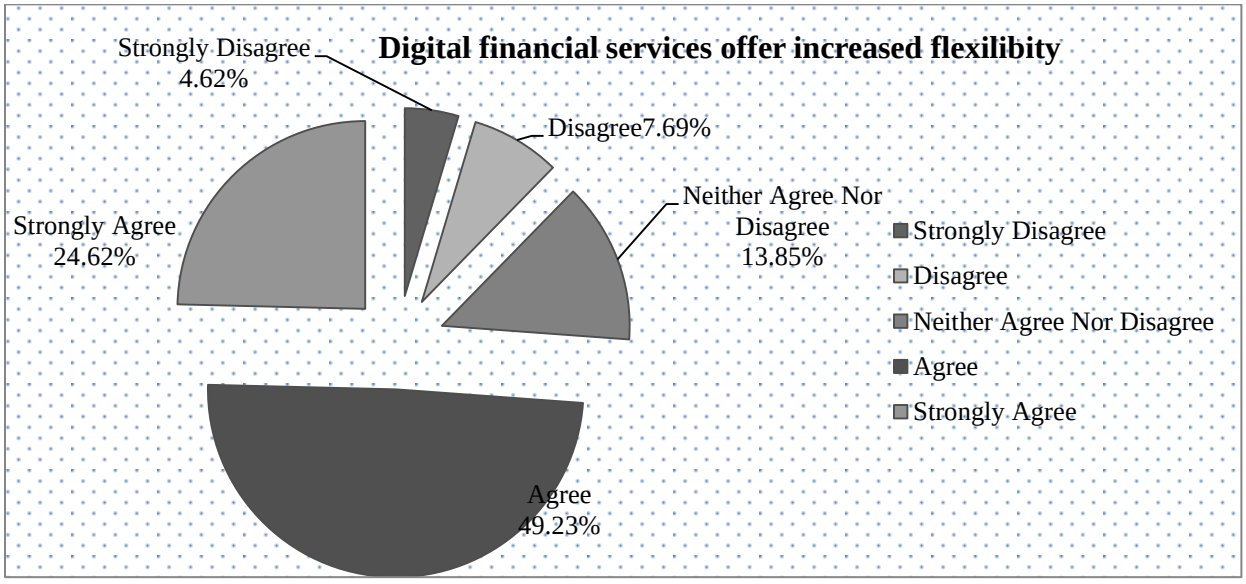


Figure 105: Digital financial services' flexibility

4.4.10 Digital financial services offer saving incentives

The majority (47.69%) respondents agreed that digital financial services offer incentives. The minority (3.08%) strongly disagreed with the said statement.

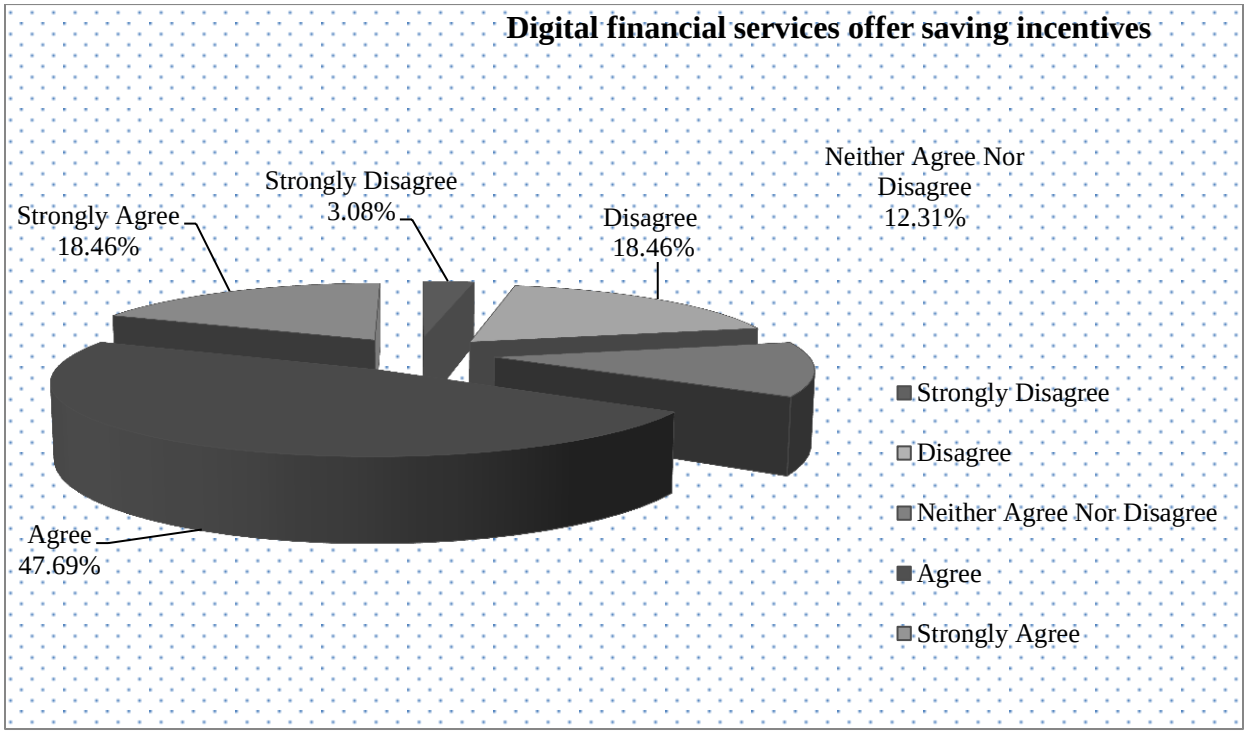


Figure 106: Digital financial services' saving incentives

4.4.11 Digital financial services give credit histories (i.e. able to trace history of a transaction)

The majority (49.23%) agreed followed by 24.62% of the respondents who strongly agreed to the said statement. However, the minority (1.54%) of the respondets strongly disagreed.

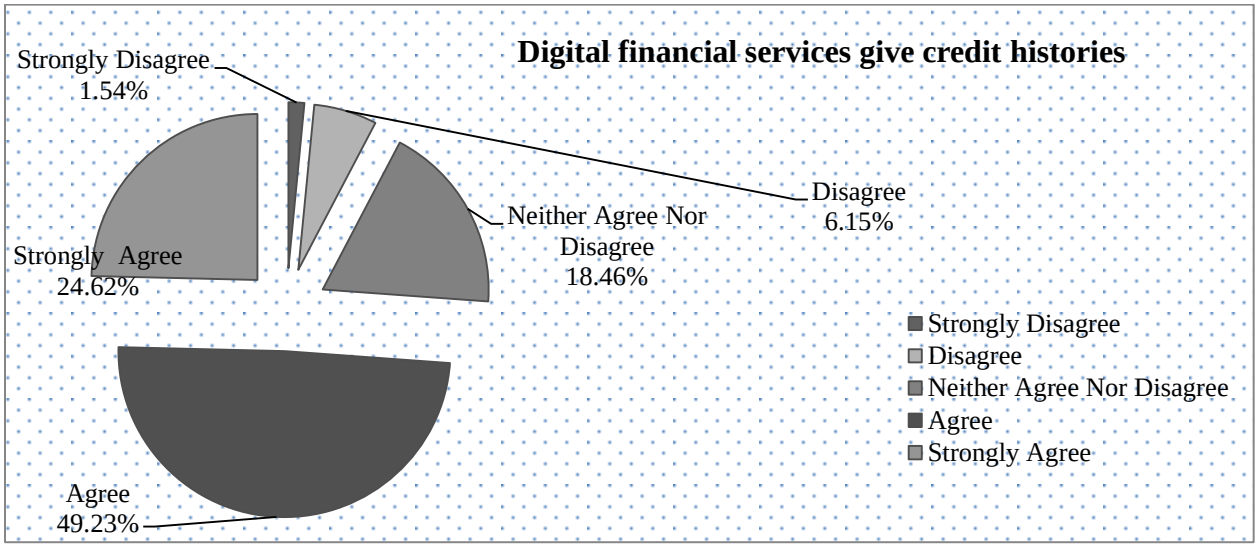


Figure 107: Digital financial services' credit histories

4.4.12 Digital financial services are important for integrating the unbanked (i.e. people without bank accounts)

Majority respondents (49.23%) agreed followed by 33.85% who strongly agreed. On the contrary, only 6.15% of the minority respondents disagreed to the said statement.

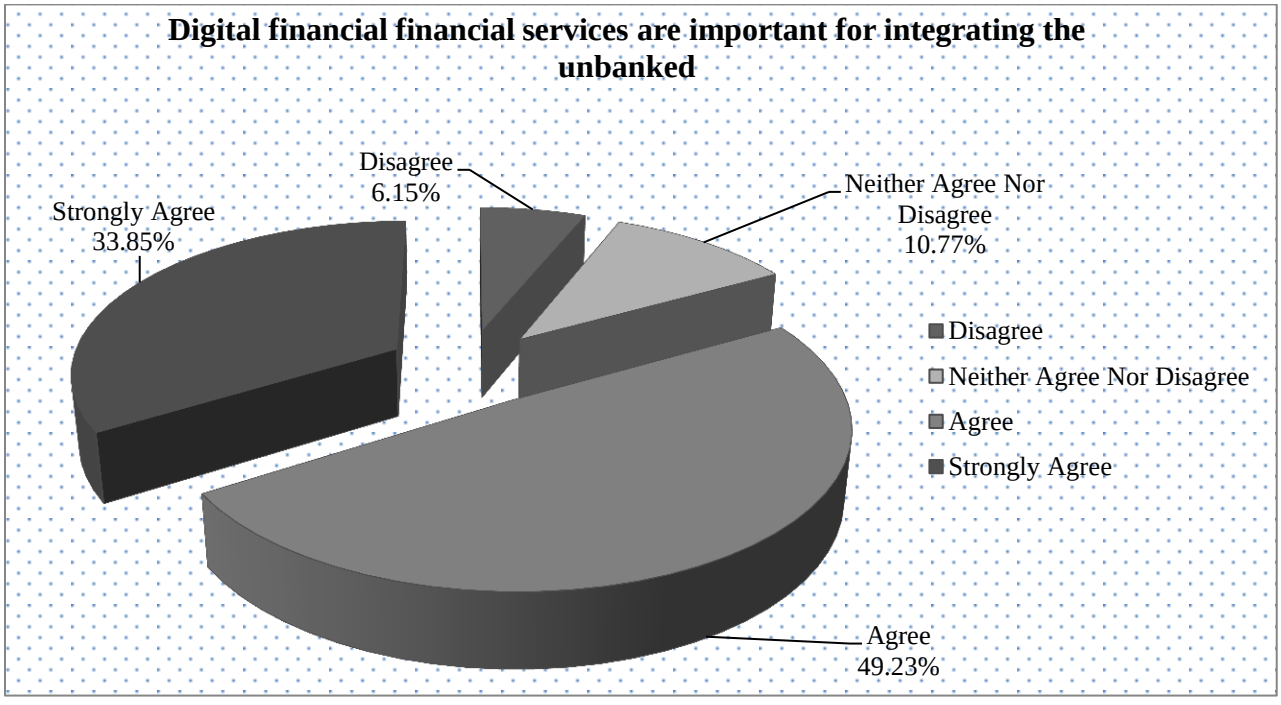


Figure 108: Importance of digital financial services in integrating the unbanked

4.4.13 Recommendations

This section illustrated the results of student respondents, with reference to recommendation of the digital financial services as an optional payment system in higher learning education institution.

4.4.14 Is it necessary to have an optional payment system

The majority of the student respondents (87.69%) recommended digital financial services for higher learning institutions. In contrast, only 12.31% of the respondents opposed the idea for higher learning institutions to have optional payment systems.

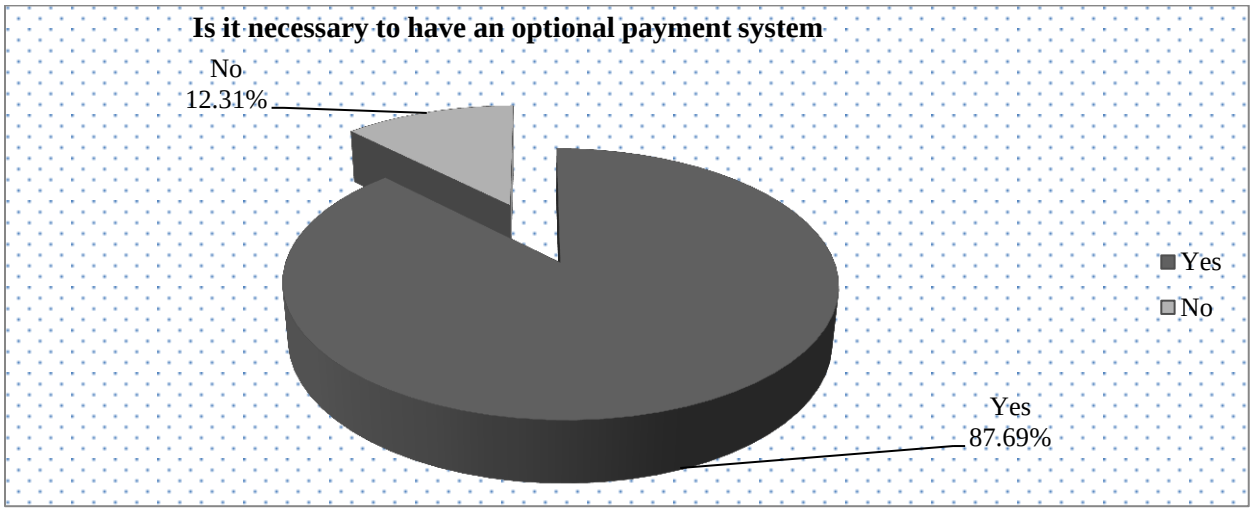


Figure 109: Need for an optional payment system

4.4.15 Can digital financial services complement banks

Most of the student respondents (81.54%) stated that digital financial services can complement banks in matters of financial inclusion. In contrast, 18.46% of the respondents opposed the given give statement.

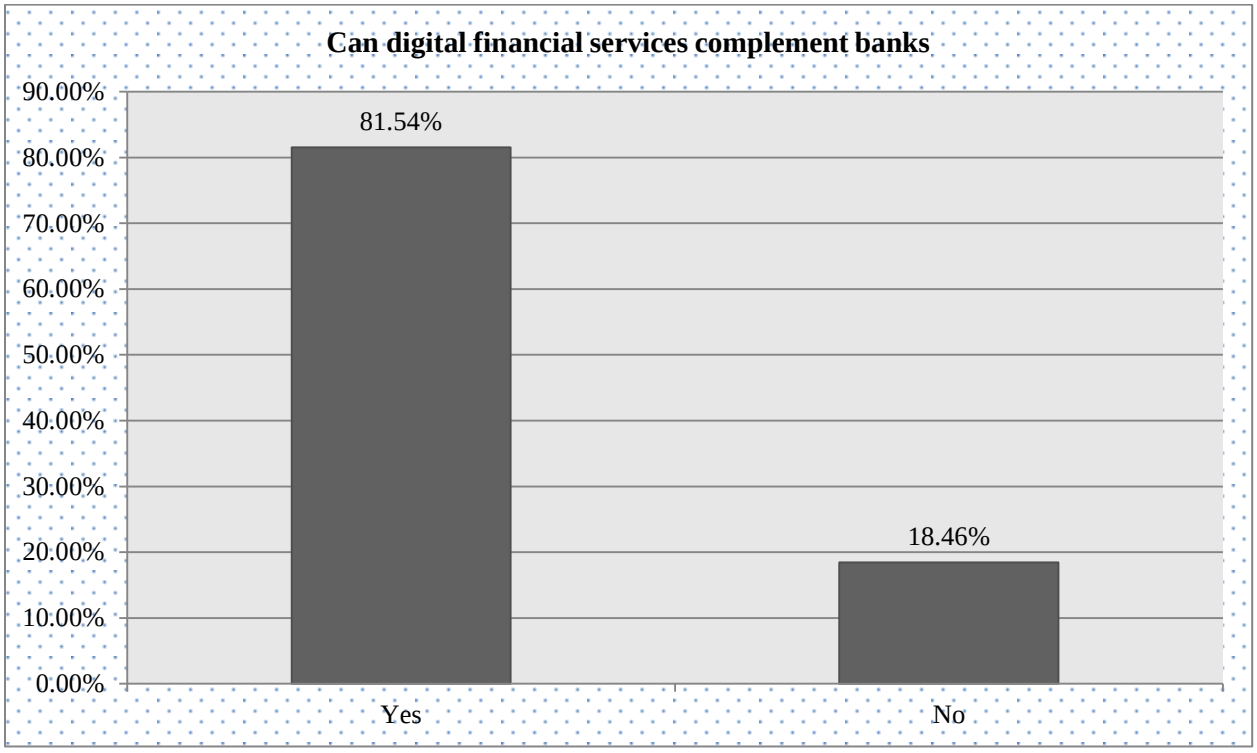


Figure 110: Digital financial services verses banks

4.4. Commercial bank respondents

4.4.1 Introduction

The study sampled 7 respondents from different banks to represent the banking financial services they work for. The research findings are based on their: banks and business processes, mobile phone payment systems and recommendations. The presentation of the results is in form of frequency tables, bar charts and pie charts.

4.4.2 Banks and their business processes

This section describes banks and their business processes by illustrating some of their business processes and the impact on their customers.

4.4.3 Documentation requirements by banks hinder many people from opening bank accounts

The majority of the respondents (42.86%) agreed that documentation requirements by banks do not hinder many people from opening bank accounts followed by 28.57% of the respondents who disagreed to the mentioned statement.

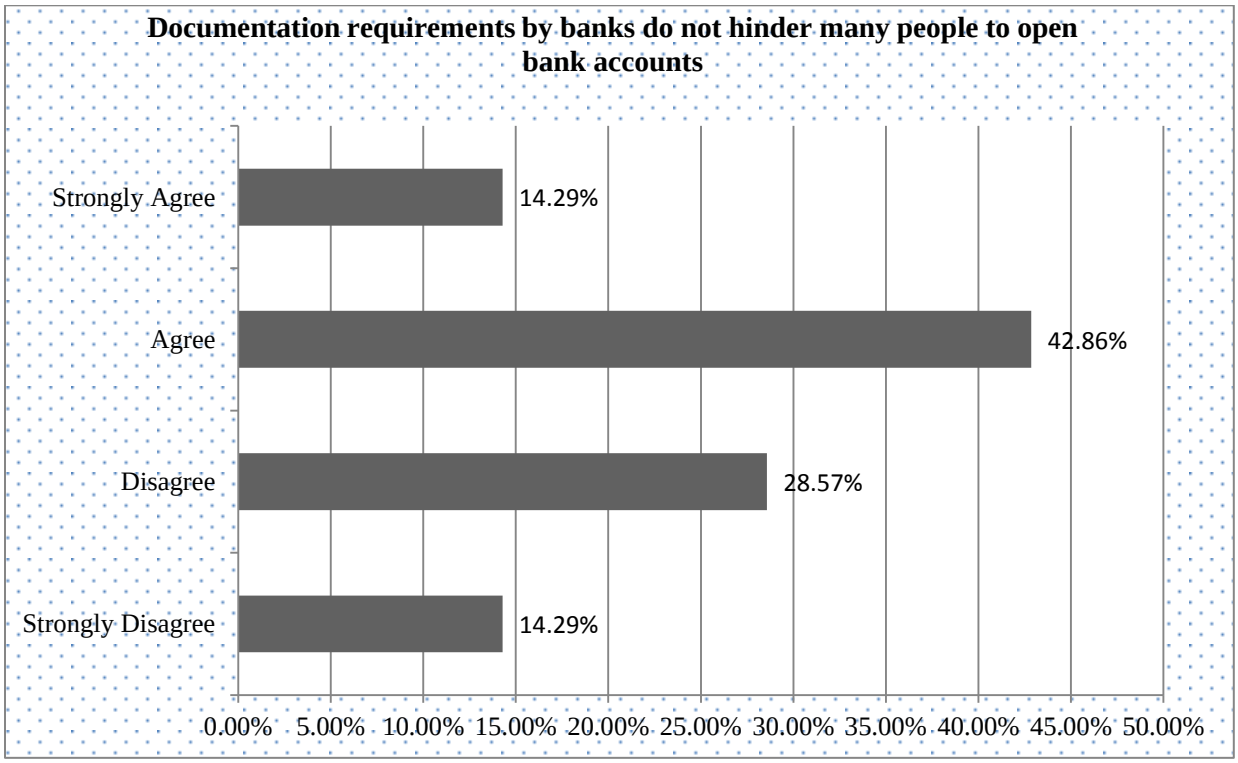


Figure 111: Documentation requirements' hindrance for the unbanked

4.4.4 Owning a bank account is not costly

Most respondents (42.86%) disagreed by indicating that owning a bank account is costly followed by 14.29% who strongly disagreed. The minority 14.29% of the respondents strongly agreed by stating that owning a bank account is not costly.

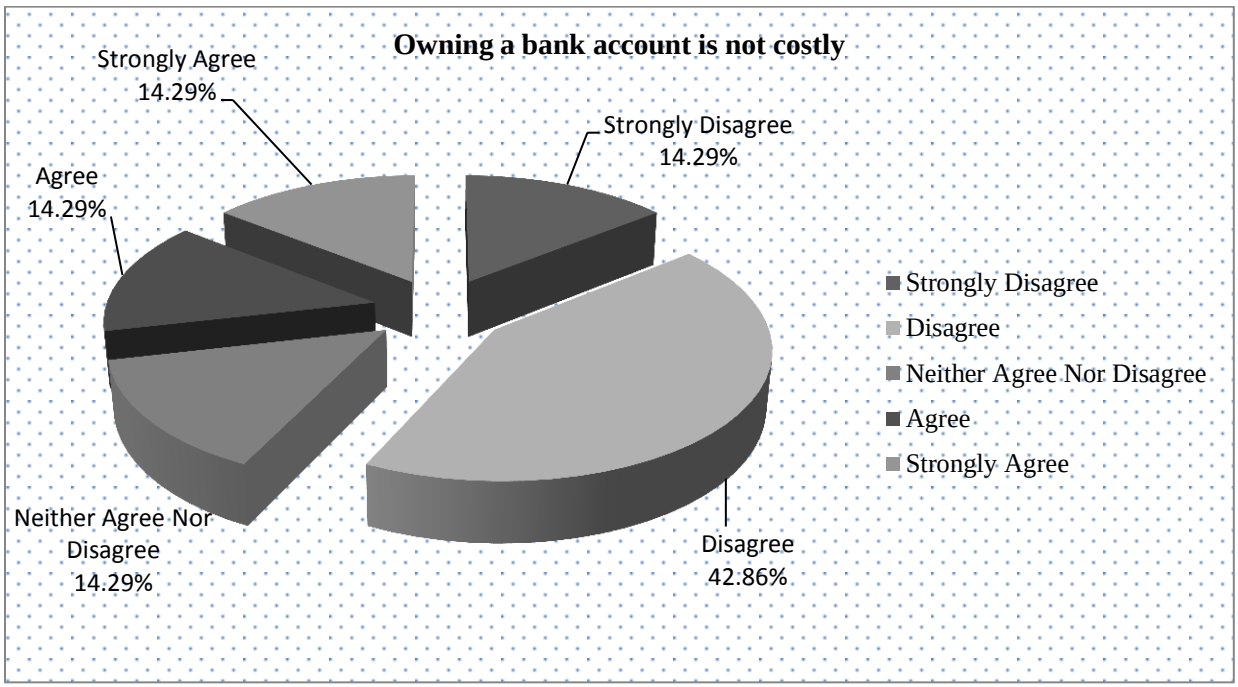


Figure 112: Assessing bank account costs

4.4.5 Banks have limited infrastructure to attract more customers

The biggest share of the sample 57.14% disagreed. On the contrary, 28.57% agreed to the said statement, while the minority 14.29% of the respondents strongly disagreed.

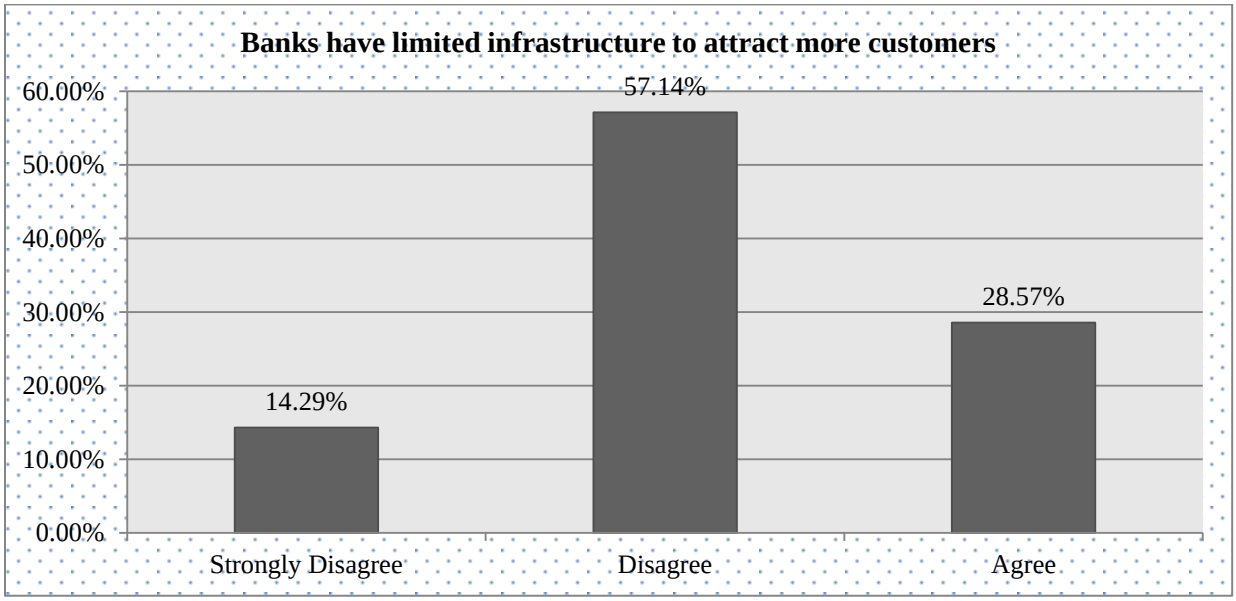


Figure 113: Banks' infrastructure

4.4.6 Banks are evenly distributed in rural and urban areas

A larger proportion (57.14%) strongly disagreed with the fact that banks are not evenly distributed in rural and urban areas, followed by (42.86%) of the respondents who also disagreed with the said statement.

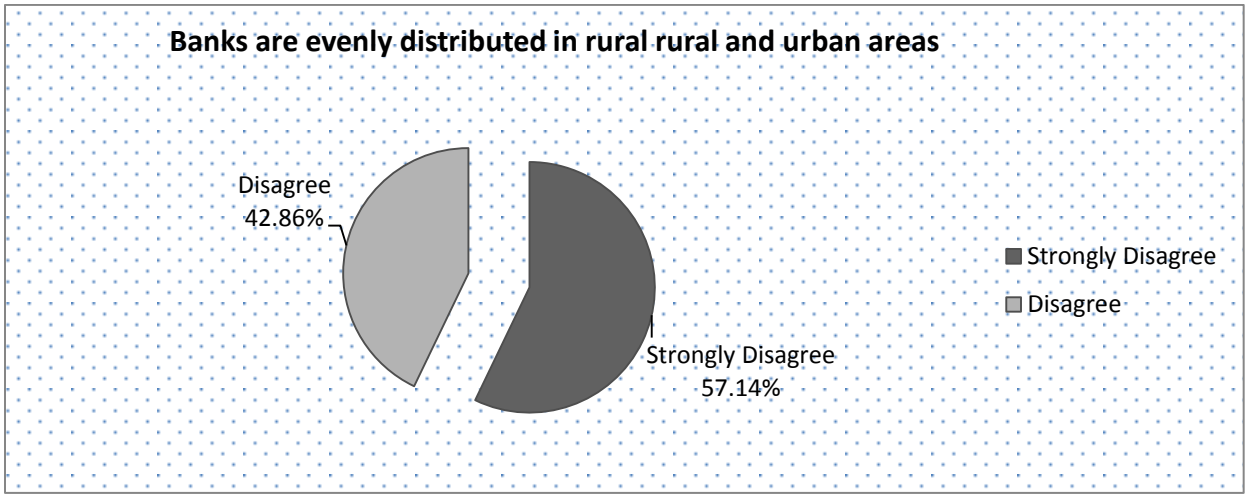


Figure 114: Banks' distribution in rural and urban areas

4.4.7 Many adults in Zambia have bank accounts

The majority (42.86%) of the respondents disagreed followed by 28.57% of the respondents who strongly disagreed with the said statement.

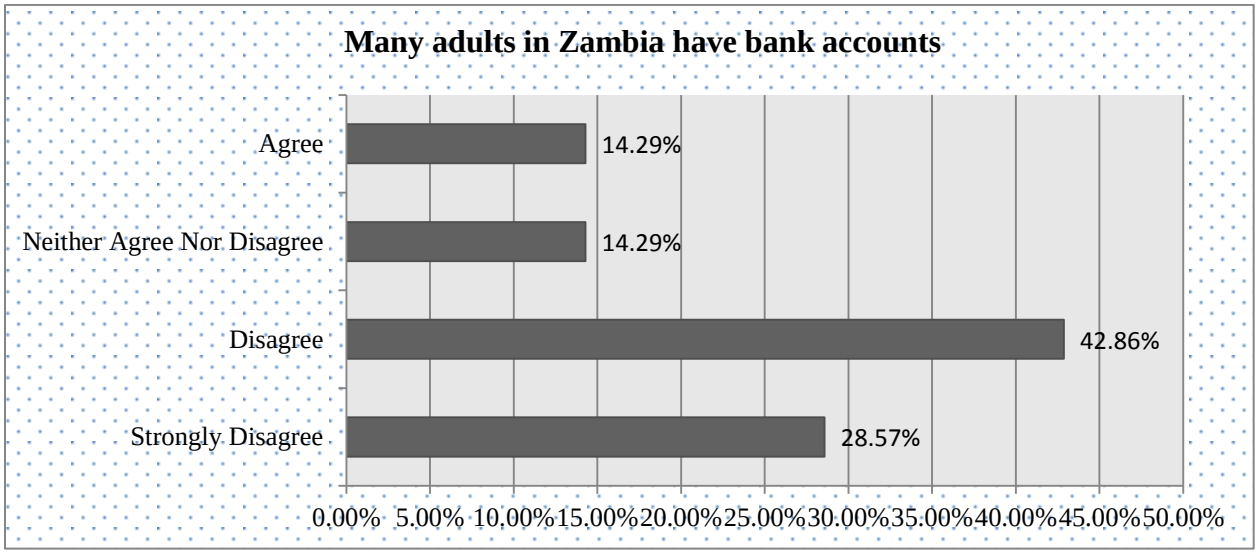


Figure 115: Assessing adults with bank accounts

4.4.8 The majority of adults have no bank accounts in Zambia

The majority (57.14%) of respondents agreed followed by 14.29% who strongly agreed with the same statement. The minority (14.29%) strongly disagreed with the mentioned statement.

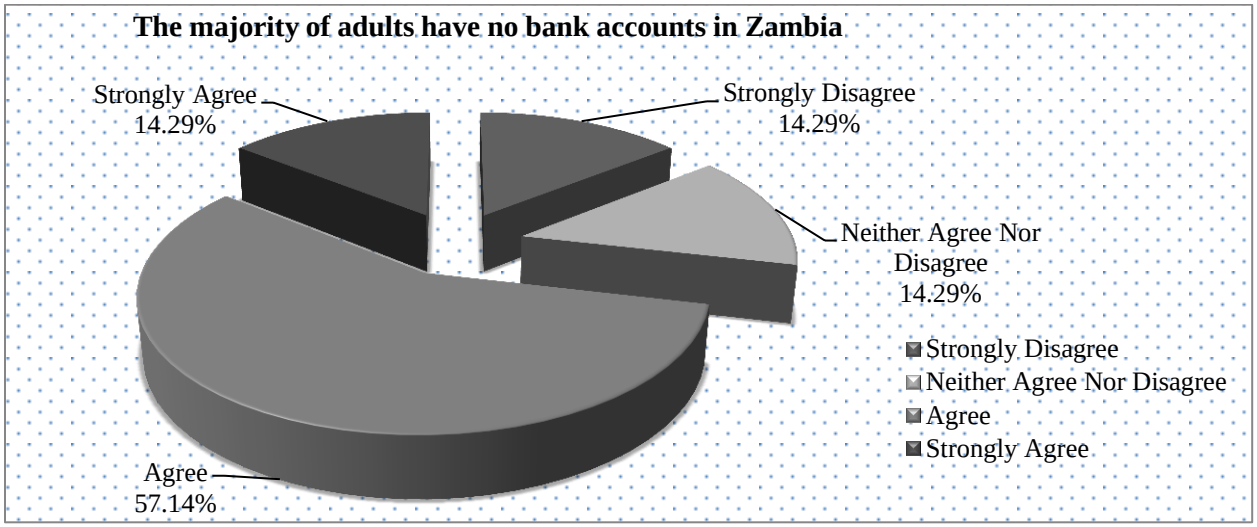


Figure 116: Assessing adults without bank accounts

4.4.9 Banks have managed to attract the low income earners

The majority of the respondents (28.57%) strongly disagreed followed by 28.57% of the respondents who disagreed with the said statement. However, the minority 14.29% of the respondents strongly agreed.

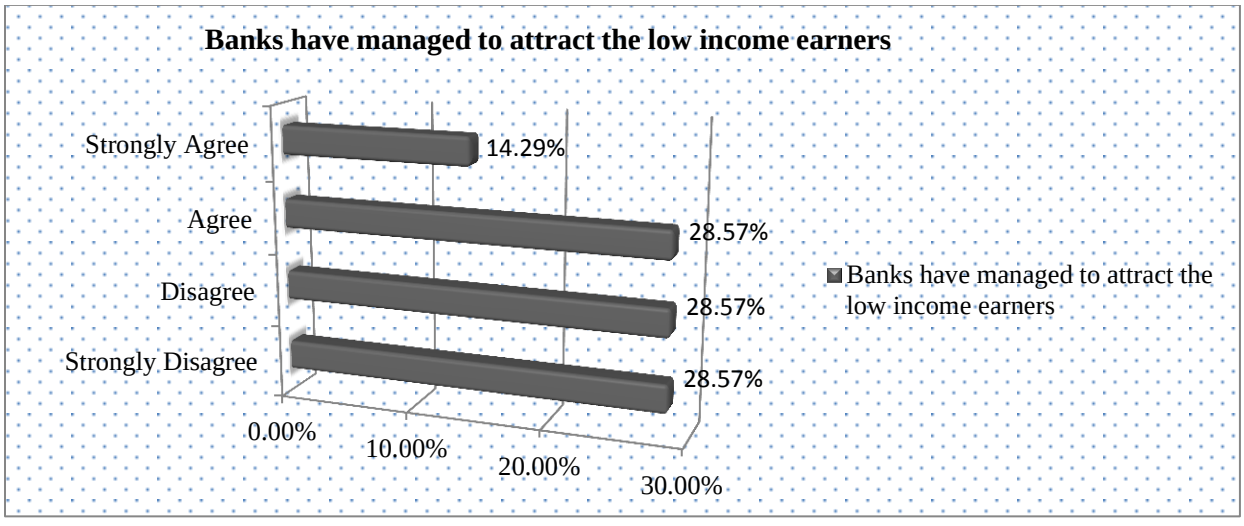


Figure 117: Banks' attraction of low income earners

4.4.10 Time spent to deposit fees in the bank is less

Most respondents (57.14%) neither agreed nor disagreed, followed by 28.57% of the respondents who disagreed with the statement. The minority (14.29%) of the respondents agreed with the said statement above.

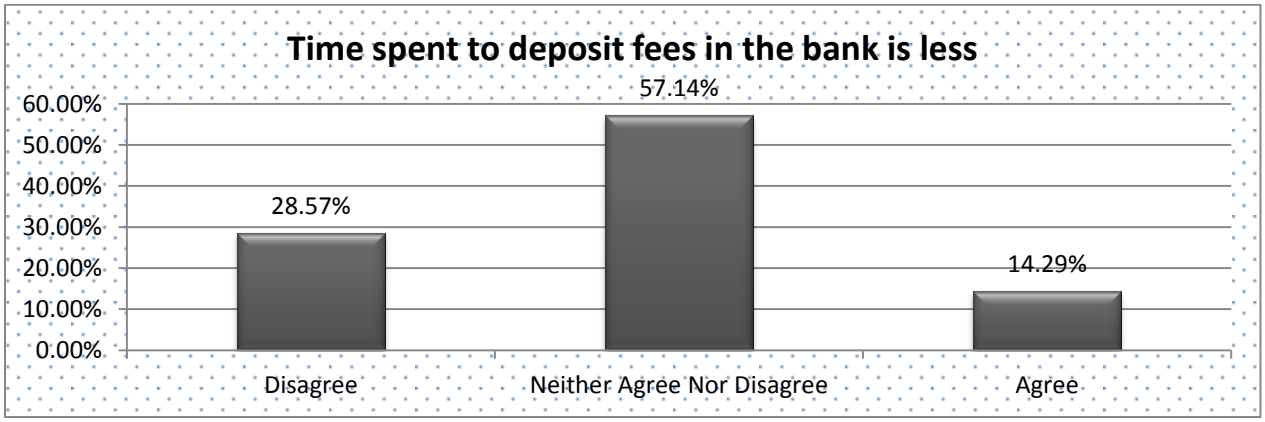


Figure 118: Assessing time spent by clients in banks

4.4.11 Time spent to deposit fees in the bank is unbearable

The majority (28.57%) of the respondents strongly disagreed that the time spent to deposit fees in the bank is not unbearable. The minority (14.29%) agreed with the fact that time spent to deposit fees in the bank is unbearable.

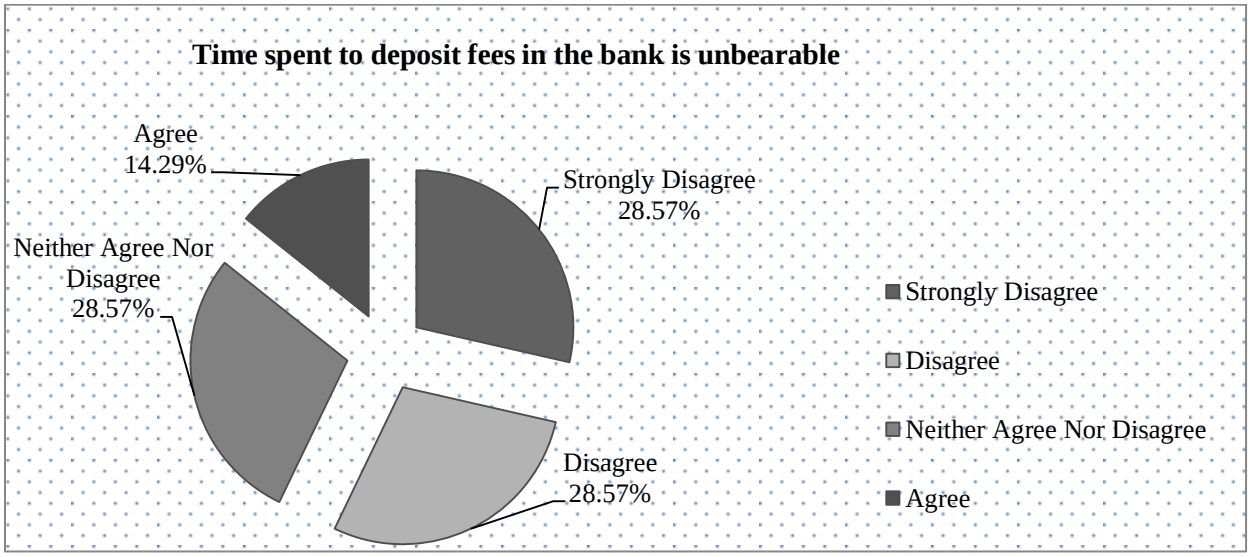


Figure 119: How clients feel when depositing money with regards to time

4.5.1 Mobile phones/mobile money services and applications

4.5.1.1 Introduction

In this section, the focus was on knowing whether the respondents had mobile phone service/on-line bank payment system in their organization. Moreover, the section describes knowledge on digital financial services and recommends mobile phone payment systems as an optional payment system.

4.5.1.2 Do you have a mobile phone service/online bank system

Most of the respondents (85.71%) indicated that they had mobile phone service/online payment system. However, the minority (14.29%) said they had no mobile phone/mobile money services payment systems.

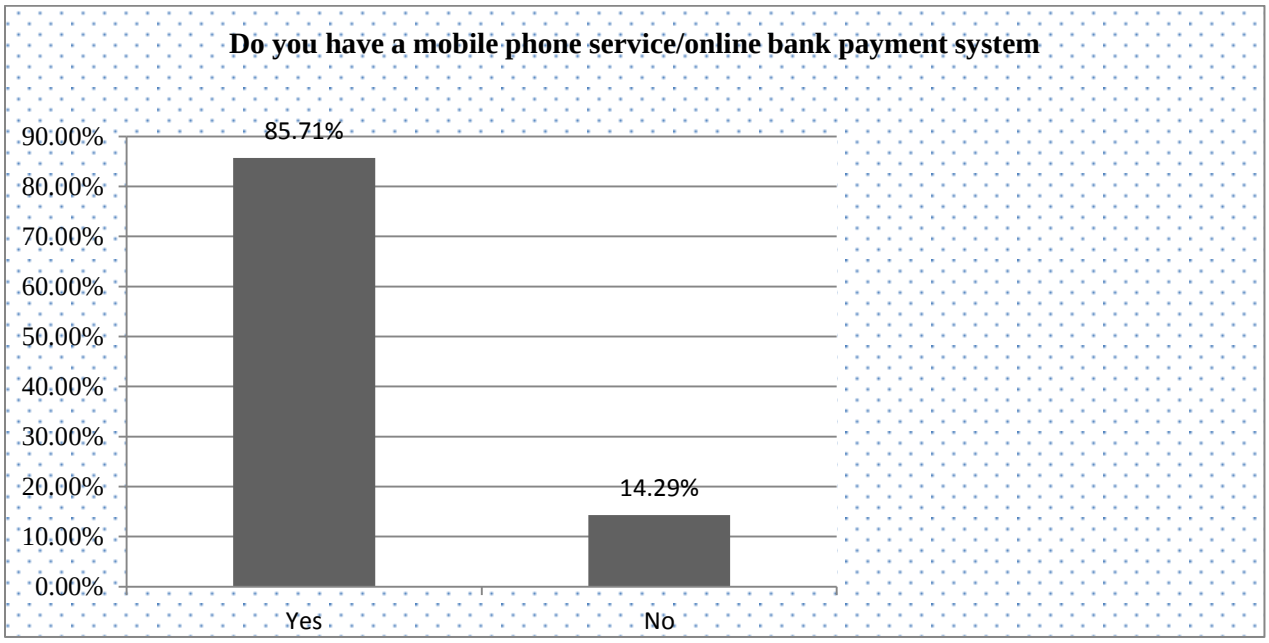


Figure 120: Mobile phone owners

4.5.1.3 Has the mobile phone service/online bank payment system attracted more unbanked customers

We used a pie chart to describe how the mobile phone/online bank payment system has attracted the unbanked customers. Most respondents (57.14%) said yes, and the minority (42.86%) indicated no.

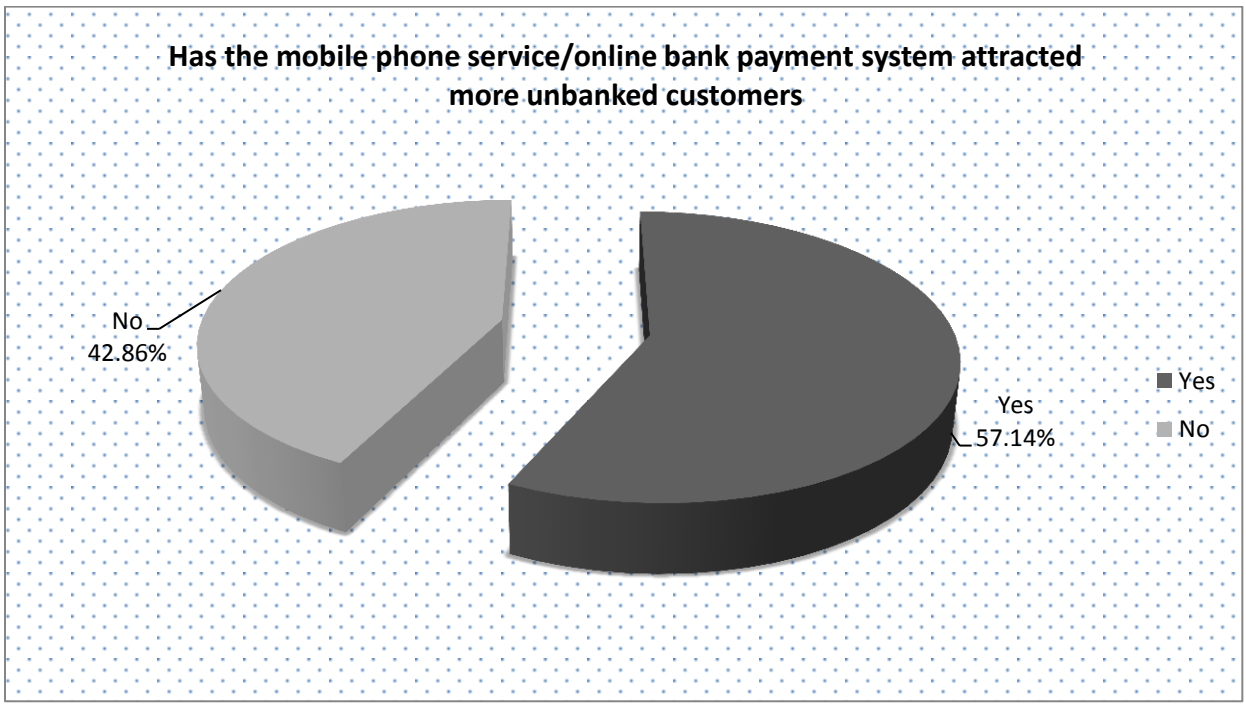


Figure 121: Performance of digital financial services

4.5.1.4 Digital financial services are safe and secure to use

A larger proportion (42.86%) of respondents strongly agreed, by stating that digital financial services are safe and secure followed by 42.86% of the respondents who equally agreed to the sad statement. However, the minority (14.29%) of the respondents disagreed.

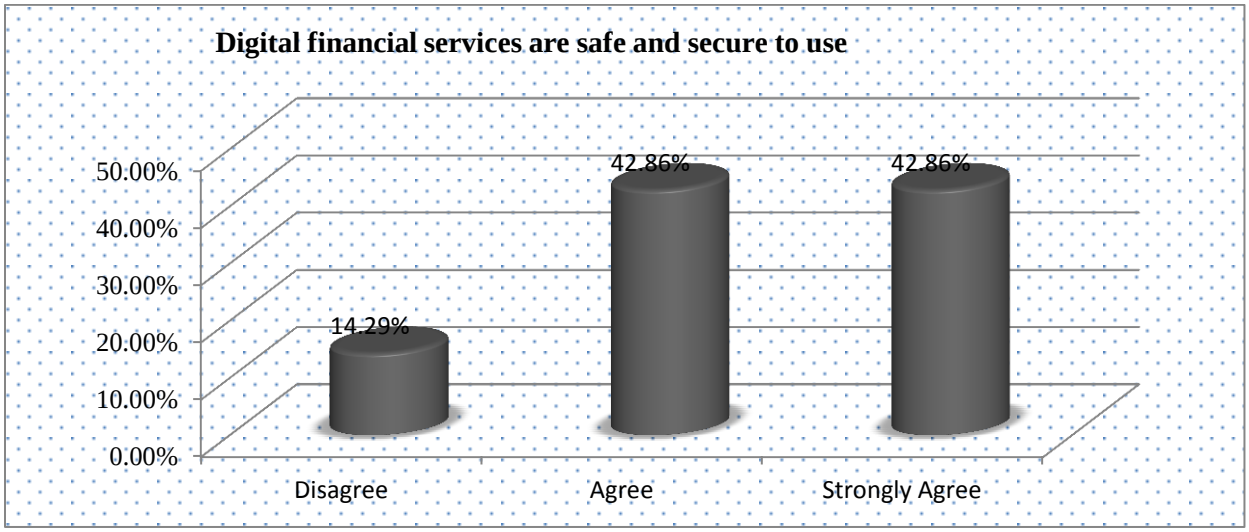


Figure 122: Safety and security of digital financial services

4.5.1.5 Digital financial services are efficient and transparent

Majority of the respondents (42.86%) agreed followed by (28.57%) of the respondents who strongly agreed with the said statement. On the contrary, the minority (14.29%) of the respondents disagreed by indicating that digital financial services are not efficient and transparent.

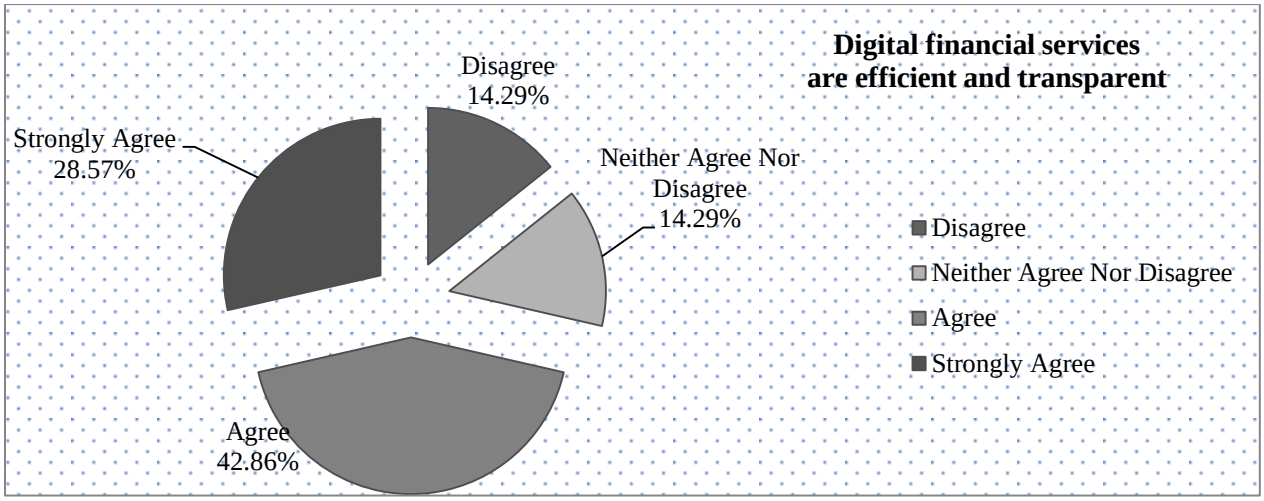


Figure 123: Efficiency and transparency of digital financial services

4.5.1.6 Digital financial services offer increased flexibility

The majority (57.14%) of the respondents strongly agreed coupled with the 28.57% who agreed as opposed to the minority (14.29%) who disagreed.

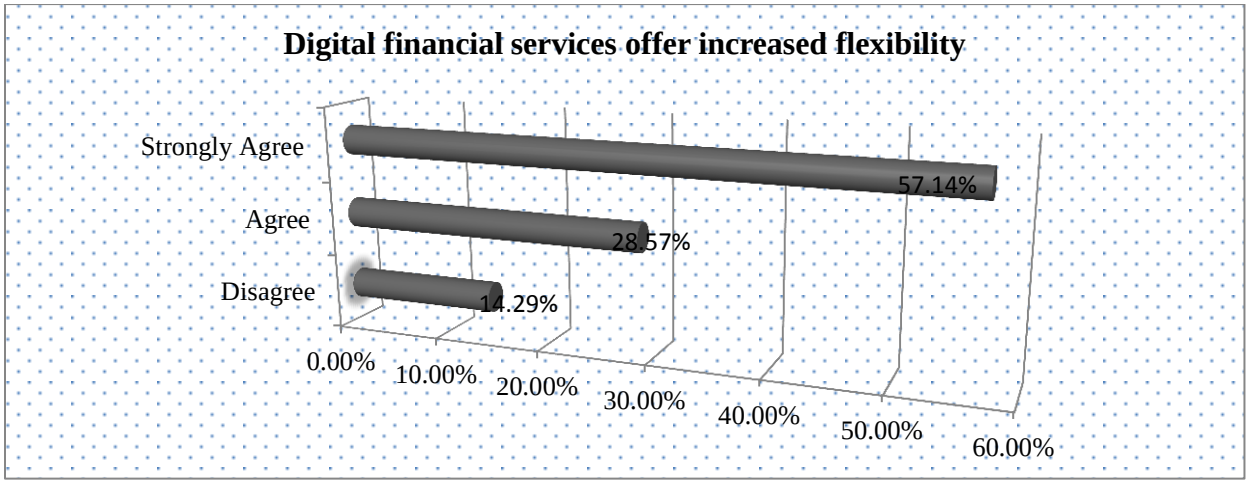


Figure 124: Flexibility of digital financial services

4.5.1.7 Digital financial services offer saving incentives

We used a bar chart to describe the results of respondents in relation to the said statement. The majority (57.14%) neither agreed nor disagreed, followed by (28.57%) of the respondents who agreed to the said statement. On the contrary, the minority (14.29%) disagreed with the mentioned statement.

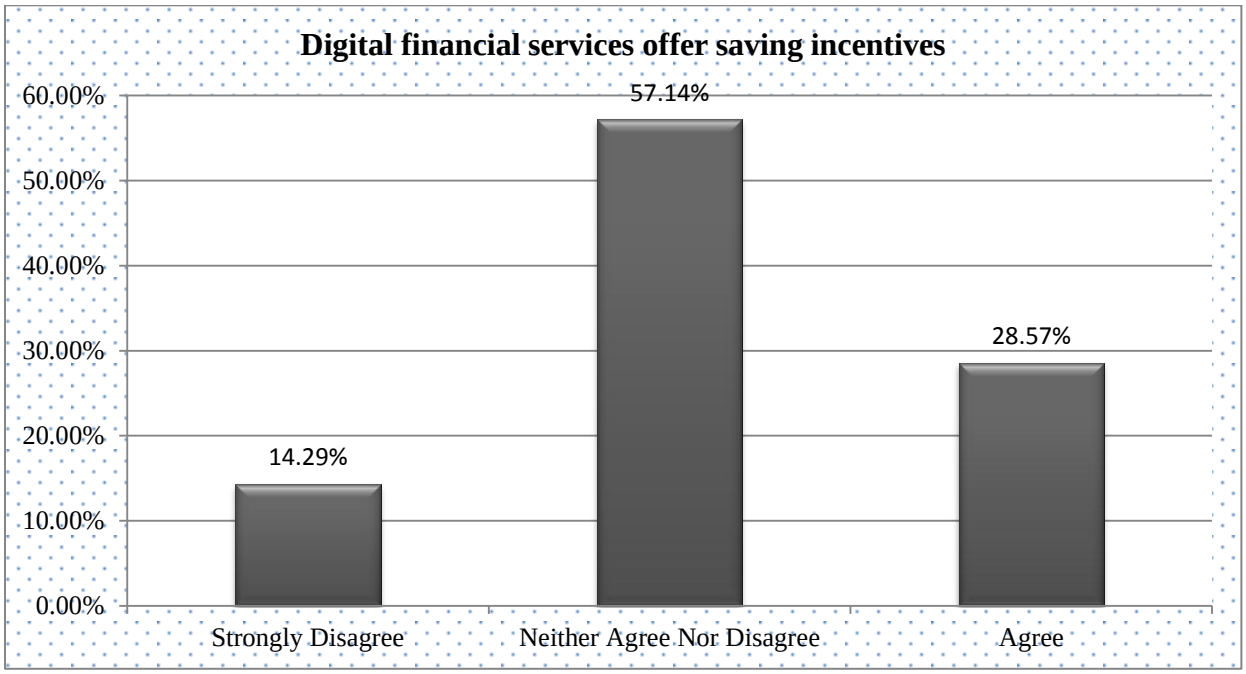


Figure 125: Saving incentives in digital financial services

4.5.1.8 Digital financial services give credit histories (i.e. able to trace history of a transaction)

The majority (71.43%) of the respondents agreed followed by (28.57%) of the respondents who strongly agreed.

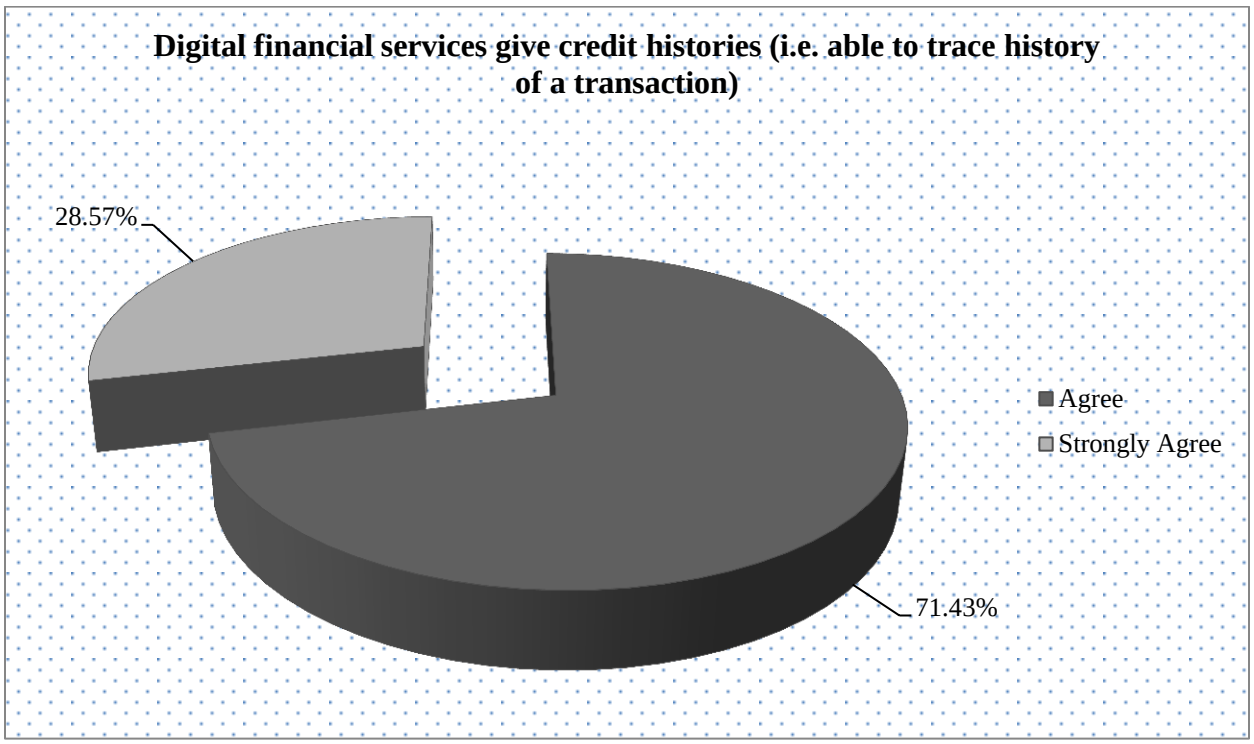


Figure 126: Credit histories in digital financial services

4.5.1.9 Digital financial services are important for integrating the unbanked (i.e. people without bank accounts)

Most of the respondents (57.14%) agreed with the fact that digital financial services are important for integrating the unbanked followed by (42.86%) who strongly agreed with the same statement.

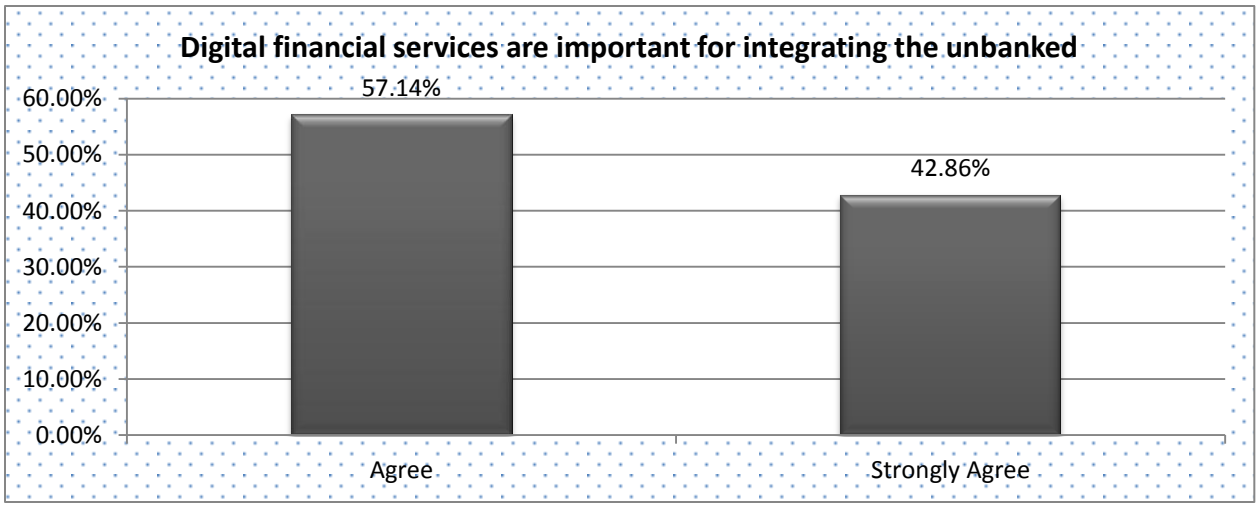


Figure 127: Integration of the unbanked by means of digital financial services

4.5.1.10 Is having an optional payment system (e.g. mobile phone payment/online banking) one way of attracting unbanked customers in your bank?

All the respondents said that digital financial services are one way of attracting the unbanked customers in their bank.

Table 17: Need for digital financial services as an optional payment system

Value label	Value	Frequency	Percent	Valid Percent	Cum Percent
Yes	1	7	100.0	100.0	100.0
	Total	7	100.0	100.0	

4.5.1.11 Do you think digital financial services can complement banks as an optional payment system?

All the respondents stated that digital financial services can complement banks as an optional payment system.

Table 18: Digital financial services verses banks

Value label	Value	Frequency	Percent	Valid Percent	Cum Percent
Yes	1	7	100.0	100.0	100.0
	Total	7	100.0	100.0	

4.5 Digital financial services agent respondents

4.5.1 Introduction

The section which follows has 08 respondents from some of the digital financial services agents found in Zambia. The DFS providers in Zambia are many; however, due to some resistant from most of the DFS providers the sample was limited to DFS agents. The presentation of results was by frequency tables, bar charts and pie charts.

4.5.2 Devices used to carry out transactions

The majority of the respondents (75%) indicated that they used a mobile phone to carry out transactions while the minority (25%) said they used a computer.

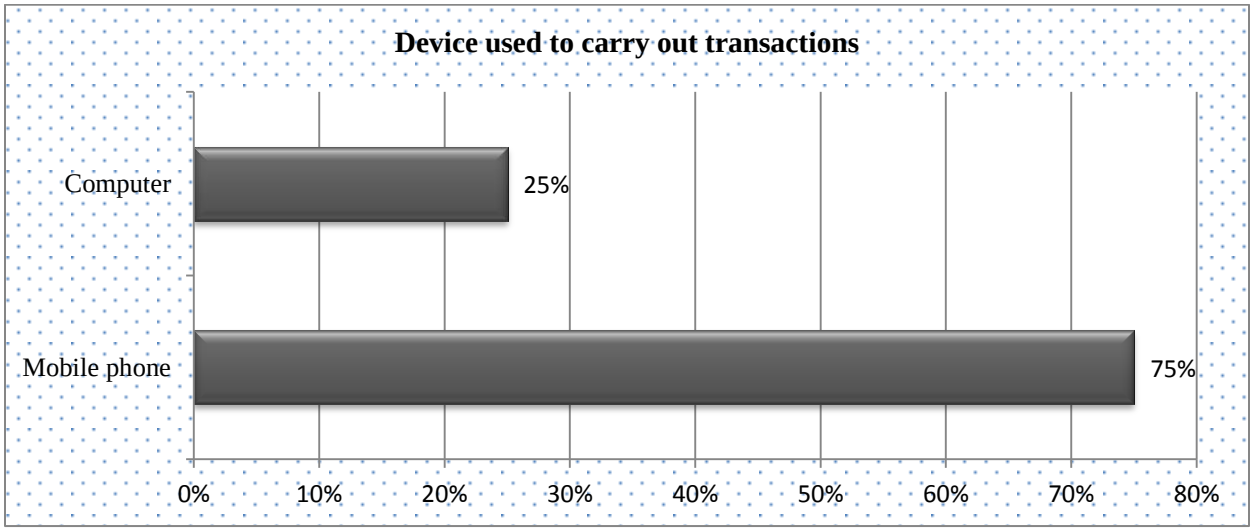


Figure 128: Name of device for carrying out transactions

4.5.3 Commonest transaction carried out

The commonest transaction (62.50%) indicated was for sending and receiving money from friends followed by saving money (25%) while the minority (12.50%) said all of the above.

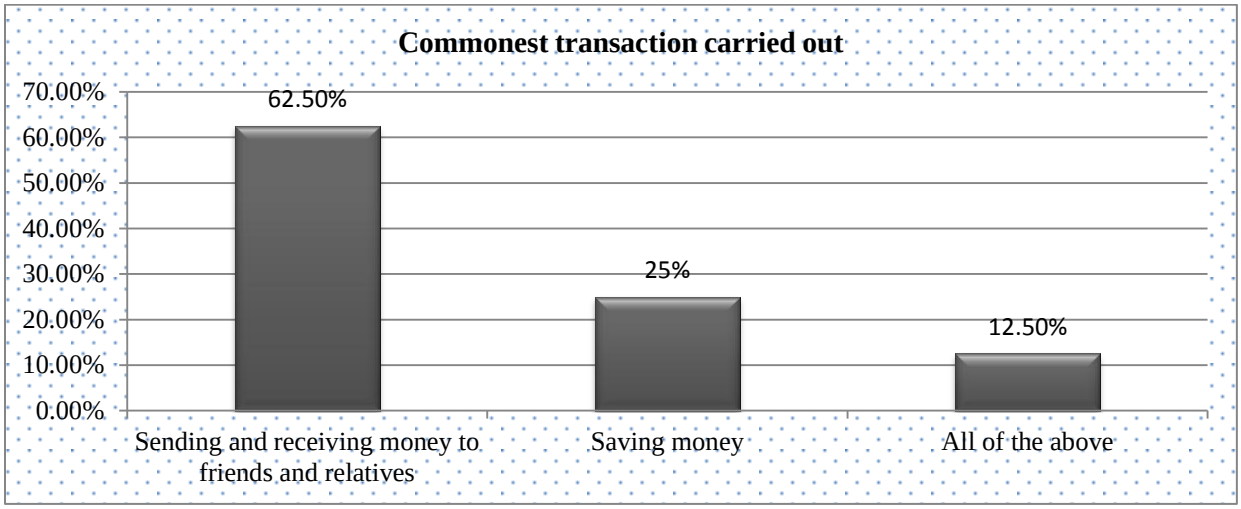


Figure 129: Commonest transaction

4.5.4 Digital financial services are safe and secure to use

The majority of the respondents (62.50%) agreed with the fact that digital financial services are safe and secure to use followed by 25% of the respondents who strongly agreed with the said statement. However, the minority (12.50%) of the respondents neither agreed nor disagreed with the said statement.

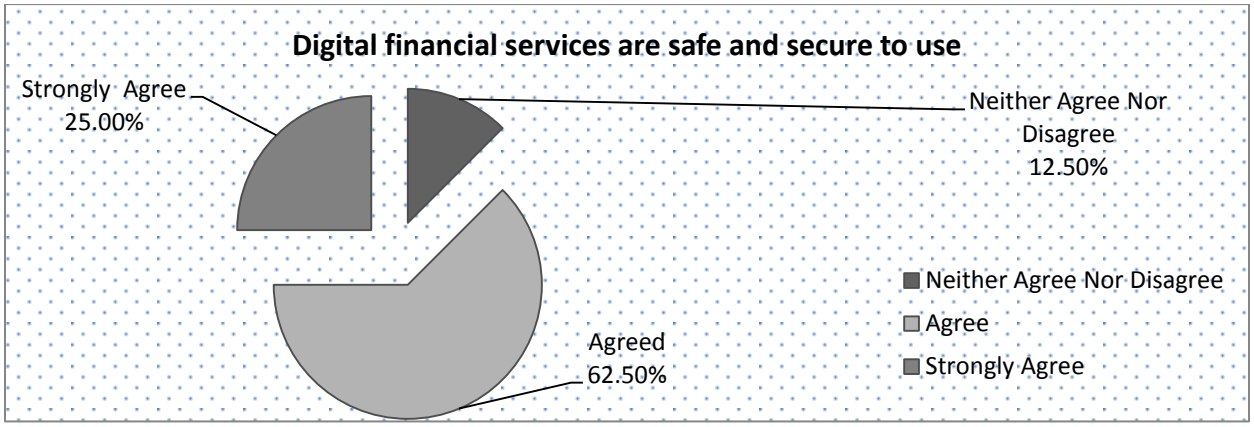


Figure 130: Safety and security of digital financial services

4.5.5 Digital financial services are efficient and transparent

Majority of the respondents (75%) agreed with the fact that digital financial services are efficient followed by 25% of the respondents who strongly agreed with the same statement.

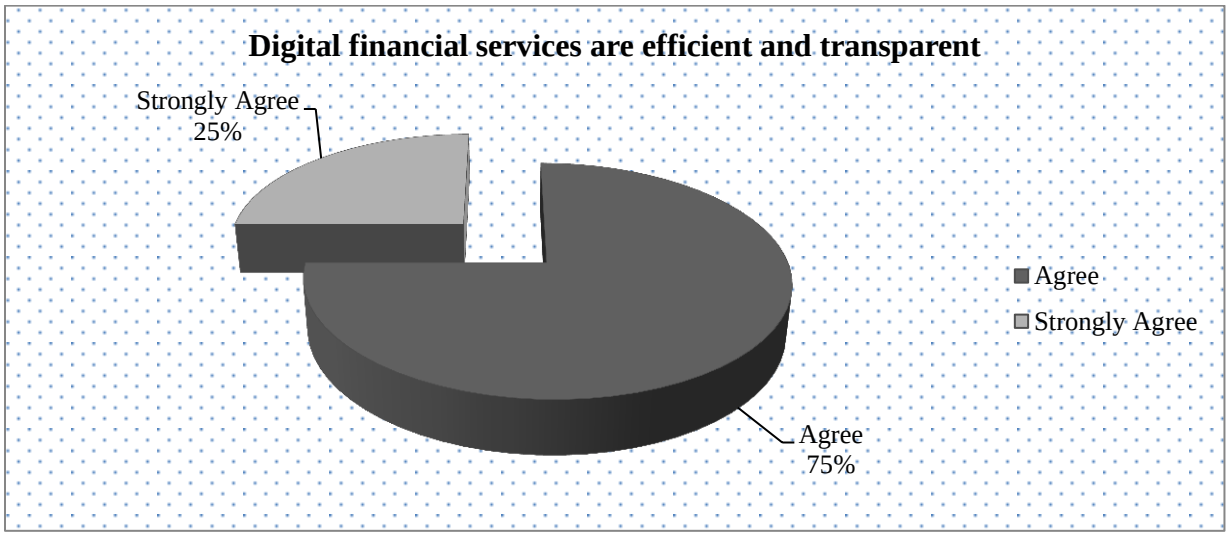


Figure 131: Efficiency and transparency of digital financial services

4.5.6 Digital financial services offer increased flexibility

The majority of the respondents (62.50%) strongly agreed with the fact that digital financial services offer increased flexibility followed by 25% of the respondents who neither agreed nor disagreed with the statement even though the minority (12.50%) agreed with the mentioned statement.

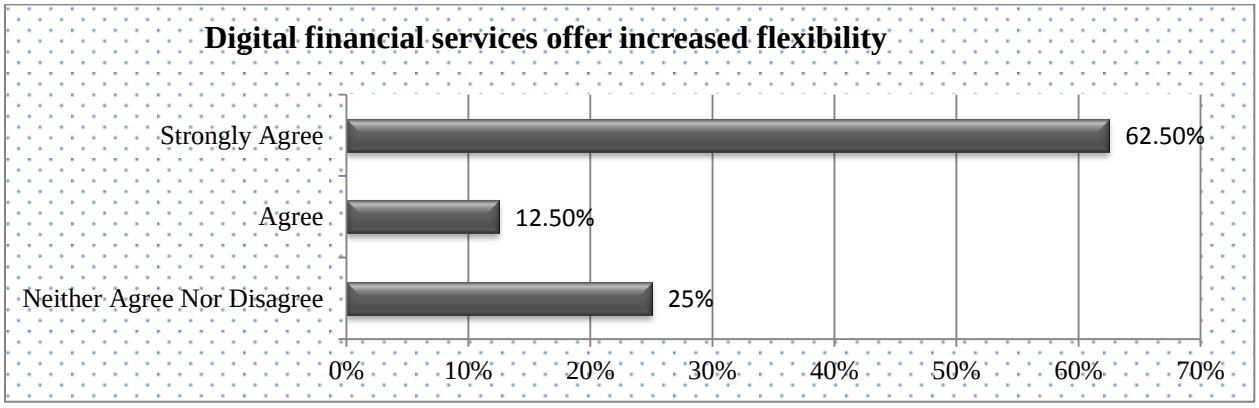


Figure 132: Flexibility of digital financial services

4.5.7 Digital financial services offer saving incentives

The majority of the respondents (62.50%) agreed followed by 37.50% of the respondents who strongly agreed with the given statement.

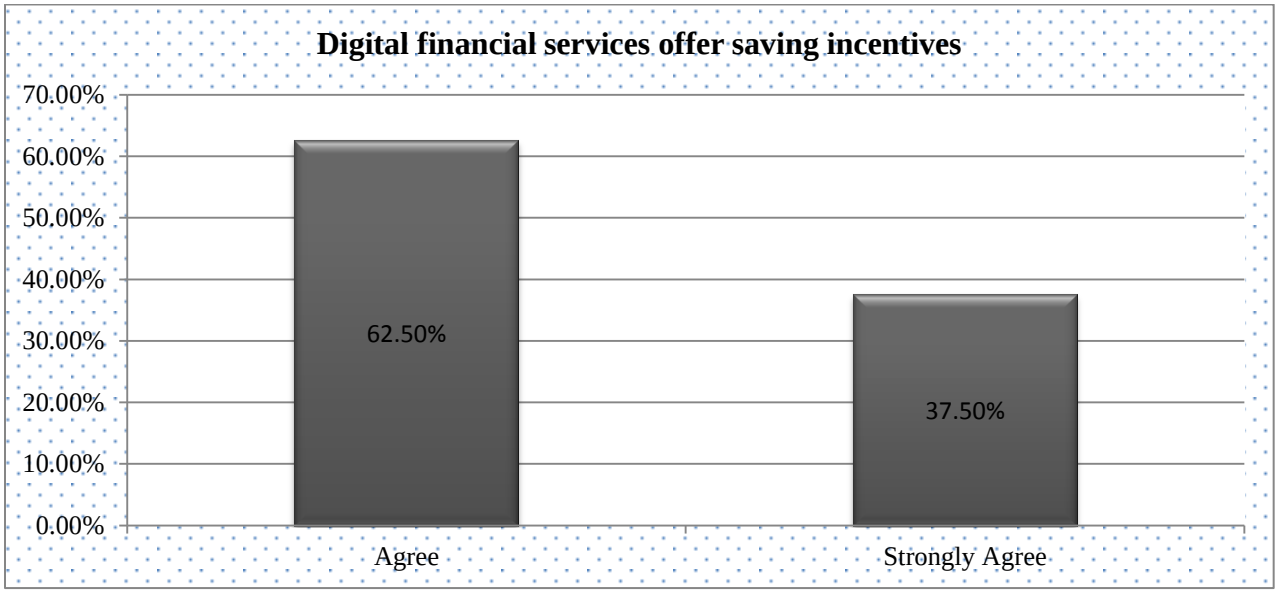


Figure 131: Saving incentives of digital financial services

4.5.8 Digital financial services give credit histories (i.e. able to trace history of transactions)

The bar chart describes the results pertaining to the above statement. Majority respondents (87.50%) strongly agreed with the statement followed by 12.50% who agreed with the same statement.

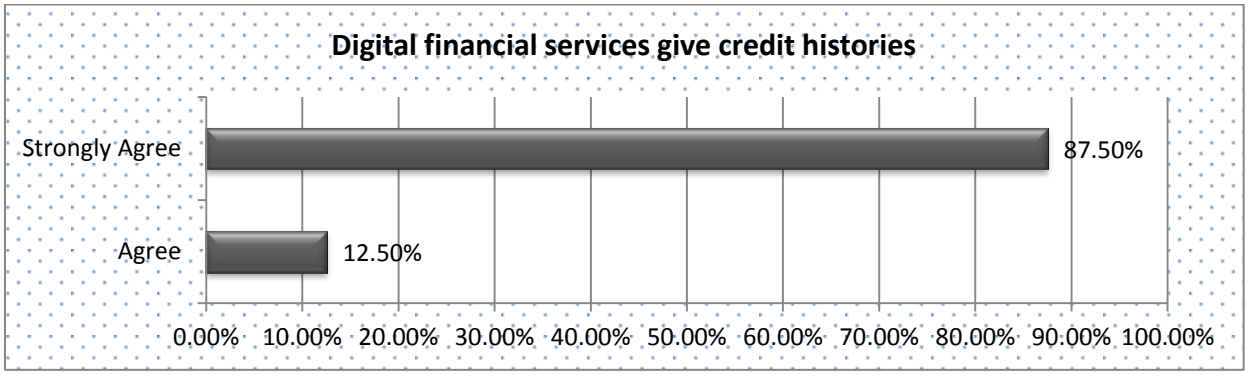


Figure 132: Credit histories in digital financial services

4.5.9 Digital financial services are important for integrating the unbanked

The 50% of the respondents strongly agreed followed by 50% of the respondents also asserted to the same statement.

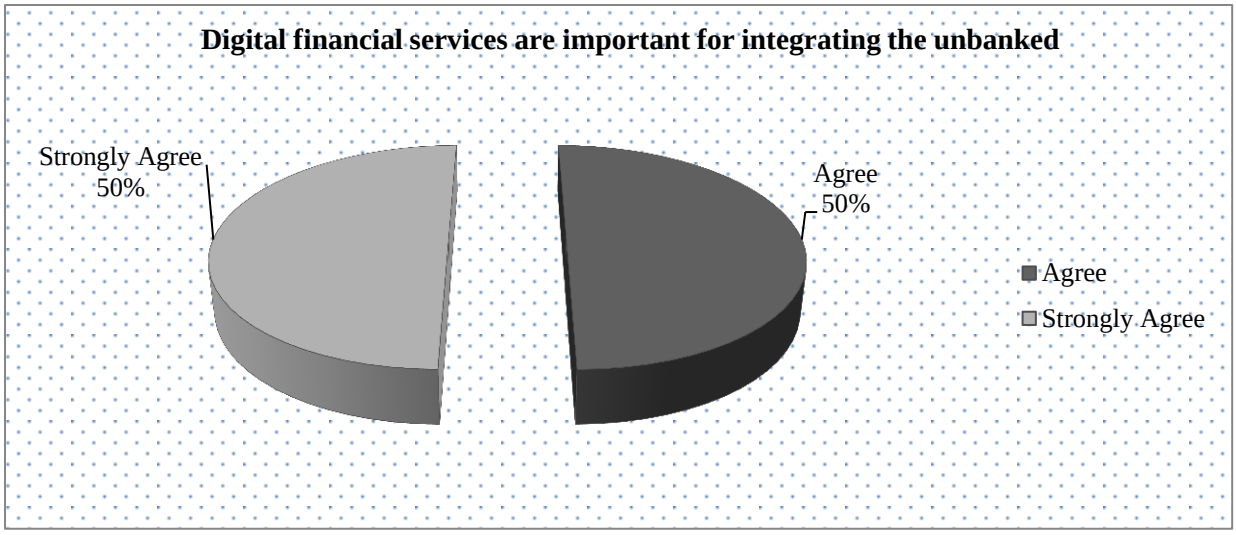


Figure 133: Integration of the unbanked using digital financial services

4.5.10 Documentation requirements to open digital financial services are easier

Majority of the respondents (75%) strongly agreed by asserting that digital financial services have easier documentation requirements followed by (25%) of the respondents who agreed with the same statement.

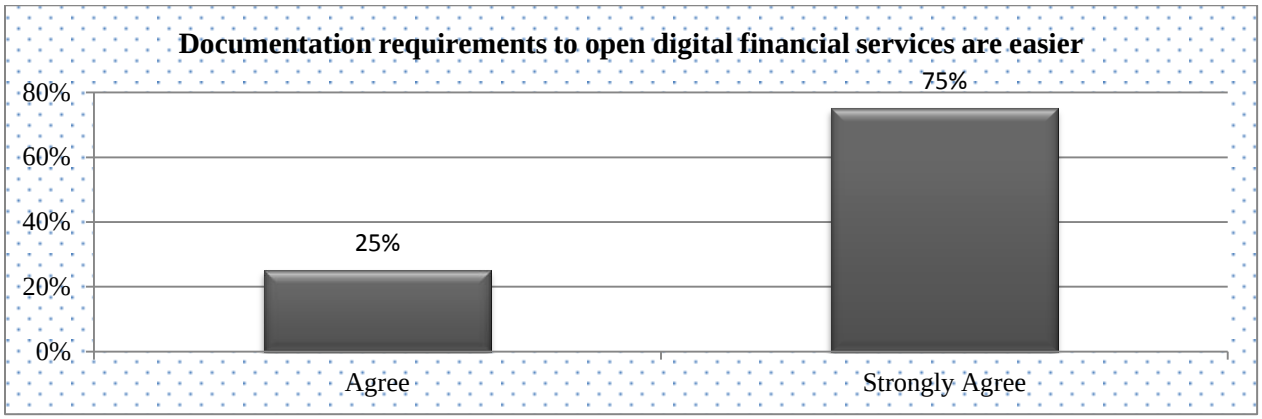


Figure 134: Documentation requirements for digital financial services

4.5.11 Digital financial services transactions are cheaper

The pie chart was used to describe the distribution which follows. The larger proportion of respondents (50%) strongly agreed with the statement given. However, the minority of the respondents disagreed with the said statement.

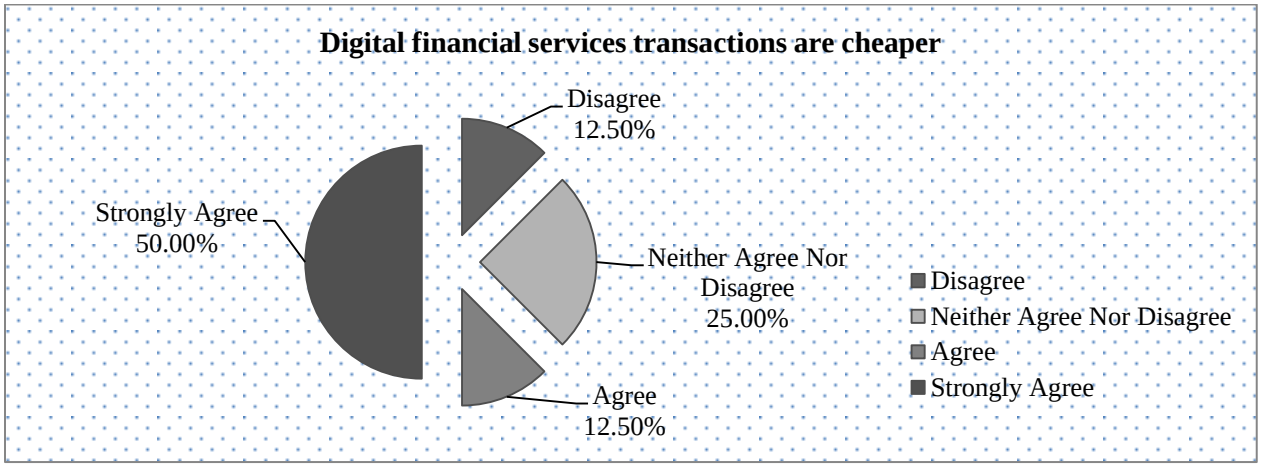


Figure 135: Affordability of digital financial services

4.5.12 People spend less time to transact using digital financial services

The majority of the respondents (62.50%) strongly agreed that people spend less time to transact using digital financial services, followed by 25% of the respondents who agreed with the same statement. On the contrary, the minority (12.50%) neither agreed nor disagreed with the mentioned statement.

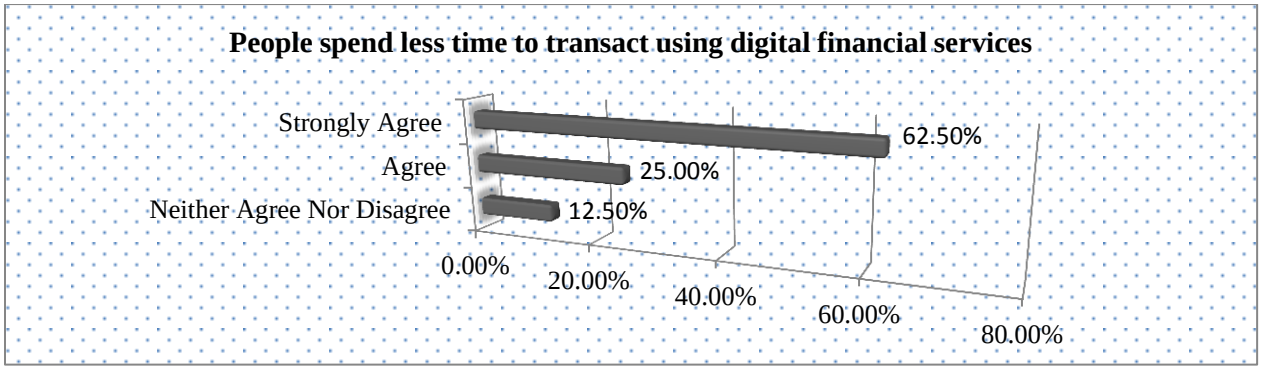


Figure 136: Time spent when transacting using digital financial services

4.5.13 Digital financial services are more convenient than banks

Majority of the respondents (62.50%) agreed followed by 25.00% of respondents who agreed with the said statement. However, the minority (12.50%) of the respondents neither agreed nor disagreed with the mentioned statement.

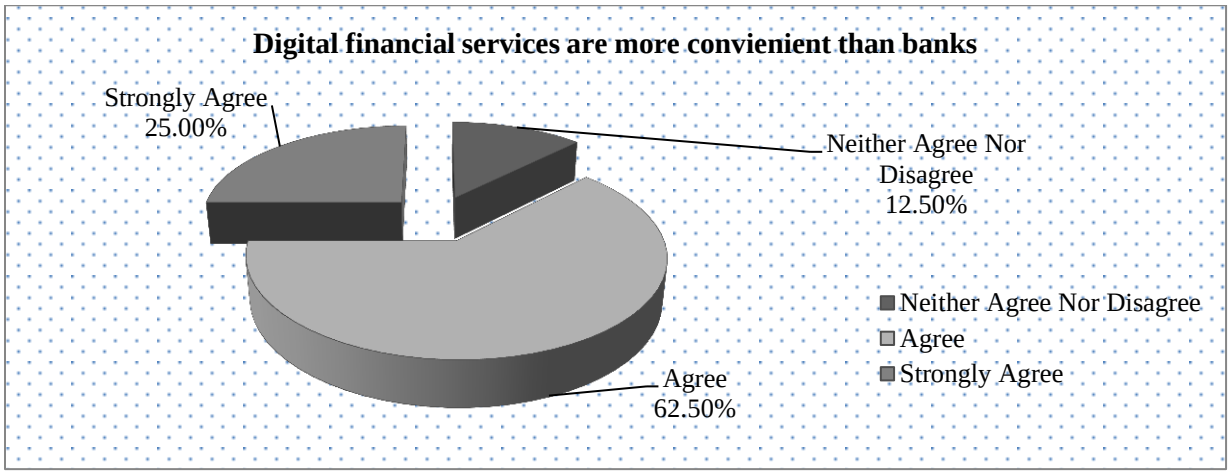


Figure 137: Convenience of digital financial services compared to banks

4.5.14 People who are unbanked like using digital financial services

The largest proportion of respondents (50.00%) strongly agreed with the statement while the minority respondents (12.50%) neither agreed nor disagreed with the said statement.

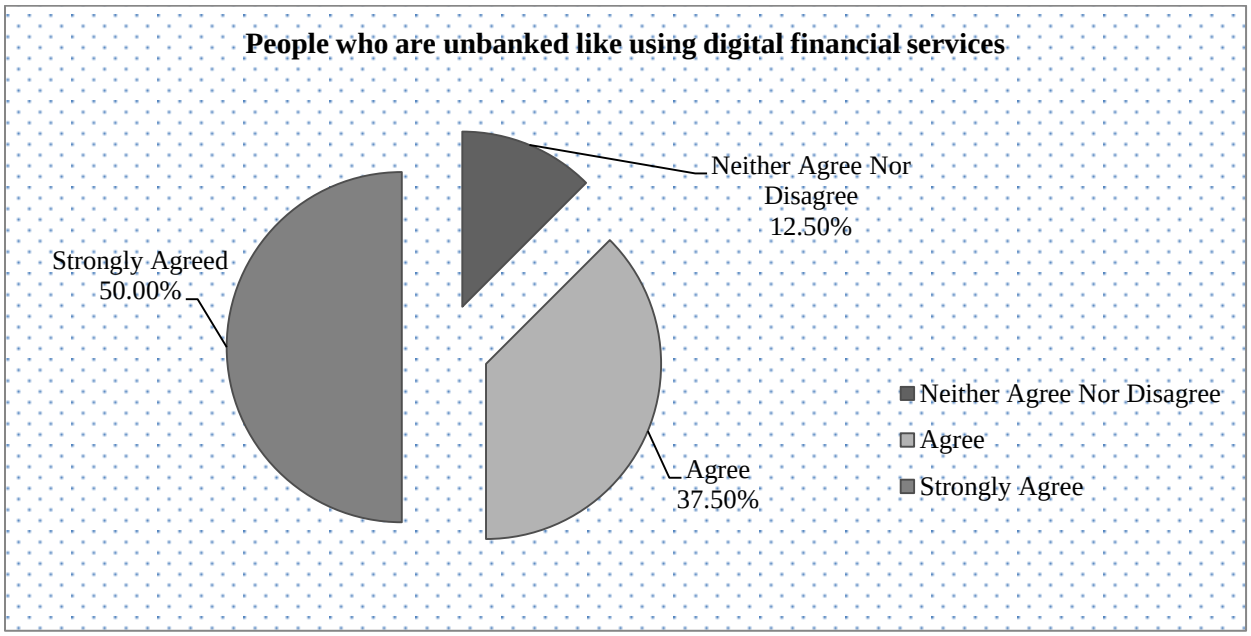


Figure 138: Use of digital financial services by the unbanked

4.5.15 Recommendations

In this section, the results describe the digital financial services agents/providers. The section illustrates the results with reference to experiences of the digital financial services agents/providers.

4.5.16 Is the rate of people using digital financial services ever increasing

All the respondents indicated that the rate of people using digital financial services is ever increasing in Zambia.

Table 19: Rating of digital financial services

Value label	Value	Frequency	Percent	Valid Percent	Cum Percent
Yes	1	8	100.00	100.00	100.0
	Total	8	100.0	100.0	

4.5.17 Have digital financial services complemented banks

The all respondents indicated that digital financial services have complemented banks.

Table 20: Digital financial services verses banks

Value label	Value	Frequency	Percent	Valid Percent	Cum Percent
Yes	1	8	100.00	100.00	100.00
	Total	8	100.0	100.0	

4.6 Higher learning education accounts personnel respondents

4.6.1 Introduction

In this section, the result findings are for the seven accounts personnel from the five institutions namely: The University of Zambia, Evelyn Hone College, University of Lusaka, Cavendish University and Chainama College. The results are presented by frequency tables, bar charts and pie charts.

4.6.2 Banks and business processes

The banks and business processes section contains information on: knowing whether an institution had a bank account, finding out the name of the recommended bank, what the bank account is used for, whether the bank account had bank charges and the general information on banking organizations.

4.6.3 Does the institution have a bank account

All the respondents asserted as shown in Table 21.

Table 21: Institutional bank account ownership

Value label	Value	Frequency	Percent	Valid Percent	Cum Percent
Yes	1	7	100.00	100.00	100.00
	Total	7	100.0	100.0	

4.6.4 Which one is the recommended institution bank

The majority of the respondents (57.14%) indicated Bank A, while the minority representation of (14.29%) each came from three banks namely: Bank B, Bank C and Bank D.

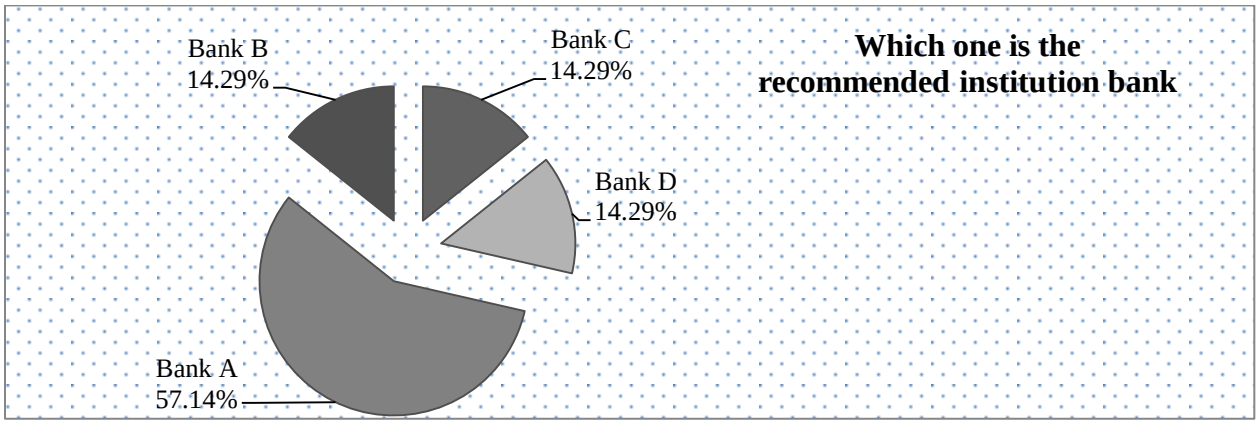


Figure 139: Name of recommended bank

4.6.5 What is the main use of the institution bank account

Majority of the respondents (85.71%) stated receiving tuition and other fees from students while the minority respondents (14.29%) mentioned saving money.

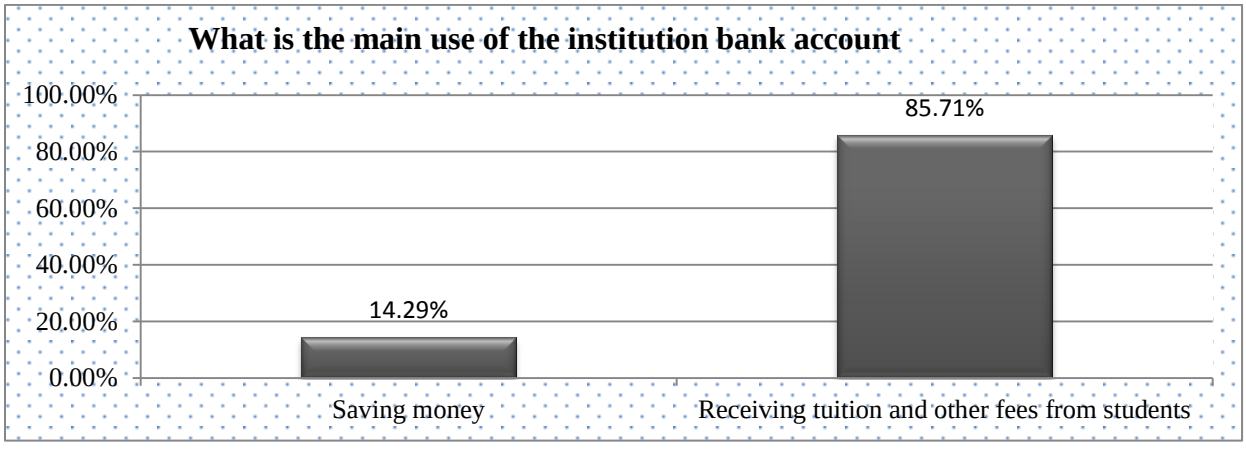


Figure 140: Main use of institution bank accounts

4.6.6 Are there any bank maintenance fees attached to owning an institution bank account

All the respondents (100%) stated that there are maintenance fees for the bank accounts that institutions have.

Table 22: Maintenance fees for owning an institution bank account

Value label	Value	Frequency	Percent	Valid Percent	Cum Percent
Yes	1	7	100.00	100.00	100.00
	Total	7	100.0	100.0	

4.6.7 Bank account maintenance fees are costly

The majority of the respondents (28.57%) agreed followed by respondents (28.57%) who neither agreed nor disagreed. Even though there were 14.29% of the respondents who strongly agreed that bank account maintenance fees are costly, however, other respondents (14.29%) disagreed followed by other (14.29%) of the respondents who strongly disagreed with the said statement.

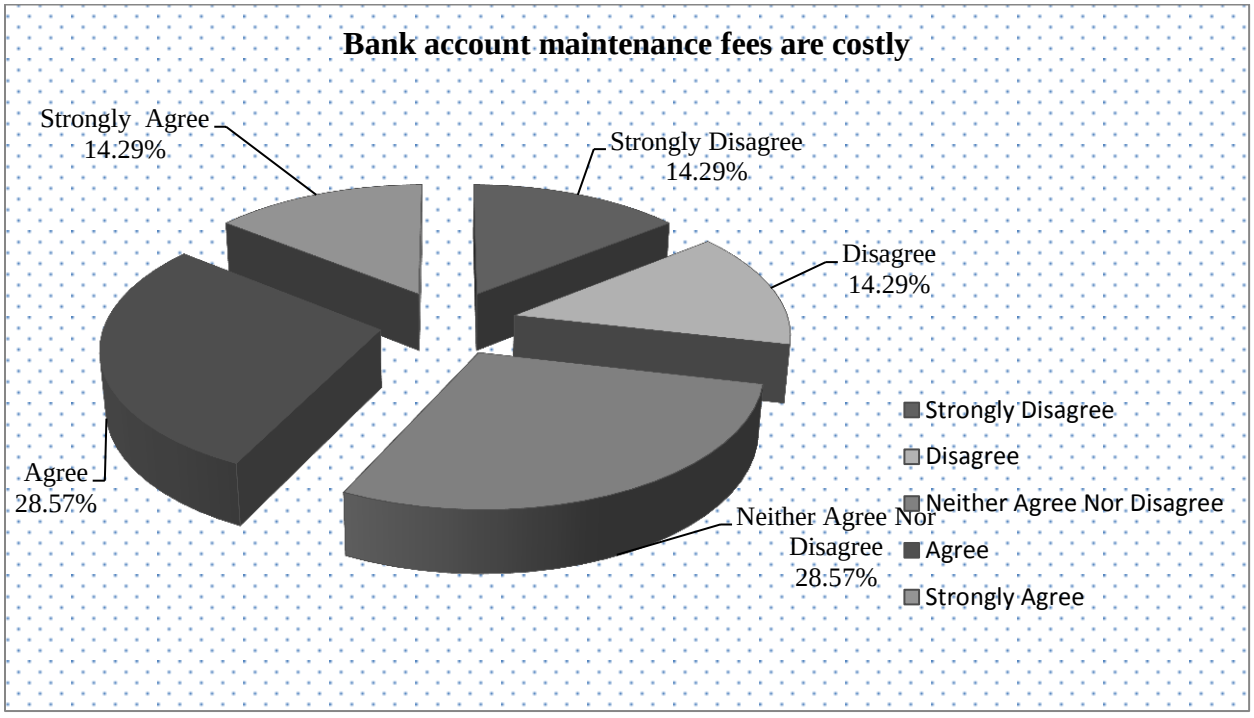


Figure 141: Cost of maintenance fees

4.6.8 It is easier and cheaper to get records (i.e. bank statements from the bank)

Most of the respondents (42.86%) agreed followed by 28.57% of the respondents who strongly agreed with the said statement. However, the minority of the respondents (28.57%) disagreed with this statement.

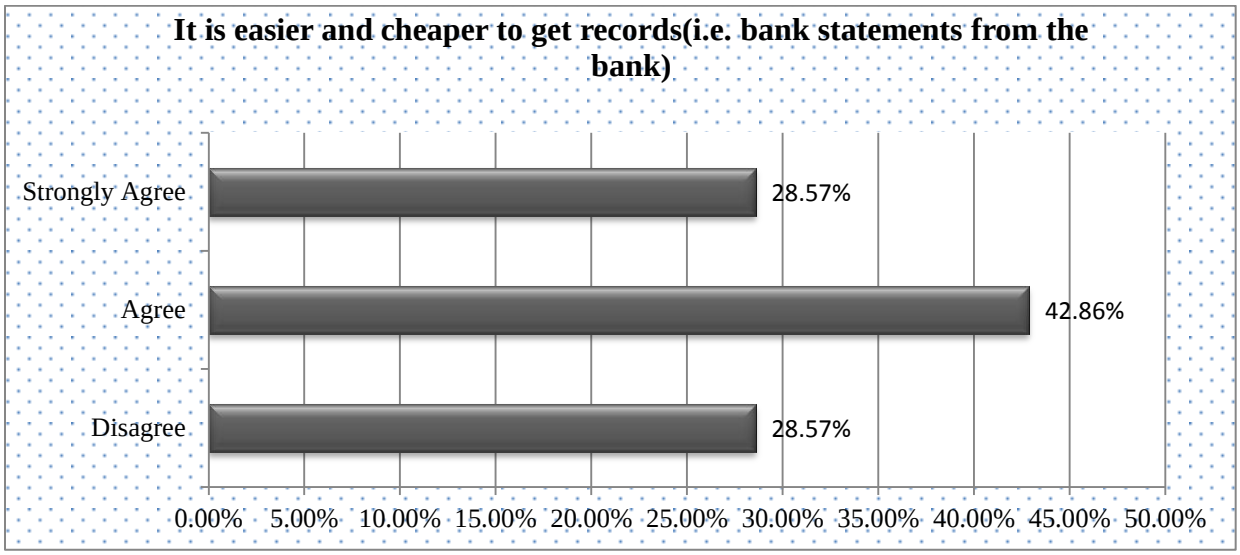


Figure 142: Accessibility of records

4.6.9 Banks easily make refunds when students have withdrawn from a study program

Majority of the respondents (42.86%) disagreed to the said statement followed by (28.57%) of the respondents who strongly disagreed. On contrast, there were the minority of respondents (14.29%) who agreed with the mentioned statement.

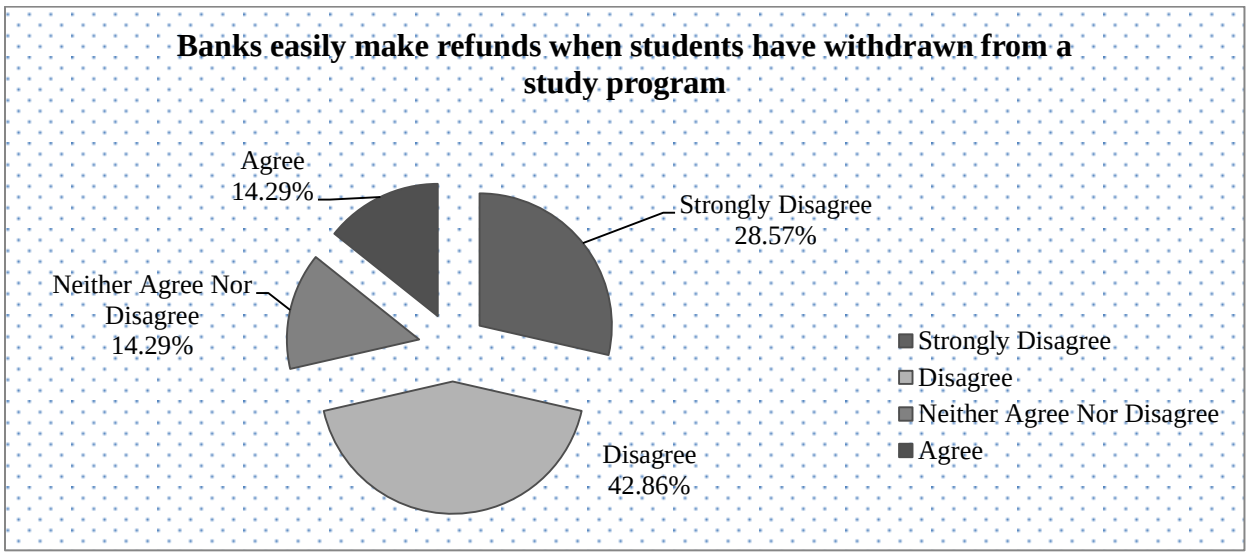


Figure 143: Refunds by banks

4.6.10 Recommended banks are evenly distributed in rural and urban areas

Majority of the respondents (42.86%) disagreed with this statement while the minority of the respondents (14.29%) neither agreed nor disagreed with the said statement.

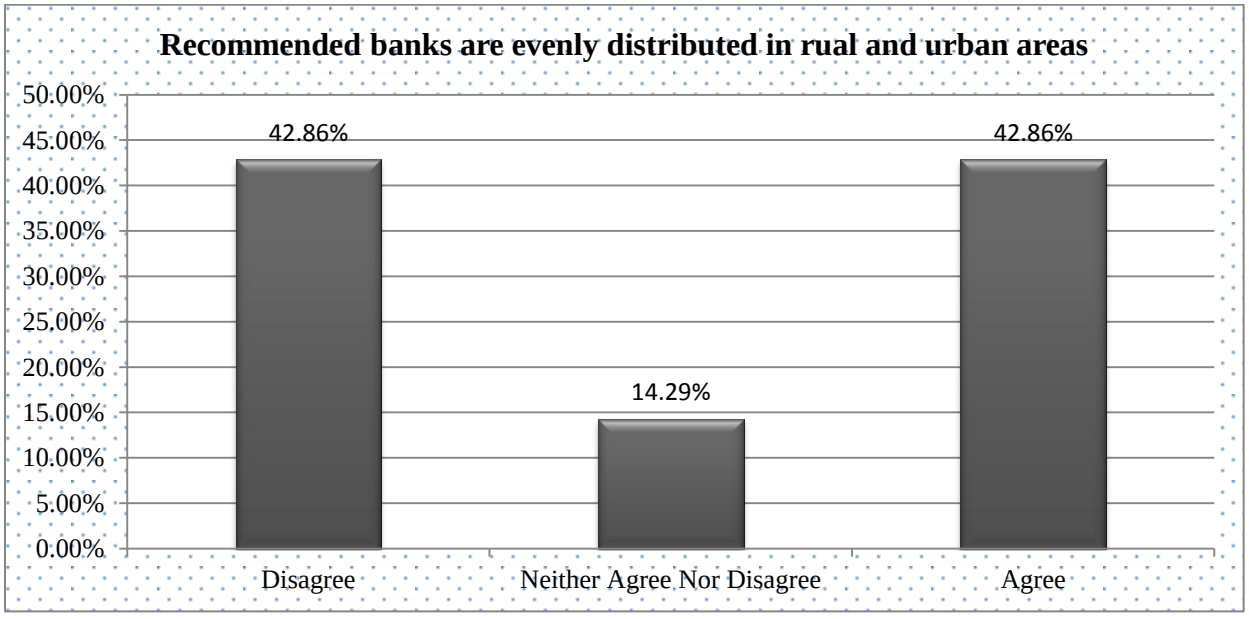


Figure 144: How banks are distributed in rural and urban areas

4.6.11 State some of the major challenges related with payment of tuition and other fees in the current payment system

The distribution below indicates the results from the respondents. All responses were written in the exact format from each respondent for us to understand the general overview of challenges that higher education learning institutions face when transacting with commercial banks.

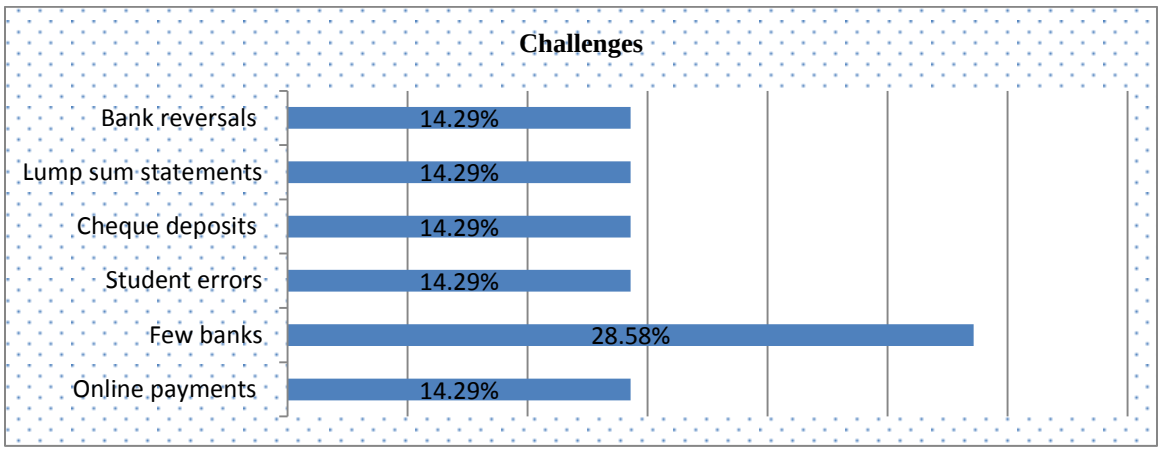


Figure 145: Major challenges

4.7.1 Mobile phone payment systems and applications

4.7.1.1 Introduction

In this section, the results presented relate to usage of digital financial services coupled with DFS with quality service delivery in Zambia.

4.7.1.2 Did you at any time send or receive money by means of mobile phone payment system

The majority of the respondents (71.43%) stated that they never sent or received money by means of mobile phone payment system. However, the minority respondents (28.57%) mentioned that they had used the stated payment systems.

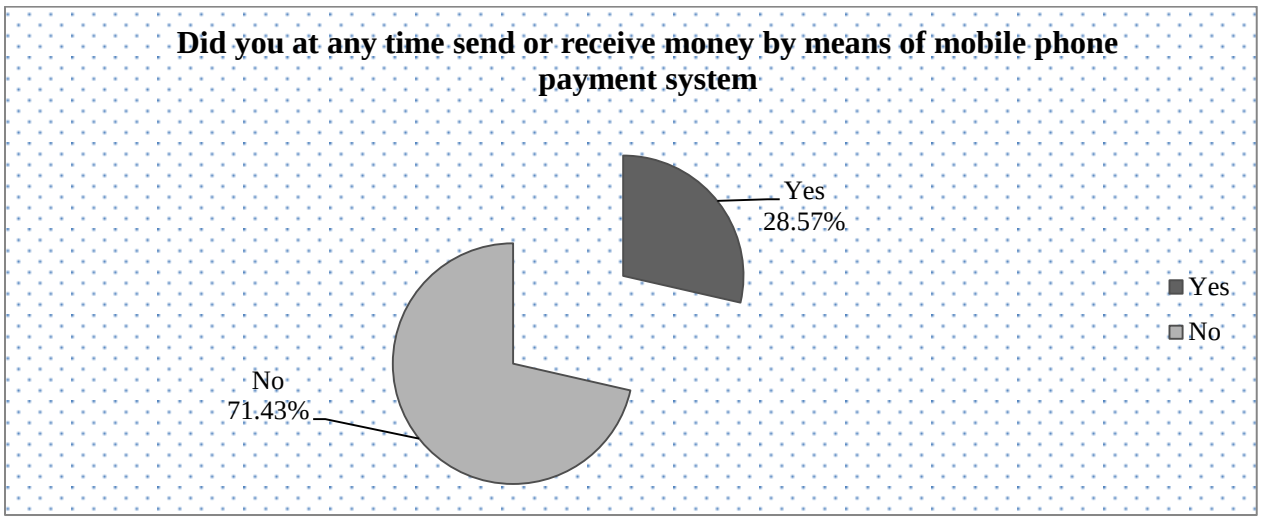


Figure 146: Usage of mobile money

4.7.1.3 Which mobile phone payment system do you currently rate highly in term of service delivery in Zambia

Most of the respondents (28.57%) indicated FNB e-Wallet as the mobile phone payment system rated highly in terms of service delivery in Zambia.

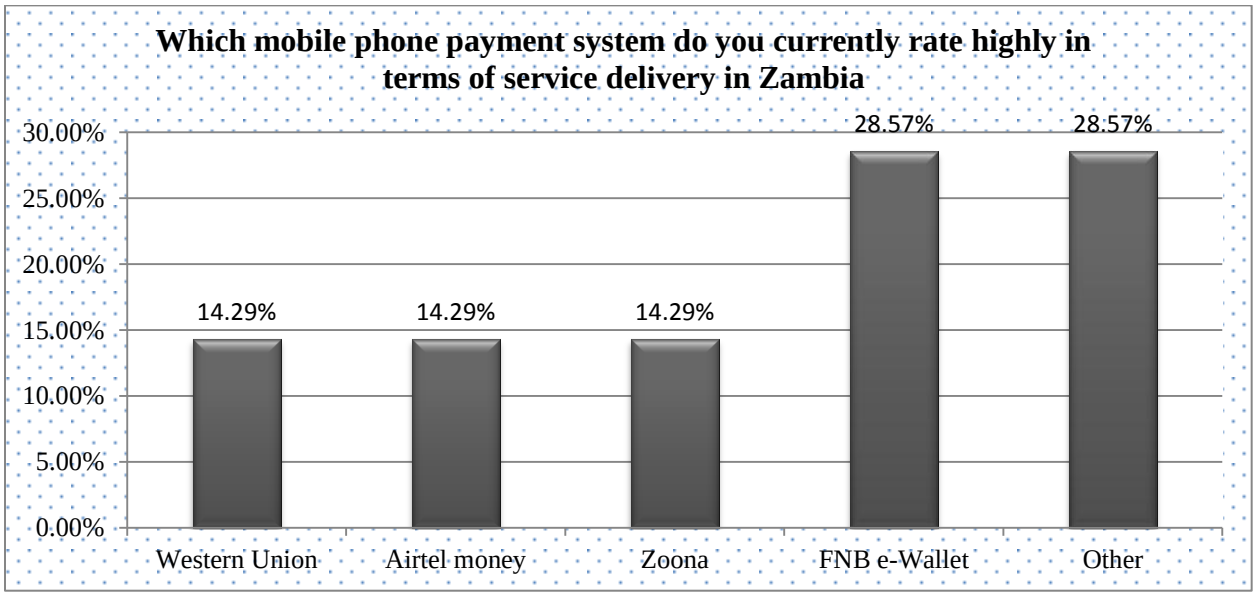


Figure 147: Rating of digital financial services in Zambia

4.7.1.4 State one digital financial service which is rated low in terms of service delivery in Zambia

The majority of the respondents (71.43%) did not know which digital financial service was rated low in terms of service delivery in Zambia.

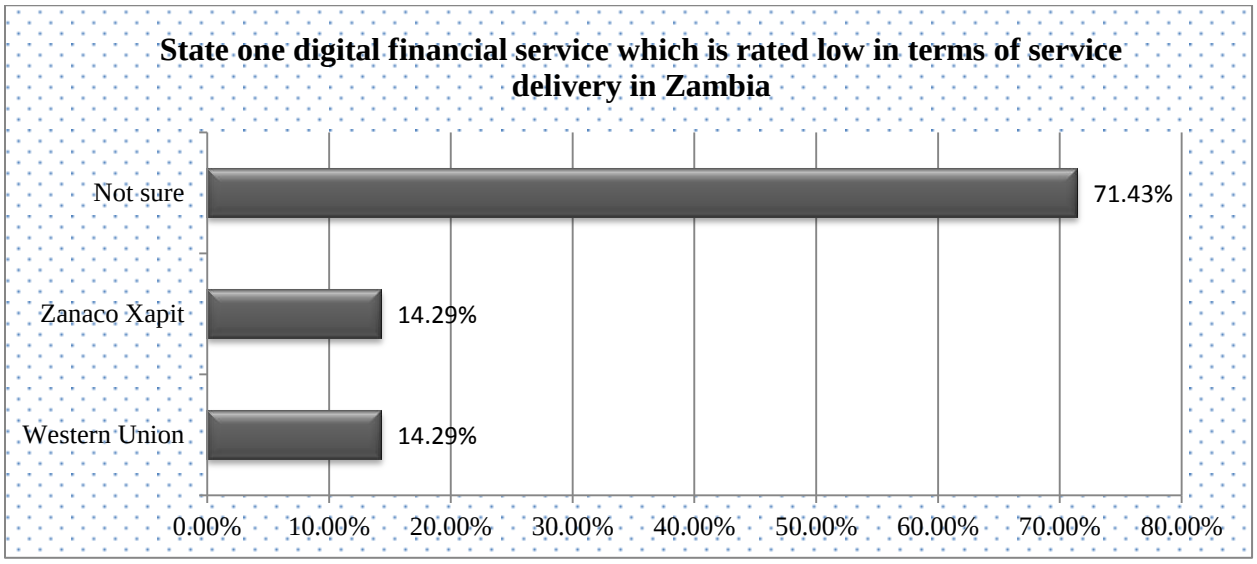


Figure 148: Low rated digital financial services

4.7.1.5 Recommendations

This section illustrates the results for account departments in higher education institutions of Zambia. The section describes the results with reference to experiences they had with digital financial services agents/providers.

4.7.1.6 Is having an optional payment system for your institution, one way of mitigating some of the challenges experienced through remittance of money in banks

The results in this distribution indicates that all the respondents asserted to the statement given by affirming that optional payment systems in institutions is a way of mitigating some of the challenges experienced through remittance of money in banks.

Table 23: Optional payment system assessment

Value label	Value	Frequency	Percent	Valid Percent	Cum Percent
Yes	1	7	100.00	100.00	100.00
	Total	7	100.0	100.0	

4.7.1.7 Do you think digital financial services can complement banks as an optional payment system for institutions

The entire sampled accounts department from all the targeted institutions indicated by stating that digital financial services can complement banks as an optional payment system.

Table 8: Digital financial services complementing banks

Value label	Value	Frequency	Percent	Valid Percent	Cum Percent
Yes	1	7	100.00	100.00	100.00
	Total	7	100.0	100.0	

4.7 Organizational respondents

4.7.1 Introduction

The section that follows includes statutory organizations, some of whom are involved in regulating digital financial services in Zambia. The sampled representatives were from: Zambia Information Communication Telecommunication Authority (ZICTA), Bank of Zambia (BOZ) and Zambia Bureau of Standards (ZABS). The format used to present results was by frequency tables, bar charts, column charts and pie charts.

4.7.2 Mobile network operators, banks and third parties found in the private sector are allowed to open digital financial services in Zambia

All the respondents agreed with this statement.

Table 9: Possibilities of opening digital financial services in Zambia

Value label	Value	Frequency	Percent	Valid Percent	Cum Percent
Strongly Agree	5	3	100.00	100.00	100.00
	Total	3	100.0	100.0	

4.7.3 Regulation for digital financial services in Zambia is open-market

Most respondents (66.67%) mentioned that regulation for digital financial services in Zambia is open market while the minority (33.33%) neither agreed nor disagreed with the same statement.

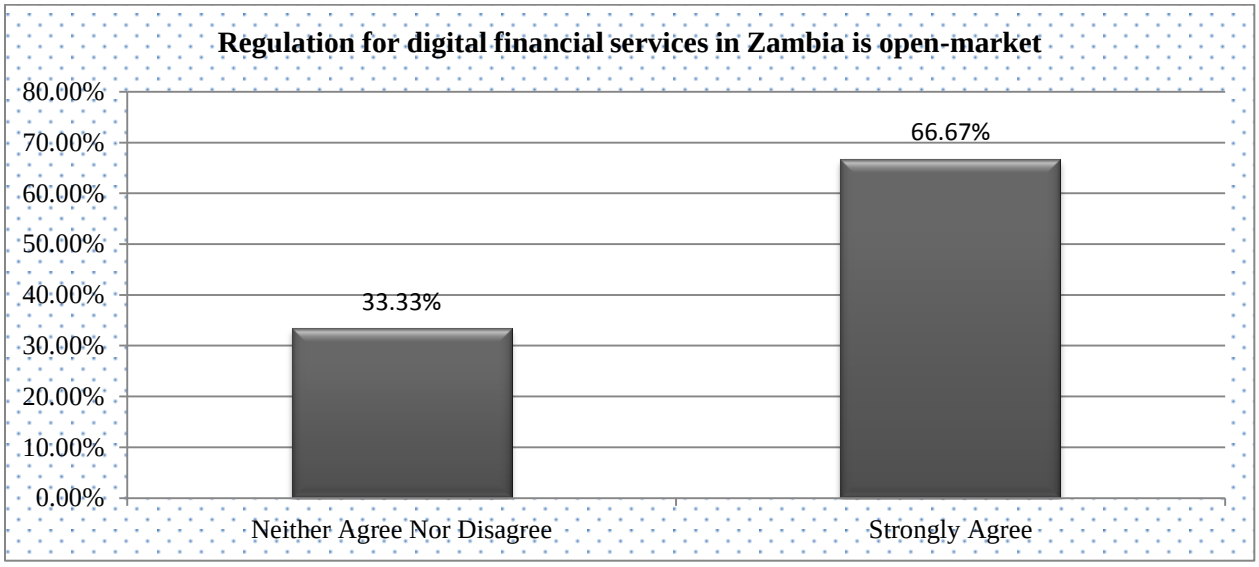


Figure 149: Digital financial services regulation

4.7.4 Banks, mobile network operators and the private sector in Zambia do not need partnership agreements to set up digital financial services

The largest proportion of respondents (66.67%) agreed with the statement as opposed to 33.33% of the respondents who strongly disagreed.

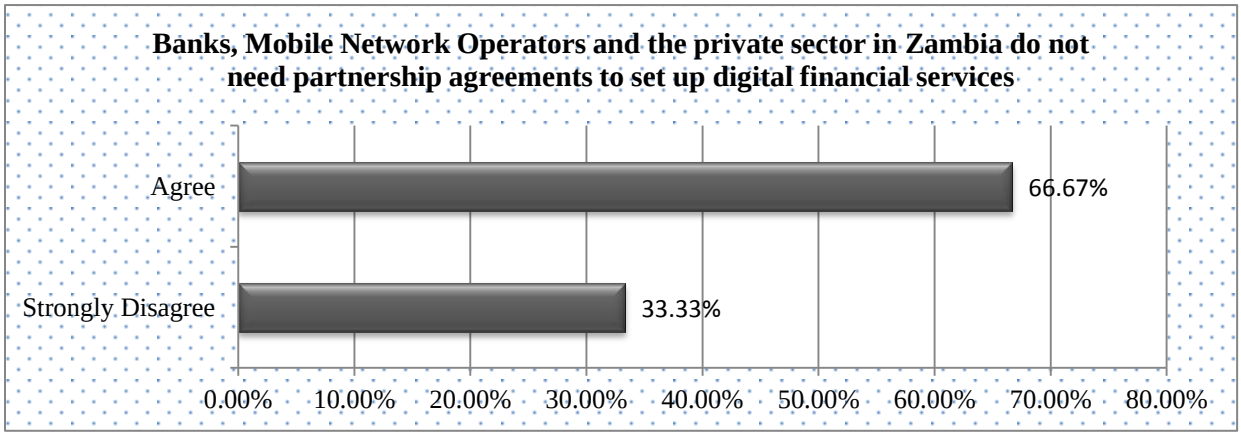


Figure 150: Partnership regulations in Zambia

4.7.5 Digital financial services are a driver for financial inclusion for the low income earners and the unbanked in many nations

Most of the respondents (66.67%) strongly agreed followed by 33.33% of the respondents who agreed with the said statement.

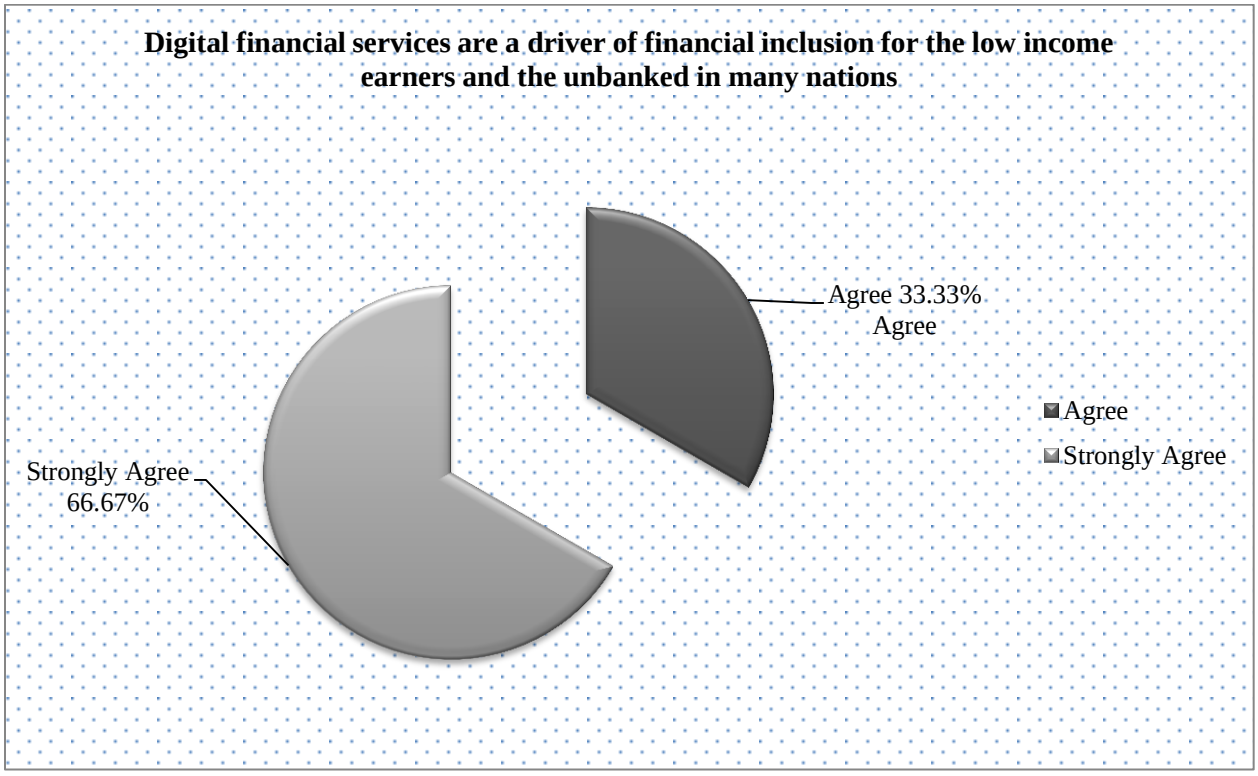


Figure 151: Digital financial services are pivotal for financial inclusion

4.7.6 Open market regulation enhance digital financial services in any country

The majority of the respondents (66.67%) strongly agreed followed by 33.33% of the respondents who agreed with the same statement.

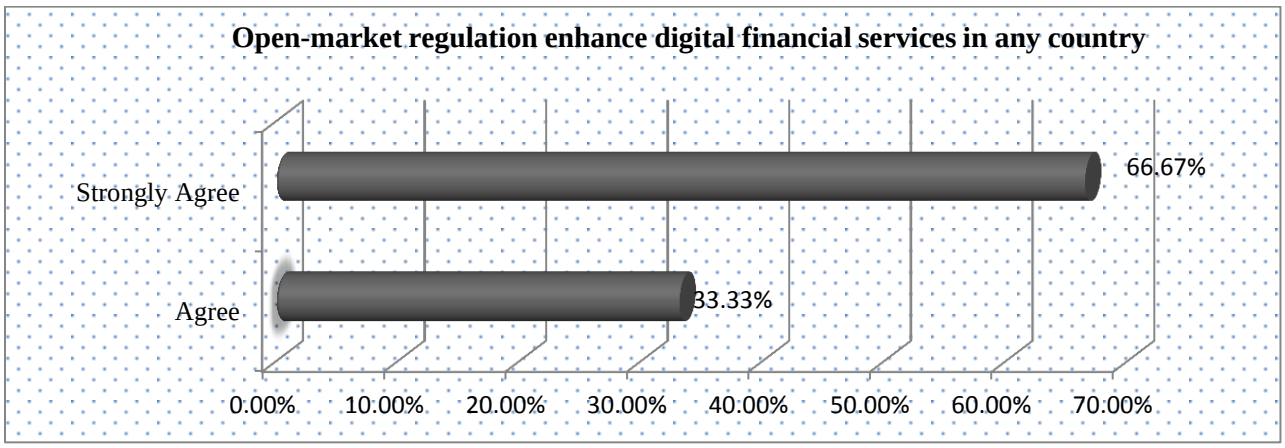


Figure 152: Type of regulation

4.7.7 Digital financial services are growing at the faster rate in addressing the business gap left by banks by integrating the financially excluded people

Digital financial services are growing at the faster rate in addressing the business gap left by banks by integrating the financially excluded people as suggested by 66.67% of the respondents who strongly agreed while 33.33% of the respondents neither agreed nor disagreed with the said statement.

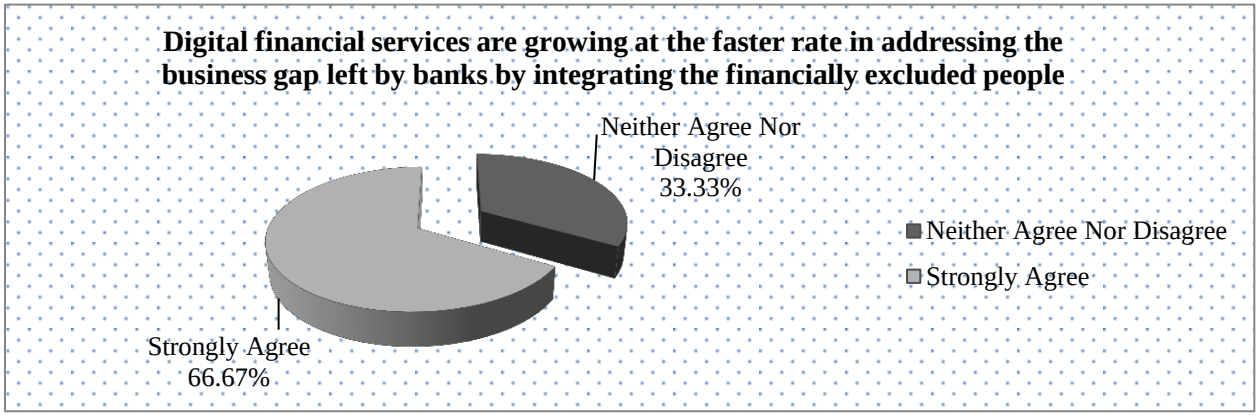


Figure 153: Growth rate of digital financial services

4.7.8 Digital financial services are safe and secure to use

The majority of the respondents (66.67%) strongly agreed while 33.33% of the respondents neither agreed nor disagreed with the mentioned statement.

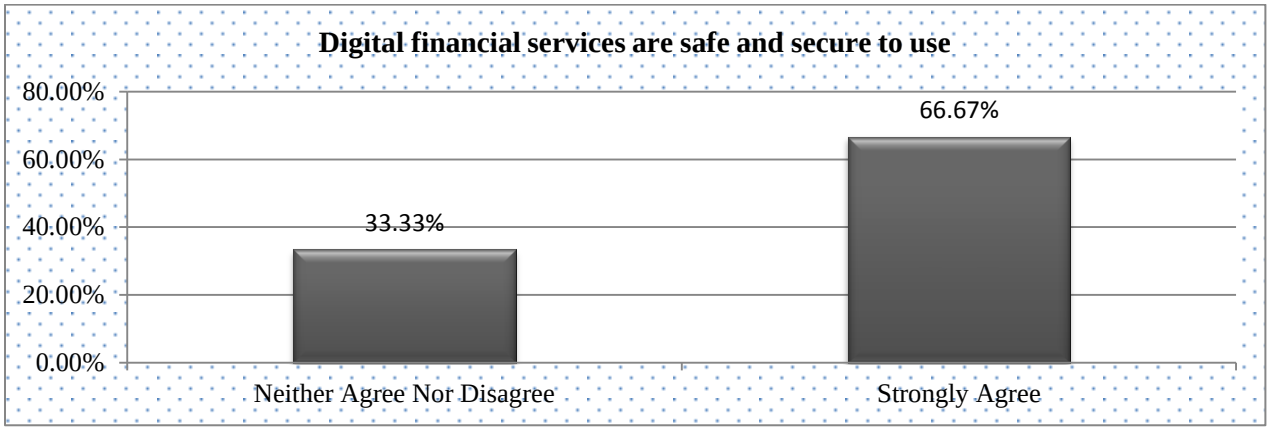


Figure 154: Safety and security of digital financial services

4.7.9 Digital financial services are efficient and transparent

Digital financial services are efficient and transparent as indicated by 66.67% of the respondents who strongly agreed while 33.33% of the respondents neither agreed nor disagreed.

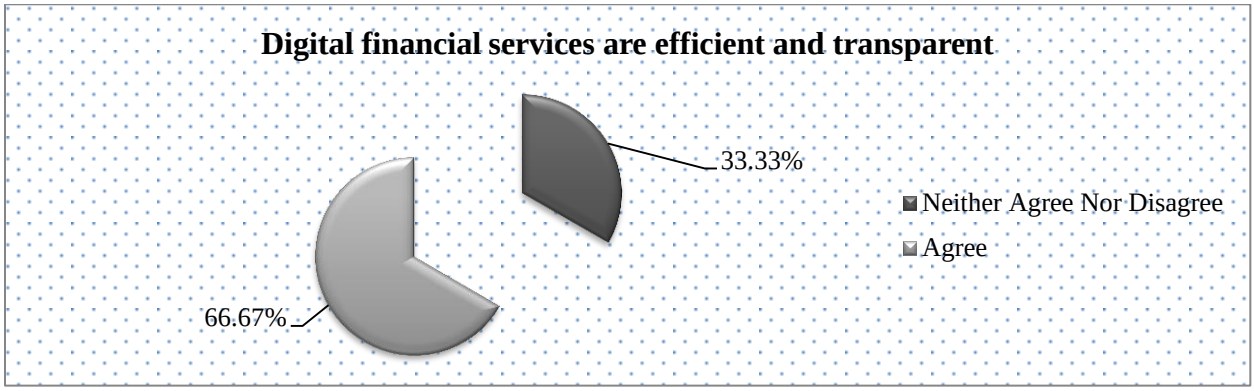


Figure 155: Efficiency and transparency of digital financial services

4.7.10 Digital financial services offer increased flexibility

Digital financial services offer increased flexibility as indicated by 66.67% of the respondents who agreed while 33.33% of the respondents neither agreed nor disagreed with the mentioned statement.

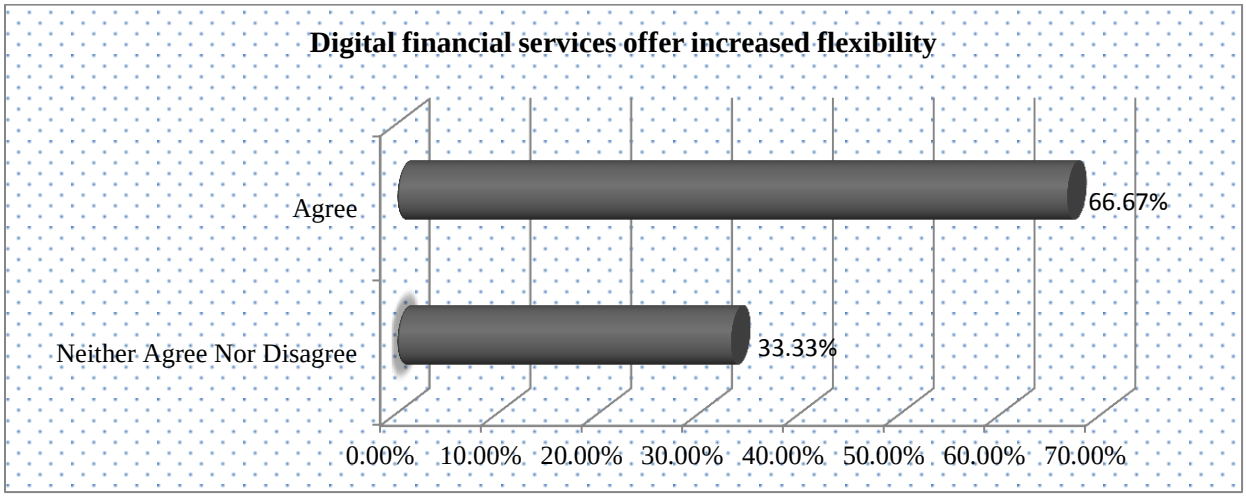


Figure 156: Flexibility of digital financial services

4.7.11 Digital financial services offer saving incentives

Digital financial services offer saving incentives as stated by all the respondents (100%).

Table 10: Saving incentives in digital financial services

Value label	Value	Frequency	Percent	Valid percent	Cum Percent
Neither Agree Nor Disagree	3	3	100.00	100.00	100.00
	Total	3	100.0	100.0	

4.7.12 Digital financial services give credit histories

The majority of the respondents (66.67%) mentioned that digital financial services give credit histories. However, the minority respondents (33.33%) neither agreed nor disagreed with the statement.

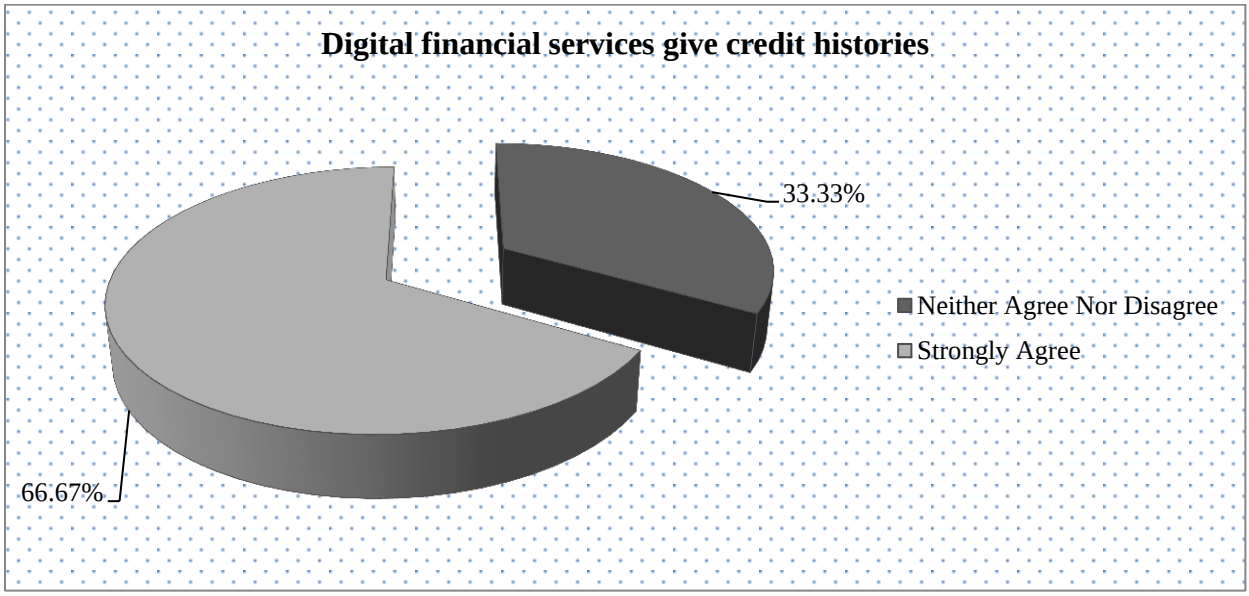


Figure 157: Credit histories in digital financial services

4.7.13 Recommendations

The recommendation section provides information on respondents' views on having optional payment systems to integrate the unbanked adults in Zambia and whether digital financial services can complement banks.

4.7.14 Is it necessary to have optional payment systems in order to integrate the unbanked adults in a country

It is necessary to have an optional payment system in order to integrate the unbanked adults in a country as mentioned by all the respondents (100%).

Table 11: Decision to have optional payment systems

Value label	Value	Frequency	Percent	Valid Percent	Cum Percent
Yes	1	3	100.00	100.00	100.00
	Total	3	100.0	100.0	

4.7.15 Can digital financial services complement banks

Digital financial services can complement banks as stated by all the respondents (100%).

Table 12: Digital financial services verses banks

Value label	Value	Frequency	Percent	Valid percent	Cum percent
Yes	1	3	100.00	100.00	100.00
	Total	3	100.0	100.0	

4.8 Mobile phone application prototype screen shots

4.8.1 Introduction

This section presents the results of the screen shots from the prototype. The results demonstrated are steps that the user is supposed to do when carrying out a transaction. At this stage, the user should have already uploaded the mobile phone application on their mobile phone. As such, users will have been sensitized on where to upload the mobile phone application for them to utilize the system.

1. Step number one

For the application to be utilized after the user has uploaded on their mobile phone, registration processes should begin with the agent. As such, the user (e.g. student) approaches the agent to register their mobile phone application system. The agent will request different details from the user for them to be registered.

Among the details that the agent would request from the users are: identity number such as: computer number or national registration card number, users' name, users' phone number, school and amount to be deposited, just to mention a few.

As an illustration, the mobile phone application will incorporate added security features of international standards in order to ensure the system is not compromised. It is at this point that other modules like authentication module in Table 1 should be integrated into the system. Additionally, once the user is logged into the system, the user will be expected to enter their personal identification number (PIN) as shown in Figure 158.

Figure 158: Mobile phone application PIN

The users' interface will be different from the interface that the agents and the administrator will be using. The agent will be expected to have privileges related to registration of the user. The agents' interface will look as shown in Figure 159 below.

The agents will not only be limited to users' registration but will carry out other functions. One of the functions the agent will be to ensure that e-float contained in the system is supported with liquidity found in the commercial bank. As such, the agents are expected to always deposit the cash that they receive from users for them to function smoothly.

Administrative requirements of how to employ the agents will be decided by the higher education institutions. Agents will undergo training that will be provided by the system host in order for them to fully understand their role.

If the institution decides to use other available options of recruiting agents, it will be better for institutions to use enterprises that are already established with a strong financial position. This will not only inconvenience users but it will enhance the uptake of the system by users when they are always accessing the services they need.

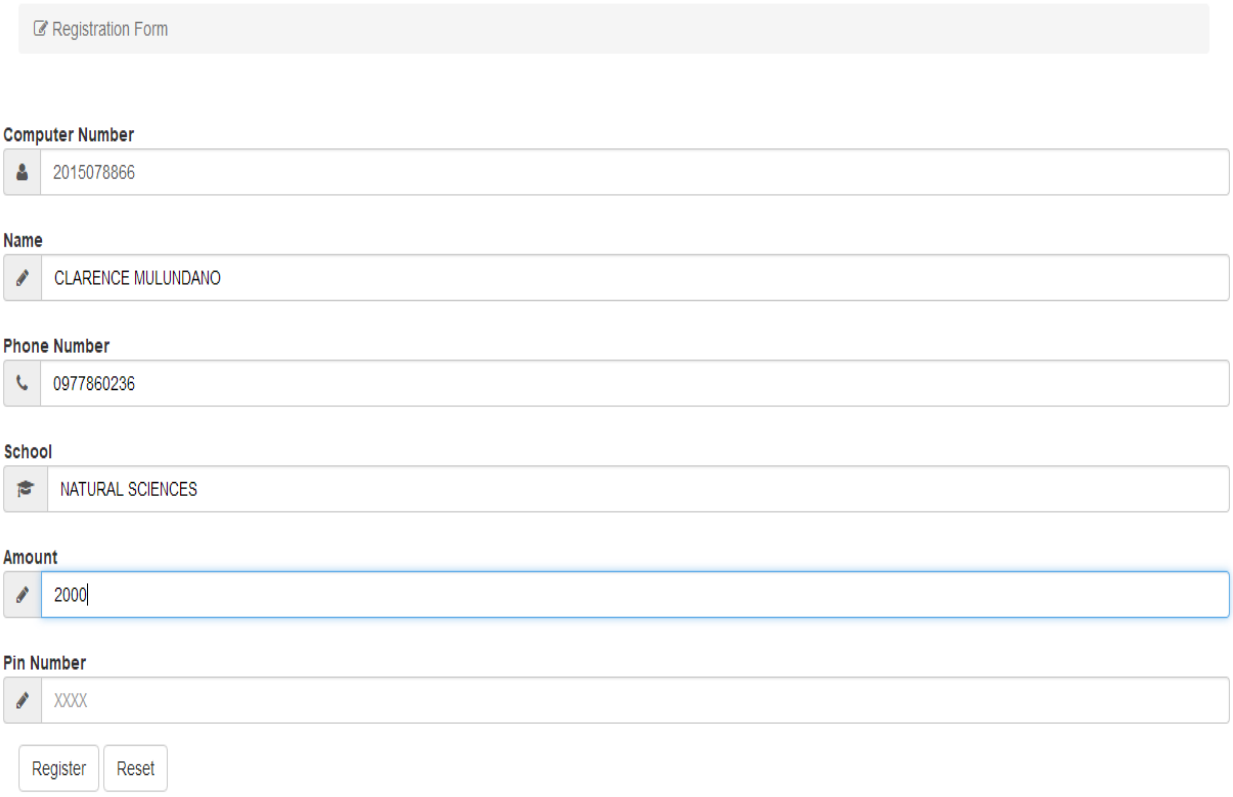


Figure 159: Agent interface when registering the student

2. Step number two

Once all the registration formalities are done by the users, they are expected at this time to log into the system. The user will click on the mobile phone application and the system will open. The system will request the user to enter the PIN as shown in Figure 166.

PIN should be known by the user for them to move to the next step of logging into the system. If the user has forgotten the PIN, they are expected to contact the agents who can in turn reset there PIN.

The user will enter PIN and finally access the welcome screen. The welcome screen appears as shown in Figure 160 will have different USSD session-oriented transactions to enable the user decide the service that they need to use. USSD session oriented transactions will be customized in accordance to the needs of the system host.

The primary goal of the mobile phone application for higher education institutions will be meant to provide convenience to users and also ensure generation of revenue for the system host through the commissions that will be raised.

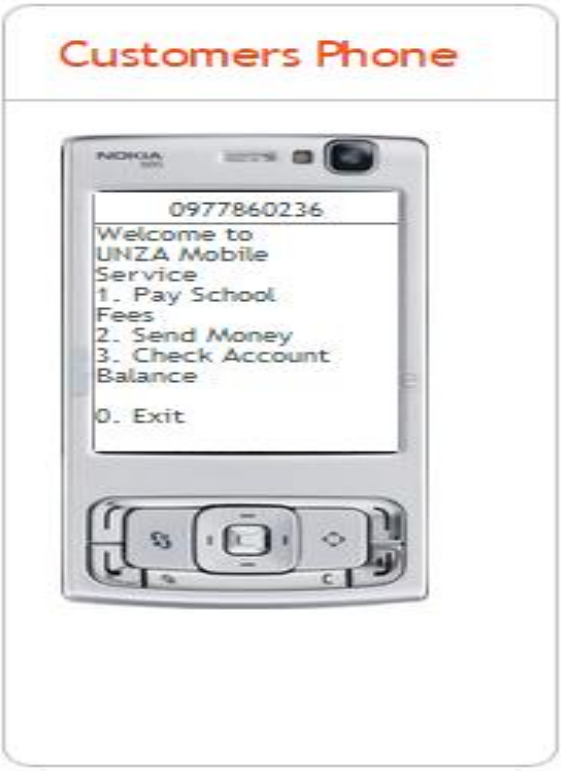


Figure 160: Welcome profile on mobile phone user

3. Step number three

In an event that the user decides to click on USSD 2, shown in Figure 160, it will be assumed that the user wants to send money to another registered user. The user will be expected to click USSD session-oriented 2 for them to access the send money transaction. The user will be expected by the user to enter the mobile phone of the recipient and the amount that they need to send. Assumingly, the recipient has a mobile phone number such as; 0977881391, the system is

supposed to indicate where the money was remitted to after the transaction is made. See Figure 161 for illustration.

Figure 161: User's profile after transaction is made

CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.1 Introduction

In this chapter, the discussion of the results that were shown in Chapter Four is presented. The results to be discussed are in the baseline study with reference to objective one and objective two of the study. Moreover, this section includes conclusion of the study, recommendations of the study and future works.

5.1.1 Baseline Study

The higher education institutions in Zambia have been experiencing unprecedented enrolment rates from time immemorial. Despite, the ever increasing enrolment rates, the higher education institutions have continued relying on the traditional formal bank systems for all student payments. Students' reliance on few recommended banks for remittance of all tuition and non-tuition fees has several challenges which negatively impacts on students.

In order to overcome challenges that students face in the current payment system between banks and higher education institutions, a baseline study was conducted to establish the specific challenges faced by students in higher education institutions. The challenges were identified through a research conducted on students, accounts personnel and general users and analyses of survey results were done.

This section discusses the results derived from baseline study. The main challenges deduced from the primary research are discussed in the following sections with references to Figures and Tables in Chapter four.

5.1.2 Major challenges of students, general users and accounts personnel

Student, general user and accounts personnel respondents face several challenges in the existing bank system (See Figures 97, 69 and 145 for illustrations).

All student respondents indicated that they deposit tuition and non-tuition fees in few recommended commercial banks. However, the mode of allowing students to be depositing tuition and non-tuition fees in few recommended banks has contributed to the challenges reported by students, general users and accounts personnel in higher education institutions. As such, majority student respondents stated that digital financial services are efficient and transparent as opposed to relying solely on traditional banks which cannot easily be rolled out to the low income people and poor communities. In this vein, [4] concurs by stating that DFS have safety and security, speed and transparency, increased flexibility, savings incentives and credit histories which conveniently benefit the users. As a result, DFS can complement commercial banks in bank service provision as stated in the study.

The current business process between higher education institutions and recommended commercial banks is inconveniency to the students because of the tedious and cumbersome processes as stated by users (see Figure 97). Figure 97 findings agree with the majority (33.85%) who stated that the time spent to deposit tuition and non-tuition fees in the bank is unbearable. As a matter of fact, the challenges that students experience in the existing payment system are as a result of banks not being evenly distributed in rural and urban areas as indicated in the study. As a matter of fact, recommended banks for students' remittance of tuition and non-tuition fees are few as stated in Figure 139. Figure 139 agrees with the findings on [5] who postulate that commercial banks are subjected to barriers like: inflexible documentation requirements, limited infrastructure, costly operations and travel distances. In this context, it is difficult to roll out banks evenly because they involve brick and mortar which is relatively expensive as opposed to rolling out kiosks or booths.

As an illustration, documentation requirements by banks hinder many people from opening bank accounts as stated by 35.38% student respondents in the study. In this vein [5] concurs with this statement by indicating that bank barriers contribute to financial exclusion for adults as shown in Figure 57 which shows 35% of the general user respondents without bank accounts. As such, it is important to integrate DFS in the existing payment system as indicated by all the respondents in the study.

In fact, digital financial services are easier to be rolled out in poor communities for the benefit of the unbanked and low income people like students. Additionally, the majority 40% of the

student respondents indicated that banks have limited infrastructure and students travel long distances for them to make deposits. Digital financial services need booths that can easily be rolled out within the institutional location or outside the location of the institution.

Subsequently, the majority 40% of the student respondents indicated that the existing banking system is time consuming. On the contrary, digital financial services are convenient because users are able to pervade various transactions by means of their mobile phones. Students at times spend a lot of time to deposit small amounts for students identity, library fees etc. The digital financial services are able transact efficiently and low income people and the unbanked have used this platform which is very pivotal for poverty reduction.

Moreover, the digital financial services are able to integrate the unbanked into the formal banking system which helps money to be in circulation. Likewise, digital financial services contribute to the economic well-being of any country. As such, the sub-Saharan have been leader in mobile money services in order to reduce financial exclusion among the adults.

General users are faced with several challenges in the existing banking system. Recommended banks are not within accessible areas as indicated in the study. As a result, these users are forced to travel long distances in some cases in order to access the recommended banks and this adversely impacts on users.

Accounts personnel in higher education institutions are faced with a number of challenges in the existing bank system (see Figure 145). There is a gap between the existing banking systems with higher education institutions that has negatively impacted on real time information for the accounts personnel. The accounts personnel are given lump sum statements without student particulars for the paid up students. The accounts personnel only have access to paid-up students when students exchange bank receipts for manual institutional receipts. On the contrary, digital financial services provide real time information by means of USSD which is beneficial to users. Digital financial services through the usage of mobile money services can be customized to mitigate the challenges of real time information prevalent in higher education institutions of Zambia.

5.2.1 Baseline study – Digital financial services

The digital financial services have been used in many countries in integrate the financial excluded. These platforms help the financially excluded individuals to carry out formal transactions even when people have no bank accounts.

Digital financial services have proven to be convenient to many users and most of the services that the users are supposed to access can be integrated within the DFS.

This section discusses the results derived from baseline study in relation to mobile phone ownership, mobile phone applications and use of digital financial services. The discussion will be premised on general user respondents and student respondents.

5.2.2 Digital financial services – General users

The study revealed that all the general user respondents had mobile phones. The majority (85%) had smartphones as opposed to feature phone. As a matter of fact, the majority (75%) users are conversant with mobile phone applications as stated in the study.

Additionally, 90% of the general user respondents stated that they have used digital financial services. In this vein, [7] concurs with the research finding by stating that the sub-Saharan Africa have been leader in the uptake of DFS. One point to remember is that, the majority 90% of the general user respondents send money to their relatives, children and friends through digital financial services.

Conversely, 75% of the general user respondents indicated that digital financial services are safe and secure. In this context, [4] agrees with the research findings while 65% of the general user respondents had also stated digital financial services are efficient and transparent.

Digital financial services offer increased flexibility as indicated by 70% of the general user respondents. As such, the majority general user respondents allude to the fact that digital financial services offer saving incentives. In this context, [6] agrees with the research finding by stating that DFS reduce poverty and have been tools that are used for financial inclusion.

Digital financial services can complement commercial banks as stated by the majority general user respondents. As a result, DFS are used by the banked and unbanked individuals to carry out convenient services to the users. In fact, DFS pervade different types of transactions which are exclusive of merely sending and receiving money by users.

5.2.3 Digital financial services – Student users

The study revealed that majority of the students had mobile phones as indicated in the study. One point to remember is that 92.31% of the student respondents are conversant with the mobile phone applications on their mobile phones as shown in the study. In fact, 89.23% of the student respondents said that they have used DFS.

The majority student respondents indicated that DFS are safe and secure with concurs with the research findings for general users. Digital financial services are efficient and transparent as mentioned by 60% of the student respondents which concur with the research findings for general user respondents.

The majority student respondents said DFS offer increased flexibility which agrees with the research findings for general user respondents as stated in the study. DFS also offer saving incentives as for both banked and unbanked which agrees with the findings for the general user respondents.

DFS give credit histories as indicated by the majority student respondents the study allude to the fact that DFS can integrity the unbanked as mentioned by the majority student respondents.

The majority student respondents (87.69%) stressed the need for the optional payment system as shown in the study. Moreover, 81.54% of the student respondents stated that digital financial services can complement banks as mentioned in the study. In this context, the research findings agree with the general user respondents results.

5.3 Conclusion

The aim of the study was to assess the major challenges in the existing bank payment systems with Zambia's higher education institutions. As such, the challenges identified were used to develop a mobile cellular service application in order to mitigate the identified drawbacks. All the objectives of the study were achieved. Based on the objectives for the study, the following conclusions were arrived at: student, general user and accounts personnel respondents face diverse challenges in the existing bank payment system. The result findings from the baseline study with student, general user and accounts personnel respondents were used to design an optional payment system model. The models are a blueprint for formation of the system prototype development which is already completed. Even though, the initial cost of implementing an optional payment system for higher education institutions might be costly, however, the benefits in the long run will be worth the initial cost. The mobile phone application will bring convenience to users, provide real time information to principal users and the system will generate income for the system host.

5.4 Recommendations

The following are the recommendations to improve the existing payment system between banks and higher education institutions in Zambia.

a) An optional mobile phone application payment system for higher education institutions to be introduced
b) Mobile phone application payment system to complement formal banking systems in higher education institutions.

5.5 Future works

Further development of the system prototype to a fully-fledged mobile phone application system to be carried out. The current prototype is but a simple system showing proof of the concept for the mobile phone application system for higher education institutions. The fully-fledged system will make use of mobile services operator gateways and will have all the modules shown in Figure 24.

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APPENDICES

A. Appendix: Questionnaire for General user

Questionnaire for General Users

Instructions

1. Answer all questions.
2. Mark ☒ in the appropriate checkbox.
3. Circle on the response that characterizes how you feel.
4. Write answers for the other questions in the spaces provided.

Section A: Basic background information

1. What is your sex?
   - ☐ Male
   - ☐ Female

2. What is your age group?
   - ☐ 17 – 27
   - ☐ 28 – 38
   - ☐ 39 – 49
   - ☐ 50 years and above

3. What is your marital status?
   - ☐ Single
   - ☐ Married
   - ☐ Divorced
   - ☐ Widowed

Section B: General Information

4. Where do you stay?
   - ☐ Lusaka - Low density (e.g. Kabulonga, Roma, Avondale etc)
   - ☐ Lusaka – High density (e.g. Garden, Mandevu, Chawama etc)
   - ☐ Non-Lusaka urban (e.g. Kitwe, Livingstone, Ndola etc)
   - ☐ Non-Lusaka district (e.g. Kaoma, Chongwe, Rufunsa)

☐ Rural

5. What is your current highest qualification attained?
   - ☐ Grade 12 Certificate
   - ☐ Certificate
   - ☐ Diploma
   - ☐ Degree
   - ☐ Master's degree
   - ☐ PhD

Section C: Banks and business processes

6. Do you have a bank account?
   - ☐ YES
   - ☐ NO
7. Which one is your bank?
   - ☐ Barclays
   - ☐ Standard Chartered
   - ☐ Stanbic
   - ☐ Zambia National Commercial Bank
   - ☐ Investrust
   - ☐ Finance Bank/BancABC
   - ☐ Indo-Zambia
   - ☐ Ecobank
   - ☐ Other (State)

   _____
8. What do you use your bank account for?
   - ☐ Saving money
   - ☐ Receiving or sending money to friends or relatives
   - ☐ Cashing check deposits
   - ☐ Receiving your income
   - ☐ All of the above
9. For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree

1. Documentation requirements by banks hinder many people to open bank accounts	1	2	3	4	5
2. Owning a bank account is very costly	1	2	3	4	5
3. Banks have limited infrastructure to attract more customers	1	2	3	4	5
4. Banks are not evenly distributed in rural and urban areas	1	2	3	4	5

10. Please state some of the major challenges related with payment of tuition fees and other fees (e.g. for your children, guardians, relatives and friends) in the current banking system.

_____

_____

_____

11. Paying tuition fees and other fees is mandatory; as such institutions have made arrangements with some of the identified banks (i.e. recommended banks) for remittance of fees. For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree

1. Recommended banks are within accessible areas	1	2	3	4	5
2. You have to travel a long distance to access a recommended bank	1	2	3	4	5
3. Recommended banks have limited infrastructure	1	2	3	4	5
4. Time spent to deposit fees in the bank is less	1	2	3	4	5
5. Time spent to deposit fees in the bank is unbearable	1	2	3	4	5

Section C: Mobile phones and applications

12. Do you have a mobile phone?
    - ☐ YES
    - ☐ NO

13. What type of mobile phone do you have?
    - ☐ Smartphone (i.e. with access to internet)
    - ☐ Feature phone (i.e. without access to internet)

14. Are you conversant with the mobile phone applications on your mobile phone (e.g. WhatsApp, Facebook etc.)?
    - ☐ YES
    - ☐ NO

15. Have you ever heard of mobile phone applications for sending or receiving money?

☐ YES
☐ NO

16. Did you at any time send or receive money by means of mobile phone payment system (i.e. digital financial services e.g. Zoona, MTN mobile money, Airtel mobile money, Swift cash etc.)
    ☐ YES
    ☐ NO

17. Which mobile phone payment system (i.e. Digital Financial Services) do you currently rate highly in terms of service delivery (i.e. sending or receiving money) in Zambia?
    ☐ Western Union
    ☐ Shoprite money transfer
    ☐ Airtel money
    ☐ Zanaco Xapit
    ☐ Swiftcash
    ☐ MTN money
    ☐ Zoona
    ☐ FNB e-Wallet
    ☐ Other (state)
    _____

18. How do you send money to your relatives/children/friends in your area?
    ☐ Through the bank
    ☐ Through digital financial services like the ones stated in question 17
    ☐ Other (state)
    _____

19. State one digital financial service (i.e. mobile phone payment system) which is rated low in terms of service delivery in Zambia among the mentioned payment systems in question 17?

    _____

20. For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree

1. Digital financial services are safe and secure to use	1	2	3	4	5
2. Digital financial services are efficient and transparent	1	2	3	4	5
3. Digital financial services offer increased flexibility	1	2	3	4	5
4. Digital financial services offer saving incentives	1	2	3	4	5
5. Digital financial services give credit histories (i.e. able to trace history of a transaction)	1	2	3	4	5
6. Digital financial services are important for integrating the unbanked (i.e. people without bank accounts)	1	2	3	4	5

Section D: Recommendations

21. Do you think digital financial services can complement banks as an optional payment system for payment of student fees in your area?

☐ YES

☐ NO

22. Give any suggestions that need to be implemented to improve mobile money services

_____

THANK YOU FOR YOUR PARTICIPATION

B. Appendix: Questionnaire for Students in higher education institutions

Questionnaire for Students in Higher Learning Education Institutions of Zambia

Instructions

1. Answer all questions.
2. Mark ☒ in the appropriate checkbox.
3. Circle on the response that characterizes how you feel.
4. Write answers for the other questions in the spaces provided.

Section A: Basic background information

1. What is your sex?
   - ☐ Male
   - ☐ Female
2. What is your age group?
   - ☐ 17 – 27
   - ☐ 28 – 38
   - ☐ 39 – 49
   - ☐ 50 years and above
3. What is your marital status?
   - ☐ Single
   - ☐ Married
   - ☐ Divorced
   - ☐ Widowed

Section B: General Information

4. State the name of your institution_____

5. What is your current highest qualification attained?
   - ☐ Grade 12 Certificate
   - ☐ Certificate
   - ☐ Diploma
   - ☐ Degree
   - ☐ Bachelor Honors' degree
   - ☐ Postgraduate Diploma
   - ☐ Master's degree
6. Please state what you are currently studying?
   - ☐ Certificate
   - ☐ Diploma

☐ Degree
☐ Postgraduate Diploma
☐ Master's degree
☐ PhD

7. Indicate the sponsor of your study program.
   ☐ Self-sponsored
   ☐ GRZ sponsored
   ☐ Other (state) _____

Section C: Banks and business processes

8. Do you have a bank account?
   ☐ YES
   ☐ NO
9. Which one is your bank?
   ☐ Barclays
   ☐ Standard Chartered
   ☐ Stanbic
   ☐ Zambia National Commercial Bank
   ☐ Investrust
   ☐ Finance Bank/BancABC
   ☐ Indo-Zambia
   ☐ Ecobank
   ☐ Other (specify)
   _____
10. What do you use your bank account for?
   ☐ Saving money
   ☐ Receiving or sending money to friends or relatives
   ☐ Cashing check deposits
   ☐ Receiving your income
   ☐ All of the above

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
11. Documentation requirements by banks	1	2	3	4	5

hinder many people from opening bank accounts					
12. Owning a bank account is very costly	1	2	3	4	5
13. Banks have limited infrastructure to attract more customers	1	2	3	4	5
14. Banks are not evenly distributed in rural and urban areas	1	2	3	4	5

15. How do you pay your tuition or other fees in your institution?
    - ☐ Bank…….. (Name the Bank_____)
    - ☐ Cash, through the accounts department for the institution
    - ☐ VISA/Debit Card
    - ☐ Other (specify)

    _____

16. If payment of tuition or other fees is not by cash, how long does it take you to get feedback from the bank that your institution has received payment?
    - ☐ 1 - 24 hours
    - ☐ 1 - 6 days
    - ☐ 1 - 2 weeks
    - ☐ Other (specify)

    _____

17. What type of form/document are you supposed to use when depositing money for your institution in the bank?
    - ☐ Students' bill muster
    - ☐ General deposit slip
    - ☐ Other (specify)

    _____

18. Apart from tuition and other fees how else do you pay for other services like: Meals at the dining hall, Institution bookshop, penalty fees (e.g. for breaking a window, library fees and fees related to spoiling equipment in your institution etc.)
    - ☐ Bank
    - ☐ Institution accounts office
    - ☐ Other (specify)

    _____

19. Please state some of the major challenges related with payment of tuition fees and other fees in the current payment system.

_____

_____

_____

_____

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
20. Recommended banks are within accessible areas	1	2	3	4	5
21. You have to travel a long distance to access a recommended bank	1	2	3	4	5
22. Recommended banks have limited infrastructure	1	2	3	4	5
23. Time spent to deposit fees in the bank is less	1	2	3	4	5
24. Time spent to deposit fees in the bank is unbearable	1	2	3	4	5

Section C: Mobile phones/Mobile money services and applications

25. Do you have a mobile phone?

☐ YES

☐ NO

26. What type of mobile phone do you have?

☐ Smartphone (i.e. with access to internet)

☐ Feature phone (i.e. without access to internet)

27. Are you conversant with the mobile phone applications on your mobile phone (e.g. WhatsApp, Facebook etc.)?

☐ YES

☐ NO

28. Have you ever heard of mobile phone applications for sending or receiving money?

☐ YES

☐ NO

29. Did you at any time send or receive money by means of mobile phone payment system (i.e. digital financial services e.g. Zoona, MTN mobile money, Airtel mobile money, Swift cash etc.)

☐ YES

☐ NO

30. Which mobile phone payment system (i.e. digital financial services) do you currently rate highly in terms of service delivery in Zambia?

☐ Western Union

☐ Shoprite money transfer

☐ Airtel money

☐ Zanaco Xapit

☐ Swiftcash

☐ MTN money

☐ Zoona

☐ FNB e-Wallet

☐ Other (state)

_____

31. State one digital financial service (i.e. mobile phone payment system) which is rated low in terms of service delivery in Zambia among the mentioned payment systems in question 23?

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree and **DFS** means Digital financial services (i.e. mobile payment systems).

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
32. DFS are safe and secure to use	1	2	3	4	5
33. DFS are efficient	1	2	3	4	5

and transparent					
34. DFS offer increased flexibility	1	2	3	4	5
35. DFS offer saving incentives	1	2	3	4	5
36. DFS give credit histories (i.e. able to trace history of a transaction)	1	2	3	4	5
37. DFS are important for integrating the unbanked (i.e. people without bank accounts)	1	2	3	4	5

Section D: Recommendations

38. Is having an optional payment system for your institutions, one way of mitigating some of the challenges experienced through remittance of money in banks?

☐ YES
☐ NO

39. Do you think digital financial services can complement banks as an optional payment system for payment of student fees?

☐ YES
☐ NO

THANK YOU FOR YOUR PARTICIPATION

C. Appendix: Questionnaire for commercial banks

Questionnaire for Commercial Banks

Instructions

1. Answer all questions.
2. Mark ☒ in the appropriate checkbox.
3. Circle on the response that characterizes how you feel.
4. Write answers for the other questions in the spaces provided.

Section A: Basic background information

1. What is your sex?
   - ☐ Male
   - ☐ Female
2. What is your age group?
   - ☐ 17 – 27
   - ☐ 28 – 38
   - ☐ 39 – 49
   - ☐ 50 years and above

3. What is your marital status?
   - ☐ Single
   - ☐ Married
   - ☐ Divorced
   - ☐ Widowed

Section B: General Information

4. State the name of your institution_____

5. What is your current highest qualification attained?
   - ☐ Grade 12 Certificate
   - ☐ Certificate
   - ☐ Diploma
   - ☐ Degree
   - ☐ Bachelor Honors' degree
   - ☐ Postgraduate Diploma

☐ Master's degree
☐ PhD

Section C: Banks and their business processes

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
6. Documentation requirements by banks do not hinder many people to open bank accounts	1	2	3	4	5
7. Owning a bank account is not costly	1	2	3	4	5
8. Banks have limited infrastructure to attract more customers	1	2	3	4	5
9. Banks are evenly distributed in rural and urban areas	1	2	3	4	5

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor	Agree	Strongly Agree

					Disagree
10. Many adults in Zambia have bank accounts	1	2	3	4	5
11. The majority of adults have no bank accounts in Zambia	1	2	3	4	5
12. Banks have managed to attract the low income earners	1	2	3	4	5
13. Time spent to deposit fees in the bank is less	1	2	3	4	5
14. Time spent to deposit fees in the bank is unbearable	1	2	3	4	5

Section C: Mobile phone payment systems

15. Do you have a mobile phone service/on-line bank payment system?
    - ☐ YES
    - ☐ NO

16. If yes, has the mobile phone service/on-line bank payment system attracted more unbanked customers in your bank?
    - ☐ YES
    - ☐ NO

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
17. Digital financial services are safe and secure to use	1	2	3	4	5
18. Digital financial services are efficient and transparent	1	2	3	4	5
19. Digital financial services offer increased flexibility	1	2	3	4	5
20. Digital financial services offer saving incentives	1	2	3	4	5
21. Digital financial services give credit histories (i.e. able to trace history of a transaction)	1	2	3	4	5
22. Digital financial services are important for integrating the unbanked (i.e. people without bank accounts)	1	2	3	4	5

Section D: Recommendations

23. Is having an optional payment system (e.g. mobile phone payment/on-line banking) one way of attracting unbanked customers in your bank?

☐ YES

☐ NO

24. Do you think digital financial services can complement banks as optional payment systems in order to attract both banked and unbanked customers?

☐ YES

☐ NO

THANK YOU FOR YOUR PARTICIPATION

D. Questionnaire for higher education institutions of Zambia - Students

Questionnaire for Students in Higher Learning Education Institutions of Zambia

Instructions

1. Answer all questions.
2. Mark ☒ in the appropriate checkbox.
3. Circle on the response that characterizes how you feel.
4. Write answers for the other questions in the spaces provided.

Section A: Basic background information

1. What is your sex?
   - ☐ Male
   - ☐ Female
2. What is your age group?
   - ☐ 17 – 27
   - ☐ 28 – 38
   - ☐ 39 – 49
   - ☐ 50 years and above
3. What is your marital status?
   - ☐ Single
   - ☐ Married
   - ☐ Divorced
   - ☐ Widowed

Section B: General Information

4. State the name of your institution_____

5. What is your current highest qualification attained?
   - ☐ Grade 12 Certificate
   - ☐ Certificate
   - ☐ Diploma
   - ☐ Degree
   - ☐ Bachelor Honors' degree
   - ☐ Postgraduate Diploma
   - ☐ Master's degree
6. Please state what you are currently studying?
   - ☐ Certificat
   - ☐ Diploma

☐ Degree
☐ Postgraduate Diploma
☐ Master's degree
☐ PhD

7. Indicate the sponsor of your study program.
   ☐ Self-sponsored
   ☐ GRZ sponsored
   ☐ Other (state) _____

Section C: Banks and business processes

8. Do you have a bank account?
   ☐ YES
   ☐ NO
9. Which one is your bank?
   ☐ Barclays
   ☐ Standard Chartered
   ☐ Stanbic
   ☐ Zambia National Commercial Bank
   ☐ Investrust
   ☐ Finance Bank/BancABC
   ☐ Indo-Zambia
   ☐ Ecobank
   ☐ Other (specify)
   _____
10. What do you use your bank account for?
    ☐ Saving money
    ☐ Receiving or sending money to friends or relatives
    ☐ Cashing check deposits
    ☐ Receiving your income
    ☐ All of the above

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
	1	2	3	4	5

11. Documentation requirements by banks hinder many people from opening bank accounts					
12. Owning a bank account is very costly	1	2	3	4	5
13. Banks have limited infrastructure to attract more customers	1	2	3	4	5
14. Banks are not evenly distributed in rural and urban areas	1	2	3	4	5

15. How do you pay your tuition or other fees in your institution?
    - ☐ Bank…….. (Name the Bank_____)
    - ☐ Cash, through the accounts department for the institution
    - ☐ VISA/Debit Card
    - ☐ Other (specify)

    _____

16. If payment of tuition or other fees is not by cash, how long does it take you to get feedback from the bank that your institution has received payment?
    - ☐ 1 - 24 hours
    - ☐ 1 - 6 days
    - ☐ 1 - 2 weeks
    - ☐ Other (specify)

    _____

17. What type of form/document are you supposed to use when depositing money for your institution in the bank?
    - ☐ Students' bill muster
    - ☐ General deposit slip
    - ☐ Other (specify)

    _____

18. Apart from tuition and other fees how else do you pay for other services like: Meals at the dining hall, Institution bookshop, penalty fees (e.g. for breaking a window, library fees and fees related to spoiling equipment in your institution etc.)

☐ Bank
☐ Institution accounts office
☐ Other (specify)
_____

19. Please state some of the major challenges related with payment of tuition fees and other fees in the current payment system.

_____
_____

_____
_____

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
20. Recommended banks are within accessible areas	1	2	3	4	5
21. You have to travel a long distance to access a recommended bank	1	2	3	4	5
22. Recommended banks have limited infrastructure	1	2	3	4	5
23. Time spent to deposit fees in the bank is less	1	2	3	4	5
24. Time spent to deposit fees in the bank is unbearable	1	2	3	4	5

Section C: Mobile phones/Mobile money services and applications

25. Do you have a mobile phone?
    - ☐ YES
    - ☐ NO
26. What type of mobile phone do you have?
    - ☐ Smartphone (i.e. with access to internet)
    - ☐ Feature phone (i.e. without access to internet)
27. Are you conversant with the mobile phone applications on your mobile phone (e.g. WhatsApp, Facebook etc.)?
    - ☐ YES
    - ☐ NO
28. Have you ever heard of mobile phone applications for sending or receiving money?
    - ☐ YES
    - ☐ NO

29. Did you at any time send or receive money by means of mobile phone payment system (i.e. digital financial services e.g. Zoona, MTN mobile money, Airtel mobile money, Swift cash etc.)
    - ☐ YES
    - ☐ NO
30. Which mobile phone payment system (i.e. digital financial services) do you currently rate highly in terms of service delivery in Zambia?
    - ☐ Western Union
    - ☐ Shoprite money transfer
    - ☐ Airtel money
    - ☐ Zanaco Xapit
    - ☐ Swiftcash
    - ☐ MTN money
    - ☐ Zoona
    - ☐ FNB e-Wallet
    - ☐ Other (state)

    _____
31. State one digital financial service (i.e. mobile phone payment system) which is rated low in terms of service delivery in Zambia among the mentioned payment systems in question 23?

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree and **DFS** means Digital financial services (i.e. mobile payment systems).

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
32. DFS are safe and secure to use	1	2	3	4	5
33. DFS are efficient and transparent	1	2	3	4	5
34. DFS offer increased flexibility	1	2	3	4	5
35. DFS offer saving incentives	1	2	3	4	5
36. DFS give credit histories (i.e. able to trace history of a transaction)	1	2	3	4	5
37. DFS are important for integrating the unbanked (i.e. people without bank accounts)	1	2	3	4	5

Section D: Recommendations

38. Is having an optional payment system for your institutions, one way of mitigating some of the challenges experienced through remittance of money in banks?

☐ YES
☐ NO

39. Do you think digital financial services can complement banks as an optional payment system for payment of student fees?

☐ YES
☐ NO

THANK YOU FOR YOUR PARTICIPATION

E. Appendix: Questionnaire for Higher learning education institutions – Accounts personnel

Questionnaire for Higher Learning Education Institutions of Zambia- Accounts section

Instructions

1. Answer all questions.
2. Mark ☒ in the appropriate checkbox.
3. Circle on the response that characterizes how you feel.
4. Write answers for the other questions in the spaces provided.

Section A: Basic background information

1. What is your sex?
   - ☐ Male
   - ☐ Female

2. What is your age group?
   - ☐ 17 – 27
   - ☐ 28 – 38
   - ☐ 39 – 49
   - ☐ 50 years and above

3. What is your marital status?
   - ☐ Single
   - ☐ Married
   - ☐ Divorced
   - ☐ Widowed

Section B: General Information

4. State the name of your institution_____

5. What is your current highest qualification attained?
   - ☐ Grade 12 Certificate
   - ☐ Certificate
   - ☐ Diploma

☐ Degree
☐ Master's degree
☐ PhD

Section C: Banks and business processes

6. Does the institution have a bank account?
   ☐ YES
   ☐ NO
7. Which one is the recommended institution bank?
   ☐ Barclays
   ☐ Standard Chartered
   ☐ Stanbic
   ☐ Zambia National Commercial Bank
   ☐ Investrust
   ☐ Finance Bank/BancABC
   ☐ Indo-Zambia
   ☐ Ecobank
   ☐ Other (State)

   _____
8. What is the main use of the institution bank account?
   ☐ Saving money
   ☐ Receiving or sending money to friends or relatives
   ☐ Cashing check deposits
   ☐ Receiving your income for employees
   ☐ Receiving tuition and other fees from students
   ☐ All of the above
9. Are there any bank maintenance fees attached to owning an institution bank account?
   ☐ YES
   ☐ NO

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree

10. Bank account maintenance fees are costly	1	2	3	4	5
11. It is easier and cheaper to get records (i.e. bank statements from the bank)	1	2	3	4	5
12. Banks easily make refunds when students have withdrawn from a study program	1	2	3	4	5
13. Recommended Banks are evenly distributed in rural and urban areas	1	2	3	4	5

14. What types of form/documents are used to deposit/withdraw money for your institution in the bank?
    - ☐ Students' bill muster
    - ☐ General deposit slip
    - ☐ Other (state) _____

15. Please state some of the major challenges related with payment of tuition fees and other fees in the current payment system.

    _____

    _____

    _____

    _____

Section C: Mobile phone payment systems and applications

16. Did you at any time send or receive money by means of mobile phone payment system (i.e. digital financial services e.g. Zoona, MTN mobile money, Airtel mobile money, Swift cash etc.)
    - ☐ YES
    - ☐ NO

17. Which mobile phone payment system (i.e. digital financial services) do you currently rate highly in terms of service delivery in Zambia?

☐ Western Union
☐ Shoprite money transfer
☐ Airtel money
☐ Zanaco Xapit
☐ Swiftcash
☐ MTN money
☐ Zoona
☐ FNB e-Wallet
☐ Other (state)

_____

18. State one digital financial service (i.e. mobile phone payment system) which is rated low in terms of service delivery in Zambia among the mentioned payment systems in question 20?

_____
_____

Section D: Recommendations

19. Is having an optional payment system for your institution, one way of mitigating some of the challenges experienced through remittance of money in banks?

☐ YES
☐ NO

20. Do you think digital financial services can complement banks as an optional payment system for institution?

☐ YES
☐ NO

THANK YOU FOR YOUR PARTICIPATION

F. Appendix: Questionnaire for Digital financial services - Agents

Questionnaire for Digital Financial Services – DFS agents

Instructions

1. Answer all questions.
2. Mark ☒ in the appropriate checkbox.
3. Circle on the response that characterizes how you feel.
4. Write answers for the other questions in the spaces provided.

Section A: Basic background information

1. What is your sex?
   - ☐ Male
   - ☐ Female

2. What is your age group?
   - ☐ 17 – 27
   - ☐ 28 – 38
   - ☐ 39 – 49
   - ☐ 50 years and above

3. What is your marital status?
   - ☐ Single
   - ☐ Married
   - ☐ Divorced
   - ☐ Widowed

4. What is your current highest qualification attained?
   - ☐ Grade 12 Certificate
   - ☐ Certificate
   - ☐ Diploma
   - ☐ Degree
   - ☐ Master's degree

Section B: General Information

5. State the name of your digital financial service provider (e.g. MTN mobile money, Zoona, Airtel etc)

_____

6. Which device do you use when carrying out transactions for your clients?
   - ☐ Mobile phone
   - ☐ Computer
   - ☐ Other (state)

_____

7. Among the items listed below which one(s) is the commonest transaction carried out by your clients?
   - ☐ Airtime mobile top up
   - ☐ Sending and receiving money to friends and relatives
   - ☐ Payment of bills (e.g. Water bills, Zesco bills etc)
   - ☐ Saving money
   - ☐ Payment of tuition and other fees
   - ☐ All of the above

   For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
8. Digital financial services are safe and secure to use	1	2	3	4	5
9. Digital financial services are efficient and transparent	1	2	3	4	5
10. Digital financial services offer increased flexibility	1	2	3	4	5
11. Digital financial services offer saving incentives	1	2	3	4	5
12. Digital financial	1	2	3	4	5

services give credit histories (i.e. able to trace history of a transaction)					
13. Digital financial services are important for integrating the unbanked (i.e. no bank account)	1	2	3	4	5

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
14. Documentation requirements to open digital financial services are easier	1	2	3	4	5
15. Digital financial services transactions are cheaper	1	2	3	4	5
16. People spend less time to transact using digital financial services	1	2	3	4	5
17. Digital financial	1	2	3	4	5

services are more convenient than banks					
18. People who are unbanked (i.e. without bank accounts) like using digital financial services to transact	1	2	3	4	5

Section C: Recommendations

19. Do you think more people (i.e. both banked and unbanked) are now using digital financial services to carry out their transactions in Zambia?

☐ YES

☐ NO

20. Have digital financial services complemented banks as optional payment systems in our communities?

☐ YES

☐ NO

THANK YOU FOR YOUR PARTICIPATION

G. Appendix: Questionnaire for Regulators (ZICTA, BOZ, ZABS)

Questionnaire for Regulators

Instructions

1. Answer all questions.
2. Mark ☒ in the appropriate checkbox.
3. Circle on the response that characterizes how you feel.
4. Write answers for the other questions in the spaces provided.

Section A: Basic background information

1. What is your sex?
   - ☐ Male
   - ☐ Female

2. What is your age group?
   - ☐ 17 – 27
   - ☐ 28 – 38
   - ☐ 39 – 49
   - ☐ 50 years and above

3. What is your marital status?
   - ☐ Single
   - ☐ Married
   - ☐ Divorced
   - ☐ Widowed

Section B: General Information

4. State the name of your institution_____

5. What is your current highest qualification attained?
   - ☐ Grade 12 Certificate
   - ☐ Certificate
   - ☐ Diploma
   - ☐ Degree
   - ☐ Bachelor Honors' degree

☐ Postgraduate Diploma
☐ Master's degree
☐ PhD

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
6. Mobile Network Operators, Banks and third parties found in the private sector are allowed to open digital financial services in Zambia	1	2	3	4	5
7. Regulation for digital financial services in Zambia is open-market	1	2	3	4	5
8. Banks, Mobile Network Operators (MNOs) and the private sector in Zambia do not need partnership agreements (e.g. Banks with MNOs) to set up digital financial services	1	2	3	4	5
9. Digital financial services are a driver of financial inclusion for the low income earners and the	1	2	3	4	5

unbanked in many nations					
10. Open-market regulation enhance digital financial services in any country	1	2	3	4	5
11. Digital financial services are growing at the faster rate in addressing the business gap left by banks by integrating the financially excluded people	1	2	3	4	5

12. Of all the digital financial services found in Zambia which one has the highest coverage in both rural and urban areas?

- ☐ Western Union
- ☐ Shoprite money transfer
- ☐ Airtel money
- ☐ Zanaco Xapit
- ☐ Swiftcash
- ☐ MTN money
- ☐ Zoona
- ☐ FNB e-Wallet
- ☐ Other (state)

_____

13. State one digital financial service (i.e. mobile phone payment system) which is rated low in terms of service delivery in Zambia among the mentioned payment systems in question 7?

_____

For each of the questions below, circle on the response that best characterizes how you feel about the statement, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree and 5 = Strongly Agree.

	Strongly	Disagree	Neither	Agree	Strongly

	Disagree		Agree Nor Disagree		Agree
14. Digital financial services are safe and secure to use	1	2	3	4	5
15. Digital financial services are efficient and transparent	1	2	3	4	5
16. Digital financial services offer increased flexibility	1	2	3	4	5
17. Digital financial services offer saving incentives	1	2	3	4	5
18. Digital financial services give credit histories (i.e. able to trace history of a transaction)	1	2	3	4	5

Section D: Recommendations

19. Is having an optional payment system for institutions, one way of integrating the unbanked adults in any country?

☐ YES
☐ NO

20. Do you think digital financial services can complement banks as an optional payment system for payment of fees in our communities?

☐ YES
☐ NO

THANK YOU FOR YOUR PARTICIPATION

LIST OF PUBLICATIONS

[ICICT2017] Your paper #1570392789 ('Digital Financial Services (DFS) as an alternative payment solution for higher education Institutions in Developing Countries') Inbox x

jackson.phiri@cs.unza.zm via edas.info 16 Aug (12 days ago)

to me, kalezhi, jameson.mbale, dkunda

Dear Mr. Clarence Mulundano:

Congratulations - your paper #1570392789 ('Digital Financial Services (DFS) as an alternative payment solution for higher education Institutions in Developing Countries') for ICICT2017 has been **accepted** and will be presented in the session titled _.

The reviews are below or can be found at http://edas.info/showPaper.php?m=1570392789. Please revise your paper and address all the comments as indicated by the reviewers before upload the final camera ready copy. The Full paper is limited to 6 pages only while student abstract is limited to a single page of not more than 500 words

ACCEPTANCE LETTER

Dear Clarence Mulundano , Dr. Jackson Phiri

Congratulations! I am pleased to announce that your paper, **Digital financial services as an alternative payment system for Higher Institutions of Learning in Zambia**, has been accepted by the International Journal of Advancements in Computing Technology (ISSN: 2005-8039). You may check your paper's status by clicking "My Page" button in IJACT. http://www.globalcis.org/ijact

Mission and Aims of IJACT:

Our mission is to publish outstanding research results of researchers from all around the world in order to exchange knowledge and experiences, present new ideas. We believe that global nature of our journal, active participation of most prominent authors and cutting edge ideas will create a stimulating atmosphere for further active development of Multidisciplinary and Hybrid/Convergent research in the areas of Advancements in Computing Technologies.

We believe that developments in the fields of Advancements in Computing Technologies directly influences development of Multidisciplinary and Hybrid/Convergent research. Thus, by publishing this journal we see our mission in enabling further considerable advancements in the fields of Multidisciplinary and Hybrid/Convergent research.

Our aim is to gather and share innovative ideas, precious knowledge and unique experiences for mutual benefit of researchers and explore possible prospects for development of Multidisciplinary and Hybrid/Convergent research in the areas of Advancements in Computing Technologies.

Date : 2017-11-14

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