

**The potential for mobile money services to promote  
financial inclusion among rural farmers in Manica  
Province, Mozambique**

**Berno Verwey**

# **The potential for mobile money services to promote financial inclusion among rural farmers in Manica Province, Mozambique**

by

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Submitted in partial fulfilment for the degree of

MCom Agricultural Economics

in the

Department of Agricultural Economics, Extension and Rural Development

Faculty of Natural and Agricultural Sciences

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Supervisor: Dr André Van der Vyver

April 2018

## **DECLARATION**

I hereby declare that the dissertation titled “The potential of mobile money services to promote financial inclusion among rural farmers in Manica Province, Mozambique” which I submit for the partial fulfilment of the degree MCom Agricultural Economics at the University of Pretoria is my own work and as not been submitted for a degree at any other tertiary institution.

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Signature

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Date

## **DEDICATION**

The completion of this dissertation marks the accomplishment of a milestone which I previously did not think was attainable by me. For this, all thanks must be to the Almighty God who has enabled me to attain all my life accomplishments and has continually put me in positions where such accomplishments are possible.

*You let me rest in fields of green grass and lead me to streams of peaceful water.*

## **ACKNOWLEDGEMENTS**

To all of my family members, friends and fellow students who have played a role in moulding me into the person I am today, I thank you.

There are, however, a few individuals who I would like to thank individually:

Firstly, I would like to thank Emma for her unconditional support, love and understanding. You have instilled in me a self-belief that I cannot thank you for enough. Thank you for your constant prayers and motivation. I am so unbelievably privileged to have you in my life.

To my parents, Johan and Maryna, thank you for providing me with the best of opportunities, always. You have demonstrated to me that hard work along with the utmost integrity delivers the best returns. I can only hope to adopt a similar attitude throughout my life. Thank you for your continued support, love and sacrifices.

To my brother, Johan, you have been a crucial part of my personal and academic development. Thank you for sharing your knowledge with me during my times of need – you are a machine.

Lastly, I would like to thank my supervisor, Dr André Van der Vyver, for providing me with the opportunity to conduct this study. Without you, this would most certainly not have been possible.

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## **ABSTRACT**

The lack of financial inclusion among rural, smallholder farmers in the developing world remains widespread, and particular so in sub-Saharan Africa, where as little as four percent of the population have access to a personal bank account. In most cases, banking institutions primarily focus their financing operations on commercial farming operations, despite the fact that the majority of the population is involved in smallholder farming operations. As a result, these “unbanked” smallholder farmers lack the ability to grow their farming operations, which prevents these economies from obtaining sufficient growth. The inability of traditional financial services to address smallholder farmers’ needs stems from, amongst other reasons, the remoteness of such farmer operations, which is associated with substantially high transaction costs and per-client operational costs. Moreover, rural farmers typically lack sufficient collateral, making such financing unfeasible from a financial institution perspective. Nonetheless, there does exist great potential to reverse such low productivity trends through the provision of services which can adequately serve these unbanked smallholder farmers. Such services should address aspects of extension services, marketing services and specifically financial services.

Such services which are suitable for attempting to service rural farmers must take into account the ubiquitous nature of mobile phone technology in sub-Saharan Africa. While most individuals who are involved in smallholder agriculture lack access to a personal bank account, the opposite is true regarding the utilisation of mobile phones. It is this mobile platform which presents the greatest opportunity to increase the proportion of the smallholder farmer population which finds benefit from financial services. There are success stories from numerous developing countries which have aggressively pursued mobile

money services, which are aimed at servicing the unbanked proportion of the population, as an avenue to increase financial inclusion for its people – Kenya’s M-Pesa being the most notable example. While lessons can be learnt from the M-Pesa model in Kenya, the potential for such a service must be evaluated in Mozambique where a mere four percent of farmers have access to formal financial services.

In order to evaluate the potential of mobile money services in Mozambique, a sample population was selected in the province of Manica, in central Mozambique. This sample population was surveyed with the intent to establish:

- i. The extent to which farmers are included in the formal financial sector.
- ii. Whether rural farmers in Mozambique have in fact adopted mobile technology services to the same extent as most of its sub-Saharan counterparts, and the extent to which rural farmers are willing to utilise such technology in order to enhance their levels of financial inclusion.
- iii. If farmers are willing and able to adopt mobile money services, where the farmers see that they could benefit the most from such services. Do farmers have enough knowledge on such services to encourage the adoption of such services? If not, what kind of farmer training is needed on the concepts of mobile money services?

The survey did indicate that Mozambique has followed a similar path to much of its sub-Saharan African counterparts with respect to mobile phone technology adoption, with most farmers owning a mobile phone. Furthermore, the survey established that there is a lack of financial inclusion among rural farmers which emphasises the need for alternative methods of financial services provision. The survey respondents indicated that they are aware of mobile money services; however, they lack sufficient knowledge on such services, which deters the respondents from adopting such services. While the majority of the rural farmers who took part in the survey indicated that they do not currently utilise a mobile money service, the farmers that are making use of such services have come to terms with the various benefits that mobile money services present, as much of these respondents utilise their mobile money service on a frequent basis in order to execute financial transactions.

In order to enhance the adoption of mobile money services, a structured introductory and roll-out process is required whereby rural farmers are introduced to mobile money services and their various benefits and functionalities. Given the general lack of knowledge on mobile money services among rural farmers, and in line with the results obtained from the survey, a structured training regime is necessary to overcome such knowledge deficiencies. In order to train rural farmers, a training manual

is needed which addresses the various knowledge gaps identified by the survey, while simultaneously demonstrating the various benefits of such services, as well as how basic mobile money transactions can be executed. Such areas of farmer training are likely to promote the adoption of mobile money services, bringing rural farmers closer to the formal financial system and allowing such farmers to transact in a way previously not possible.

**Key concepts:** Financial inclusion, unbanked, rural farmers, traditional formal financial services, mobile technology, mobile money, training.



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## LIST OF ACRONYMS

ATM	Automated Teller Machine
BIM	Banco Internacional de Moçambique
BoM	Bank of Mozambique
BOM	Opportunity Bank of Mozambique (formerly Banco Oportunidade de Moçambique)
CGAP	Consultative Group to Assist the Poor
GDP	Gross Domestic Product
ICT	Information and Communication Technology
MFI	Micro Financial Institution
MM	Mobile Money
MNO	Mobile Network Operator
MZN	Mozambican Metical
NGO	Non-Governmental Organisations
PIN	Personal Identity Number
SIM	Subscriber Identity Module
SMS	Short Messaging Service
SSA	Sub-Saharan Africa
USSD	Unstructured Supplementary Service Data



# CHAPTER 1

## INTRODUCTION

### 1.1 Background

The prosperity of developing economies typically relies on the agricultural sector which, in most cases, lack sufficient access to affordable and useful financial services to meet their needs, such as savings, credit, transactions, payments and insurance (The World Bank, 2018). Agricultural development in much of the developing world is hindered by a myriad of factors, ranging from poor agricultural and development policies to extreme variations in environmental climates. However, one of the most pertinent forces behind this suppression in agricultural development is the fact that many of the developing economies do not provide their people with adequate access to financial services. Often, agricultural production remains a subsistence practice whereby producers limit production to sustaining their households, with limited stocks being available for marketing purposes. The concept of financial inclusion is centred on overcoming the gap between individuals which have access, and are able to effectively utilise financial service, and the estimated two billion adults of working age who cannot adequately access or utilise financial services (Consultative Group to Assist the Poor, 2018). Typically, farmers who have access to financial aid, such as production loans, are able to benefit from larger volumes of production due to their capacity to acquire crucial production and labour inputs. Being more financially independent often also allows rural farmers to have more flexibility with respect to the marketing of their produce, as they are not forced to sell at harvest time, when prices are usually at their lowest, but to wait and sell when prices are high. It is therefore crucial that developing agricultural economies, in this case in Africa, find ways in which the financial inclusion of rural farmers is enhanced.

### 1.2 Problem statement

Many rural farmers are excluded from opportunities to expand and grow their farming operations. One reason is lack of access to financial services, such as much-needed loans. Access to mobile money services would bring financial inclusion to rural farmers, offering them access to funding as well as ease of transacting.

### **1.3 Objective**

The overall objective of this study is to determine what the potentials for mobile money services are in enhancing the financial inclusion of rural farmers, and how such technology should be rolled-out. The secondary objectives to be addressed are:

- i. What is the level of financial inclusion - farmers which have access and utilise either or any combination of formal financial services offered by financial or technology institutions, among rural farmers?
- ii. Are there any mobile technology platforms or services which could enhance the financial inclusion of farmers? What are the limitations to these platforms or services?
- iii. To what extent are rural farmers familiar with such services?
- iv. If farmers are introduced to such services, what is the process to be followed? What training is required?

### **1.4 Hypothesis**

Mobile money platforms have the potential to greatly enhance the reach of financial services with respect to rural farmers, if rolled-out and introduced to these farmers in a well-structured and planned process.

### **1.5 Study Outline**

The study commences with a literature review that aims to provide a background on the adoption of Information and Communication Technology (ICT) in sub-Saharan Africa (SSA) and how this relates to the rates of financial inclusion among rural farmers. Additionally, the potential of mobile money services, as well as the manner in which the adoption thereof could enhance the financial inclusion of rural farmers, is examined. The concept of mobile money is scrutinised with the intent of establishing the shortcomings of such services, together with the opportunities which are presented to farmers through the utilisation of such services. This is followed by an overview of the mobile money services available to rural farmers in SSA, and in particular, those in Manica Province, Mozambique. The focus of the study will centre on the analysis of data obtained through the utilisation of a survey questionnaire that was distributed to rural farmers in Manica Province. The survey questionnaire responses are

intended to highlight the adoption (or lack of adoption) of mobile money services among these rural farmer respondents. Moreover, the analysis will indicate the shortcomings and potential of mobile money services, with a focus on the province of Manica. The roll-out and introduction of mobile money services to rural farmers in Manica Province will be evaluated in order to establish how such introductory attempts should ideally be approached.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter sets out to review the literature which relates to the financial inclusion of smallholder farmers in the developing world, and in particular, SSA. The chapter commences with a review of ICT in the developing world and of how such technologies relate and contribute to economic prosperity. With this backdrop, the chapter will review the status of the financial inclusion of rural farmers in the developing world, and Mozambique in particular, and how mobile technology can lead to enhancements in financial inclusion. Finally, the chapter seeks to identify the current mobile money services available to developing communities in selected sub-Saharan African countries, and how such services have aided in financial inclusion.

#### 2.2 Information and Communication Technology (ICT) in Africa

The effective utilisation of knowledge can be attributed to much of the economic growth realised in many developing countries around the world, and in particular, the growth experienced in much of East Asia (Schware *et al.*, 2002). ICTs are described by Kramer, Jenkins and Katz (2007) to have positive externalities in the sense that ICTs increase the productivity and efficiency of markets while also increasing the levels of accessibility of these markets to goods as well as services. In addition to the positive impacts that ICT investments can have on a country's gross domestic product (GDP) and the lowering of barriers to economic growth, Kramer *et al.* (2007) suggest that ICTs remain critical in the enrichment of the knowledge bases of communities, which, in-turn, enables communities to better manage their businesses. ICT use in developing countries<sup>1</sup> has grown exponentially over the past two decades. Cieslikowski *et al.* (2009) note that the proportion of the populations of developing countries who have access to mobile phone subscriptions has grown from 30 percent of the global total in the year 2000 to around 70 percent of the world total in the year 2007. ICTs are defined by Niebal *et al.* (2013) as comprising all technical facilities and equipment<sup>2</sup> which either saves, converts and/or transfers a variety of information sources in a digital form. Ultimately, the fact that the use of ICT, in particular that of mobile telephony, together with associated ICT infrastructure, is increasing rapidly in much of

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<sup>1</sup> Africa, East Asia, South Asia, Western Asia, Latin America and the Caribbean (United Nations, 2014).

<sup>2</sup> Voice telephony, computer, radio, television and other wireless technology.

the developing world, suggests that the knowledge bases and market access of many of these communities can be greatly enhanced.

There is an evident need for the diffusion of knowledge in the developing world, as Schware *et al.* (2002) claim that the lack of growth rates around the world can be attributed to a lack of knowledge, as opposed to the accumulation of physical capital such as capital and labour, which is responsible for less than 30 percent of the global growth rate variations. Furthermore, Schware *et al.* (2002) indicated that the relationship between broad-based development and knowledge has been reinforced by the recent advances in ICTs.

### 2.3 Financial exclusion of rural farmers in sub-Saharan Africa

Africa has been affirmed to be an agricultural-based continent, with approximately 60 percent of the regions labour force being involved in agriculture (African Development Bank, 2017). Despite the high level of agricultural involvement by the continent’s labour force, Kanu *et al.* (2016) have reported that the sector continues to make meagre contributions to the region’s GDP, with contributions ranging between 72 percent of GDP and as low as 2.4 percent of GDP (on a per-country basis), with the average contribution towards GDP standing at a low 15 percent. The primary reasons for this inadequate contribution to the GDPs of the economies under consideration are described by Salami *et al.* (2010) as comprising the lack of technology adoption, a lack of market access, volatile food prices, and a lack of financial inclusion in the form of credit access. In Mozambique, for example, there are an estimated 3.4 million smallholder farmers who contribute 97 percent of the country’s agricultural production (Achicala *et al.*, 2015; CGAP, 2016; CGAP, 2017). The average size of such farmers’ agricultural land is 1.2 hectares, while there is minimal utilisation of fertiliser, pesticides and mechanisation (CGAP, 2016). Ultimately, the productivity of this land remains highly limited – much of this can be attributed to the lack of financial inclusion (credit access) which such farmers are faced with.

**Table 2.1: Agricultural holding size and distribution in Mozambique per hectare (ha)**

	Size of agricultural holding					TOTAL
	< 0.5 ha	0.5 - 1 ha	1-2 ha	2-5 ha	> 5 ha	
<b>Number of farmers</b>	1,439,521	1,009,051	941,007	571,318	53,049	4,013,946
<b>Percentage of total</b>	36%	25%	23%	14%	1%	100%

Source: Adapted from Inquerito Agrario Integrado, cited in Achicala *et al.* (2015, p. 31)

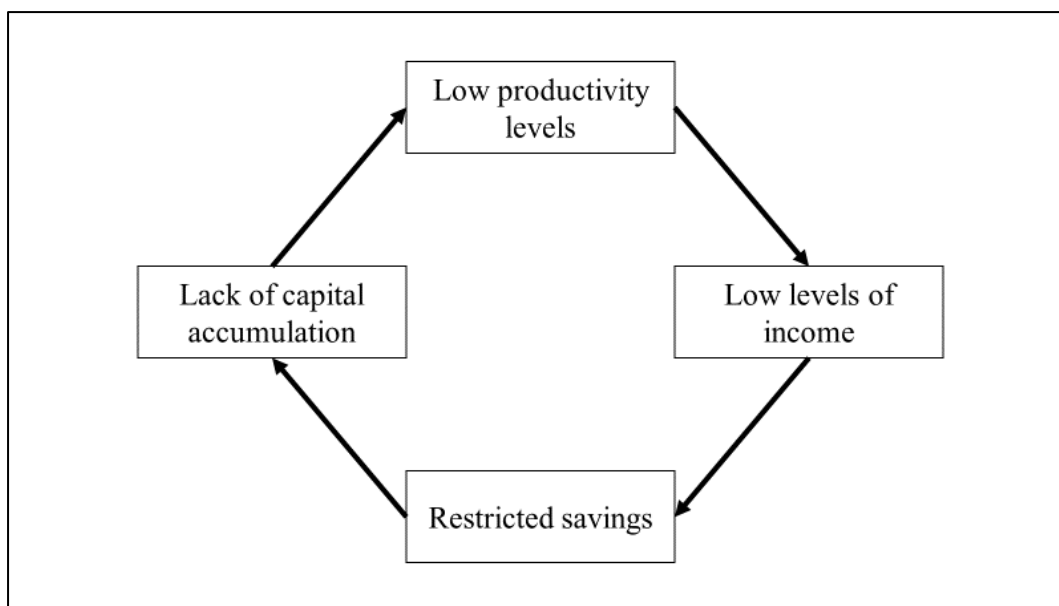
In Africa, Oji (2015) states that banking access ranges between 4 percent and 42 percent in selected countries<sup>3</sup>. Furthermore, only 4.7 percent of adults in the developing world's rural communities have access to a loan (IFC, 2014). The fact the majority of the African population remains “unbanked” ultimately means that the population forgoes any opportunities to accumulate interest on amounts saved, while banking institutions are in a situation where they lose the opportunity to utilise these savings funds to finance surrounding communities (Oji, 2015). In a Kenyan study on the financial inclusion of smallholder farmers<sup>4</sup>, it was revealed by Okech *et al.* (2017) that a common thread exists throughout the study population regarding the reasons why such a large proportion of the population remains unbanked – these include:

- i. The lack verifiable and credible data on rural smallholder farmers and their operations.
- ii. The inability of rural smallholder farmers to provide collateral.
- iii. The fact that the geographical dispersion of such farmers, particularly in rural areas, increases the transaction costs of becoming part of the formal financial system.
- iv. There exists a high risk in agriculture financing, and ultimately financial inclusion. Thus, formal financial institutions remain reluctant to invest in the smallholder agricultural sector where the natural risk of production failure, as well as related market risks, can lead to an entire economic sector being crippled and thus being unable to service debts.

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<sup>3</sup> Kenya, Nigeria, Egypt, Democratic Republic of Congo.

<sup>4</sup> Smallholder farmers being those who manage less than 10 hectares of land, characterised by motives centred on the family household, primarily using family labour in all production, while a large proportion of their produce is utilised for family consumption.



**Figure 2.1: The Vicious Cycle of Poverty**

Source: Vincent (2014)

The fact that the majority of smallholder farmers in SSA lack the necessary access to financial services effectively fuels what Vincent (2004) refers to as the “Vicious Cycle of Poverty” illustrated in Figure 2.1 above. This reflects a scenario where poor individuals typically have an inadequate capacity to invest in capital, which results in their inability to increase productivity and which, in-turn, means that income levels remain restricted and ultimately that savings are restricted. With a lack of savings, these individuals cannot afford to accumulate capital, resulting in economic growth remaining stagnant (Vincent, 2004).

### **2.3.1 Determinants of financial inclusion**

Auma and Mensah (2014) state that limitations to financial inclusion could be divided into two distinct categories, involving both individual attributes and the inherent characteristics of formal financial institutions, which are addressed in Chapter 2.3.1.1 and Chapter 2.3.1.2.

#### **2.3.1.1 Individual attributes**

The rate of financial inclusion, and ultimately credit access, of rural farmers is well documented in the literature to be attributed to factors relating directly to the individual and the individual’s household. These factors include age, gender, the size of the household, the level of education, and the existence of social economic groups (Hananu, Abdul-Hanan & Zakaria, 2015).

In a logistic regression model by Hananu *et al.* (2015) that evaluated household survey data, it was found that gender plays a significant role in financial inclusion, with females being more likely to gain access to credit. This outcome is economically consistent as females are being increasingly targeted over males by credit schemes, which are designed by banking and developmental institutions, due to the fact that females are classified as being previously discriminated against, while they are simultaneously identified as being more credit worthy than their male counterparts (Akudugu, 2012). These results may be in contradiction to previous studies that are likely to have assessed the financial inclusion of females in a more historical sense. In these studies, females have been demonstrated as being discriminated against because their male counterparts were, in most instances, considered as the breadwinners of the household, while discriminatory inheritance traditions allocate land (and associated assets) to the male family members (Agrawal, 2003). As a result, rural female individuals have previously been disproportionately excluded financially, as opposed to rural male individuals, due to differences in land and asset ownership which directly impact on an individual's creditworthiness.

A more mature age of a farmer attempting to gain access to credit has been found to be positively related to the success in gaining access to credit, which suggests that older farmers are considered to be more responsible and may have greater business experience than their younger counterparts do, thus rendering older farmers more credit worthy (Baiyegunhi & Fraser, 2014).

A smaller size of a farmer's household is described by Hananu *et al.* (2015) to have a negative effect on credit access because credit is then utilised to acquire labour, as well as farming inputs. Larger households require a smaller number of labourers as much of the labour can be performed by the household members, thus these households have lower capital requirements. Smaller households are in greater need of capital, as additional labour as well as farming inputs may be required.

According to Toth and Arvai (2001), the degree to which a farmer will access credit increases as the farmer's level of education increases, as more highly educated individuals are expected to have longer planning horizons, which present the farmer with the need for capital.

It is stated by Asante-Addo *et al.* (2016) that individuals who belong to a formal social economic group, such as a village group or association, may have a greater probability of gaining access to credit. This sentiment is shared by Meyer (2015) who indicates that commercial banks in SSA are known to typically provide loans to commercial agribusinesses and, in some cases, to cooperatives and farmer associations. Akudugu (2012) indicates that social economic groups provide a joint guarantee for each other that enables financial institutions to disregard the need for collateral, as the formation of such groups avoids issues relating to moral hazard and adverse selection. Furthermore, an example of the



successes of group lending is described by Armendariz de Aghion and Morduch (2005) in the Grameen Bank group-lending scheme, which was established in 1976 whereby the bank provided group lending to poor borrowers in Bangladesh. Much of the success of this group-lending mechanism is explained by Armendariz de Aghion and Morduch (2005) to be associated with the joint liability aspect of these loan agreements.

### **2.3.1.2 Formal institution characteristics**

The primary institutional characteristic which might deter financial inclusion relates to the cost of credit which the financial institution carries – interest rates (Auma & Mensah, 2014). Shaw (1973) has suggested that a need exists for financial institutions to deregulate interest rates, as well as to relax the formal requirements for individuals and businesses to enter the financial services sector.

### **2.3.2 Financial services available to smallholder farmers**

The financial inclusion of much of the rural, smallholder farmer population in the sub-Saharan African region remains low. However, there are various services available to these farmers, although these services are, in most cases, not easily accessible. Machethe (2004) states that the low productivity trends of smallholder farmers can be reversed if such farmers are provided with adequate support services in the form of marketing, extension and, in particular, financial services.

#### **2.3.2.1 Commercial banks**

The disbursement of agricultural loans by commercial banks in SSA typically represents less than 5 to 10 percent of the commercial portfolios of such banks, with agricultural lending being focussed on commercial agricultural practices and agribusinesses (Meyer, 2015). The financing of smallholder farmers in much of SSA is hindered by the fact that much of the region's smallholder farmers are vastly dispersed across much of the region, and are typically a significant distance away from any major towns or cities with bank branches. This is the typical scenario faced by commercial banks in Mozambique. Hunguana *et al.* (2012) indicated that, at the time of their report, Mozambique had 462 commercial bank branches, of which only 24 percent was directed at servicing rural areas of the country (these bank branches are typically located outside of provincial capitals).

The primary reasons behind the inability of these commercial banks to serve much of the rural and smallholder farmer population are described by Hunguana *et al.* (2012) as:

- i. **High operating costs:** Given the fact that most banking clients are situated in rural areas, these bank branches are faced with the problem of high volumes but, in most cases, low value transactions. Consequently, these bank branches run a high per-client operating cost.
- ii. **Poor infrastructure:** Banks are increasingly reliant on “online” banking systems, while many banks in rural areas lack the necessary ICT infrastructure to utilise these systems to perform services to their clients. Moreover, rural bank branch services are hindered by a low level of road infrastructure, which directly impacts on the cost of moving cash between bank branches with excess cash and bank branches with cash deficits.
- iii. **Human resources shortages:** The movement of educated and skilled labourers from rural to urban areas results in the inability of rural banks to remain resourced with knowledgeable and experienced staff.

**Table 2.2: Mozambican adults per bank branch by rural and urban areas per province (2012)**

Province	Rural areas		Urban areas	
	Number of bank branches	Number of adults per branch	Number of bank branches	Number of adults per branch
Cabo Delgado	6	138,170	7	24,580
Gaza	17	24,190	12	15,470
Inhambane	14	32,440	14	14,480
Manica	7	73,980	16	10,670
Maputo	18	13,040	31	14,630
Nampula	9	177,980	37	19,370
Niassa	5	120,740	5	51,080
Sofala	8	52,870	33	14,330
Tete	10	60,370	18	7,570
Zambezia	10	147,980	10	43,020
<b>TOTAL</b>	<b>104</b>	<b>7,158,970</b>	<b>183</b>	<b>3,196,110</b>
<b>TOTAL POPULATION</b>	<b>19,457,590</b>		<b>9,371,886</b>	

Source: Adapted from FinScope (2012), cited in Hunguana *et al.* (2012, p.36)

### 2.3.2.2 Microfinanciers

Microfinance is described by Nghiem, Coelli and Rao (2007) as being the provision of services related to finance to the poor, in particular. Over the past three decades, the microfinance industry has evolved into an industry catering to about 70 million people, spanning across 40 different countries, with the

primary objective of poverty reduction (Harris, 2005). In Africa, Microfinance Institutions (MFIs) typically include downscaled banks and Non-Governmental Organisations (NGOs) which are aimed at servicing lower-income segments of the market (Kanu *et al.*, 2016). The fact that microfinance acts as a productivity catalyst in most rural, smallholder farmer operations might be a boon to the sub-Saharan economy, if utilised in an efficient manner (Zeller & Meyer, 2002). MFIs in Mozambique have performed relatively poorly due to the fact that the central bank of that country, the Bank of Mozambique (BoM), has instituted stringent microfinance regulations which, for example, require MFIs to provide the BoM with notices of intention of deposit collections 90 days prior to any such collections (Hunguana *et al.*, 2012). Such regulatory measures, which complicate financing transactions, act as a deterrent to achieving increased levels of microfinancing.

### **2.3.2.3 Community-based associations**

In an attempt to overcome collective problems, as well as to drive a strong level of community involvement and commitment, the organisation of community members into rural institutions has been one of the first efforts made by rural individuals in an endeavour to enhance both rural and self-development (Nalere, Yago & Oriel, 2015). To this, Anriquez and Stamoulis (2007) add that the development of smallholder agricultural practices, driven by organised groups, stimulates poverty reduction at an increased rate. Such community-based associations are typically structured in groups of three to five individuals who are jointly liable for the repayment of loans, with loan periods ranging between four and nine months, while interest rates are usually between 3 percent and 4.5 percent per month (Hunguana *et al.*, 2012). Adding to this, Hunguana *et al.* (2012) note that the main constraints to success with respect to such community-based associations include:

- i. **A lack of skilled members:** The ability of members of community-based associations to process large amounts of financial information is highly limited in rural areas. Therefore, once members of such associations start demanding credit, often at the start of the production season, members who are responsible for managing accounts at such periods of high demand may lack the necessary skills to execute such demands adequately.
- ii. **Poor selection of association management:** Often, an individual's status within a community may form the premise in the election and fulfilment of managerial positions within associations. In many cases, highly respected individuals within communities may not be qualified for such positions, which may further retard the operations of such associations. Notwithstanding this, once such individuals are elected to managerial roles, it may be difficult to change any such an appointment, regardless of performance.

#### **2.3.2.4 Warehouse receipt systems**

Smallholder farmers characteristically do not have sufficient assets to present as collateral for agricultural loans. This collateral restriction can be overcome by warehouse receipt systems that provide farmers with secure storage of the commodities which they have produced, while acting as collateral for obtaining credit from financial institutions (Kanu *et al.*, 2016). Moreover, warehouse receipt systems lessen the pressure on smallholder farmers to sell their commodities directly after harvests when prices are low, while also reducing post-harvest losses (Hollinger, Rutten & Kiriakov, 2009). The utilisation of warehouse receipt systems in Mozambique is limited, with scarce private sector involvement as well as low levels of financial literacy amongst smallholder farmers.

#### **2.4 Mobile technology and financial inclusion in the sub-Saharan African region**

The SSA region is characterised by alarmingly low levels of financial inclusion, with some countries in the region having exclusion rates of up to 96 percent (Oji, 2015). The low levels of financial inclusion in the region is described by Fanta *et al.* (2016) as “the inability of ‘brick and mortar’ banks to provide financial services to rural, smallholder farmers at affordable rates”. To this, Kirui *et al.* (2012) add that, in Kenya, the structural weaknesses of the formal financial sector limit the ability of rural clients to partake in the formal financial system. Such formal financial institutions are typically focussed on urban areas, with terms and conditions that present barriers for rural clients in making use of their services (van Biljon & Kotze, 2008).

Mobile technologies, such as mobile phones, offer individuals and communities a real-time and portable platform on which public information and basic services can be made available to a greater proportion of the previously knowledge-disadvantaged population (Zambrano & Seward, 2012). It is this mobile technology that can be utilised to tap into a market of previously (and currently) unbanked individuals of the SSA region. The developing world, of which SSA forms part, has taken a “mobile first trajectory” in which mobile phones have been the first form of modern communication infrastructure to which the region has been exposed to, as opposed to the developed world in which fixed land-line communication infrastructure was the initial communication infrastructure (Aker & Mbiti, 2010; Donovan, 2012). There is the notion that, in some developing countries, there are more individuals with access to mobile phones than there are individuals with access to water, which emphasises the fact that the mobile revolution may be the key in development opportunities, thus providing a mechanism to change the livelihoods of the overwhelmingly poor, rural, smallholder farmer population (Donovan, 2012).

### 2.4.1 Mobile money

The concept of mobile money, which was launched in Kenya, has expanded rapidly in developing countries in Africa and in Asia (Subia & Martinez, 2014). Across the world, Donovan (2012) reports that there are 110 mobile money services with a reach of over 40 million users. Mobile money is described by Subia and Martinez (2014) as constituting “electronic financial services executed via mobile phones” with such services including:

- i. **Mobile banking:** where access is gained to financial services by clients who belong to a formal financial institution. Such services are typically associated with the developed world. Mobile banking is referred to by Dermish *et al.* (2012) as a subset of branchless banking<sup>5</sup>. Mobile banking services that provide mobile account access to banking clients are described by Etim (2014) as additive models of mobile money, in which the mobile service is purely an addition to a traditional banking service already provided to a banking client.
- ii. **Mobile payments and mobile transfers:** The access gained to financial services by “unbanked” individuals, which is linked to a Subscriber Identity Module (SIM) card as well as a Personal Identity Number (PIN), provide the user access to a particular account. This service is typically associated with the developing world. The mobile money services which are aimed at providing financial inclusion to non-banking individuals are described by Etim (2014) as being transformative mobile money models which hold the greatest opportunity for combatting financial exclusion.

The fact that the SSA region has been exposed to limited infrastructure development, particularly in the form of paved roads, post offices and public telephony, has led to the region being at the forefront of the mobile phone adoption frontier, which provides a suitable foundation for the utilisation of mobile technologies such as mobile money (Fanta *et al.*, 2016). Furthermore, Fanta *et al.* (2016) indicate that this widespread adoption of mobile phone technology is linked to enhanced economic development. Additionally, the region has made satisfactory progress in the adoption of second- and third-generation mobile networks which can be utilised to provide mobile money services, despite the fact that smartphone technology remains expensive and thus unaffordable to much of the rural farmer population. Against this backdrop, mobile money services have the potential to further provide the SSA region with economic development and poverty reduction through enhanced levels of financial

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<sup>5</sup> These are new distribution channels which enable formal and commercial banking institutions to offer financial services outside of traditional banking premises, usually through the utilisation of technology (Dermish *et al.*, 2012).

inclusion (Subia & Martinez, 2014). Mobile phone technology is ideal for the expansion of financial services in the SSA region due to the ubiquitous nature of mobile phones in the region, with mobile phone adoption growth rates for the region standing at 208 percent versus 46 percent in East Asia, coupled with the constant lowering of internet data costs (Fanta *et al.*, 2016).

Aker and Mbiti (2010) do, however, differentiate mobile money from banking in a technical and legal sense, stating that mobile money services do not:

- i. Provide interest on savings.
- ii. Facilitate access to credit from formal financial institutions.
- iii. Ensure the value stored in mobile accounts.

Although Aker and Mbiti (2010) provide such a differentiation, there are instances where formal financial institutions such as banks and MFIs provide smallholder farmers with microloans via mobile money services.

#### **2.4.1.1 Benefits of mobile phones and mobile money**

Mobile money presents developing countries with an opportunity to enhance financial inclusion, as Jenkins (2008) states that there is a direct and positive relationship between the level of mobile phone technology adoption and financial inclusion. This opportunity is compounded by the fact that the reduction in communication costs to the developing world is linked to “tangible economic benefits and improved agricultural and labour market efficiencies as well as increases in consumer and producer welfares” (Aker & Mbiti, 2010).

The benefits of mobile money services use are described by both Aker and Mbiti (2010) and Donovan (2012) as follows:

- i. Increased personal savings as a result of increased privacy. Wives are no longer required to gain permission from their husbands, in traditional settings, to spend money. Mobile money services allow the holders of their money to spend or share their money according to their own choice.

- ii. Mobile money services have been proven to be drastically less expensive than traditional transactions are, with McKay and Pickens (2010) indicating that transaction costs on mobile money services are up to 19 percent less expensive.
- iii. Mobile money is safer if it is well supervised.
- iv. The speed and liquidity associated with mobile money transactions far exceed that of traditional money transfers initiated through “brick and mortar” banking services.

### 2.4.1.2 Key mobile money role players

The mobile money service sector is described by Jenkins (2008) and Muya (2015) as comprising a business ecosystem in which various stakeholders have a unique and supportive role to play, giving rise to the success of mobile money services. These various stakeholders are listed in Table 2.3 along with the roles, capabilities and responsibilities each of these stakeholders have within the mobile money ecosystem.

**Table 2.3: Key role players in the mobile money business ecosystem**

Role player	Roles, capabilities and responsibilities
<b>Mobile network operators (MNOs)</b>	<ul style="list-style-type: none"> <li>• Provide and enhance telecommunication and mobile money infrastructure.</li> <li>• Actively broaden and build their customer base.</li> <li>• Generate revenue through:               <ul style="list-style-type: none"> <li>• Mobile payments,</li> <li>• Fees on transactions,</li> <li>• Commission earned on business-to-business transactions.</li> </ul> </li> <li>• Build trust with their customers.</li> <li>• Promote, build and support their network agency network:               <ul style="list-style-type: none"> <li>• Train and assist agents.</li> </ul> </li> </ul>
<b>Banks</b>	<ul style="list-style-type: none"> <li>• Obtain banking licences, and enhance and develop formal banking infrastructure.</li> <li>• Gain access to monitoring resources developed by central banks.</li> <li>• Comply with all regulatory practices set out by central banks.</li> <li>• Recruit new customers and in doing so, partner with MNOs to provide lines of credit.</li> </ul>

	<ul style="list-style-type: none"> <li>• Reduce the cost of formal financial services.</li> <li>• Enhance presence in rural areas where formal financial institutions lack.</li> </ul>
<b>Microfinance Institutions (MFIs)</b>	<ul style="list-style-type: none"> <li>• Enhance credit access, particularly to rural, low-income groups. <ul style="list-style-type: none"> <li>• Thereby, directly impacting on rural and smallholder farmer development.</li> </ul> </li> <li>• Associated with high cost of credit. <ul style="list-style-type: none"> <li>• Must actively attempt to reduce their cost of lending.</li> </ul> </li> </ul>
<b>Government Regulators</b>	<ul style="list-style-type: none"> <li>• Implement policies directly impacting: <ul style="list-style-type: none"> <li>• Financial service providers,</li> <li>• Financial service users.</li> </ul> </li> <li>• Provide an overview of the financial service sector, monitoring all services and their associated transactions.</li> <li>• Ensure the stability of the financial service sector by protecting the best interests of the sector and all of its stakeholders.</li> <li>• Ultimately, provide an enabling environment for financial services to thrive.</li> </ul>
<b>Agents</b>	<ul style="list-style-type: none"> <li>• Points of physical contact between mobile money service end users and mobile money service providers.</li> <li>• Facilitate mobile money transactions: <ul style="list-style-type: none"> <li>• Registering and opening of mobile money accounts,</li> <li>• Converting physical cash to electronic money (e-money) on mobile money service platforms (cash-in),</li> <li>• Converting e-money to physical cash (cash-out),</li> </ul> </li> <li>• Track customer usage patterns in order to gain a greater understanding of customers.</li> <li>• Earn commission on account openings and transactions.</li> <li>• Facilitate the education of customers.</li> <li>• Build customer trust and, in doing so, expanding the customer base.</li> </ul>
<b>Super Agents</b>	<ul style="list-style-type: none"> <li>• Perform e-money distributions between businesses (business-to-business) in bulk transactions. <ul style="list-style-type: none"> <li>• Typically, financial institutions.</li> <li>• Earn commission on bulk e-money distributions.</li> </ul> </li> </ul>



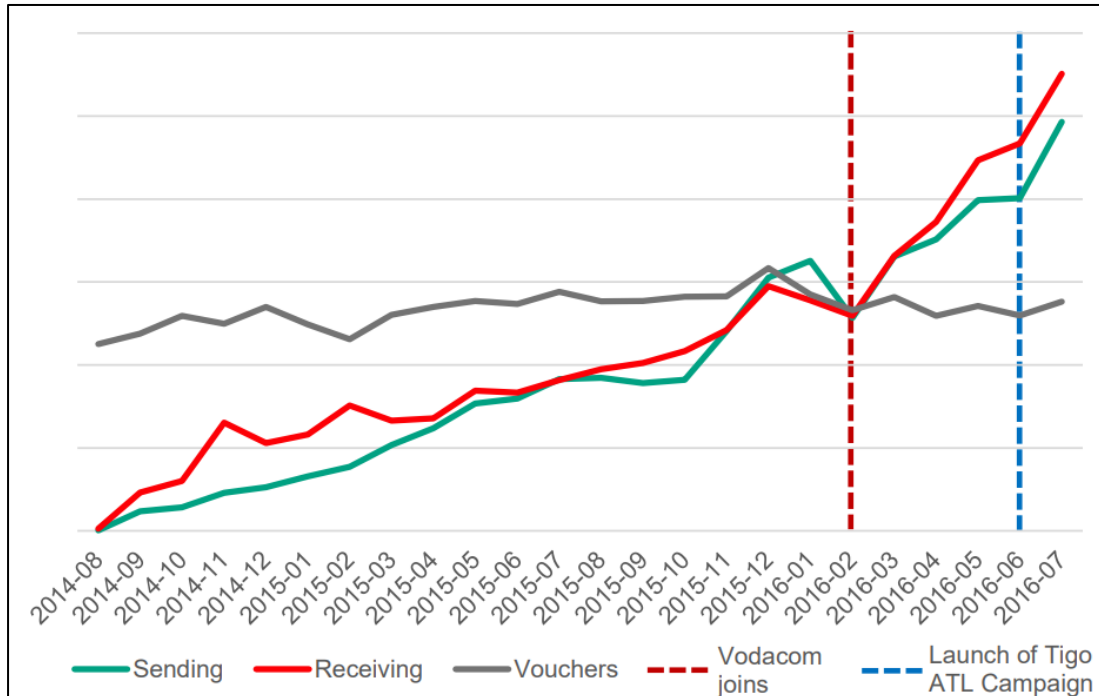
<p><b>Retailers and utilities</b></p>	<ul style="list-style-type: none"> <li>• Physical points of contact between end users and mobile money service providers which facilitate transactions between the end user and a third party: <ul style="list-style-type: none"> <li>• Retailers,</li> <li>• Agro-dealers,</li> <li>• General dealers (typically in rural areas),</li> <li>• Utilities and other service providers (government and private sector)</li> </ul> </li> <li>• Reduce the cost of handling cash.</li> <li>• Reduce the cost of bill collections.</li> <li>• Enhance customer convenience.</li> </ul>
<p><b>Donors</b></p>	<ul style="list-style-type: none"> <li>• Have a great deal of cross-country experience with a variety of different mobile money services.</li> <li>• Usually have strong relationships with regulators, establishing the donor’s credibility.</li> <li>• Catalyst in rural development and ultimately, financial inclusion.</li> </ul>
<p><b>End Users</b></p>	<ul style="list-style-type: none"> <li>• Present strong financial needs which need to be met, particularly in under-developed areas where formal financial institutions lack in presence.</li> <li>• Mobile money reduces the risks associated with the carrying of physical cash.</li> <li>• Increases the convenience of paying for goods and services.</li> <li>• Presents a viable opportunity to send and receive money and other financial transactions.</li> <li>• Perform cash-in and cash-out transactions.</li> </ul>

Source: Adapted from Jenkins (2008), Etim (2014) and Muya (2015)

### 2.4.1.3 Interoperability of mobile money services

In 2013, three Indonesian MNOs entered into an agreement which introduced interoperability between the three mobile money services, which was the first agreement of its kind, worldwide. This agreement lowered barriers to entry and enhanced the cost-efficiency of mobile money services. In a Tanzanian study, GSMA (2016) emphasised the effects of interoperability introduction by Tigo-Pesa, a Tanzanian mobile money service offered by MNO, Tigo Tanzania. The study indicated notable increases in both

the sending and receiving of mobile money payments, while off-network vouchers<sup>6</sup> decreased accordingly. The success of mobile money services can thus be enhanced through collaborative strategies between various financial service providers, and particularly between MNOs.



**Figure 2.2: Tigo-Pesa interoperability launch and its effects after Vodacom joined the agreement and after extensive marketing campaigns were conducted**

Source: GSMA (2016)

#### 2.4.1.4 Mobile money in sub-Saharan Africa

There are numerous mobile money services available in SSA, although not all mobile money services have yielded the same growth as have the most well-known mobile money service in the region and in the world – Safaricom’s M-Pesa from Kenya.

- i. **Kenya:** In Kenya, mobile money services, particularly that of Safaricom’s M-Pesa, has taken the financial sector to new heights. Safaricom is an MNO in Kenya which was established in 1997. This MNO, in 2011, had a market share of 80 percent (Jack & Suri, 2011). It is this market share which acted as a catalyst in the success of Safaricom’s M-Pesa mobile money

<sup>6</sup> An SMS received by a recipient of e-money who is not a subscriber to the same mobile money services as that of the sender. This is a system which is also used in Mozambique for mobile money transfers between M-Pesa, Movitel and M-Cel. The receiver has seven days to redeem the amount value of the voucher at an M-Pesa agent, while fees do apply (see Annexure D for M-Pesa transaction rates).

service. Dermish *et al.* (2012) state that, in the quest for obtaining its user base of 50 percent of the Kenyan population, Safaricom dedicated a substantial amount of organisational capital in the form of marketing services which instilled trust in the prospective users of M-Pesa. Moreover, Safaricom ensured a pricing structure which accurately reflected the consumers' willingness to pay (Subia & Martinez, 2014). Initially, M-Pesa was utilised as a micro-payment platform; however, the benefits of transferring money from the city to rural family members by skilled workers in Kenyan cities resulted in the official launch of M-Pesa as an official money transfer service in 2007 (Hughes & Lonie, 2007). The early adopters of the M-Pesa mobile money service are described by Jack and Suri (2011) as comprising the younger, more educated, wealthier and banked portion of the Kenyan population. However, with the growth of the service, which now serves more than 50 percent of the Kenyan population, the service is becoming predominantly adopted by the portion of the population which is less educated and less wealthy. Cook and McKay (2017) state that the number of traditional bank accounts was surpassed in 2009 by the number of mobile money accounts in Kenya, growing to 16 million M-Pesa subscribers in 2011, with an agency network of 17 000 M-Pesa agents<sup>7</sup>, as opposed to the recorded 1 063 bank branches and 1 979 automated teller machines (ATMs). The number of M-Pesa agents continued to grow in 2013 by 40 percent (Pew Research Center, 2014). Moreover, Cook and McKay (2017) argue that M-Pesa may have been the catalyst behind the formal banking trend seen after 2014, when the number of traditional bank accounts surpassed the number of mobile money accounts in Kenya. This is attributed to the fact that Equity Bank<sup>8</sup> had launched their own mobile banking and mobile money service, which is aimed at the bank's already 8.4 million customer-base. The innovation by Safaricom, giving rise to competition, has thus compounded the rate of financial inclusion in Kenya. Oji (2015) indicates that M-Pesa transactions account for 31 percent of Kenya's GDP, making it one of the most successful mobile phone-based financial services in the developing world (Jack & Suri, 2011).

- ii. **Uganda:** By 2012, there were 110 mobile money service providers around the world, of which a mere 11 had a client base exceeding one million, and of these 11 mobile money service providers, three originated from East Africa, including the MNO, MTN Uganda (USAID, 2012). MTN Uganda introduced MTN Mobile Money to the Ugandan economy in 2009, positioning itself similarly to Safaricom with its M-Pesa that had been launched in Kenya, two years prior. The primary objective of the mobile money service is to facilitate person-to-person money transfers across the country, and in many cases, from urban individuals to their rural

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<sup>7</sup> These constitute physical points of presence which represent and facilitate mobile money transactions such as converting cash to electronic money and accepting electronic money as legal tender for the purchase of goods and services (Jenkins, 2008).

<sup>8</sup> Equity Bank is a registered bank, domiciled in Kenya.

counterparts (Mas & Morawczynski, 2009). There are four mobile money service providers in Uganda, including Airtel Money, Africell and M-Sente in addition to MTN Uganda. However, MTN Uganda's mobile money service is the market leader with a 72-percent market share, measured by usage (Macmillan, Paelo & Paremoer, 2016). The success of MTN Uganda's Mobile Money service in Uganda is attributed to the fact that the target market for MTN Uganda comprised young, literate individuals who had a strong demand for person-to-person money transfers at a time when mobile phone penetration was growing rapidly in that country, coupled with a regulatory environment which was conducive for the launch of mobile money services (USAID, 2012). It is this "light-touch" regulatory environment, described by Macmillan *et al.* (2016), that paved the way for an MNO-led mobile money industry, and not a bank-led mobile money industry. Ultimately, MTN Uganda's Mobile Money client base grew from 600 000 subscribers in 2009 to over 21 million subscribers in 2015, with 71.4 percent of the country's utility payments being facilitated by MTN Mobile Money (Macmillan, Paelo & Paremoer, 2016). Although the client base has been reported to be over 21 million subscribers, the active<sup>9</sup> number of subscribers is 7 million, which represents 47 percent of registered SIM cards in Uganda (USAID, 2012). Moreover, MTN Uganda Mobile Money has introduced an added financial service, MTN Finance, which offers life insurance policies, in partnership with two life insurance multinationals, AON and Piccadilly Insurance (Lwanga & Adong, 2016). Further developments of MTN Uganda Mobile Money include a partnership with Western Union<sup>10</sup>, which facilitates cross-border transactions as well as micro-loan and micro-savings services that were launched in 2016 (Macmillan, Paelo & Paremoer, 2016; USAID, 2012).

- iii. **Mozambique:** Mobile money services in Mozambique have not come to life in the same way as M-Pesa and MTN Mobile Money have in Kenya and in Uganda, respectively. The concept of mobile money is relatively new in Mozambique, with the first service of its kind being launched in 2011 by the MNO, M-Cel (Hunguana *et al.*, 2012). In its initial months, M-Cel actively attempted to grow its mobile money service market share, recruiting 1 000 m-Kesh<sup>11</sup> agents by the last quarter of 2011 (Batista & Vicente, 2013). Hunguana *et al.* (2012) state that the client base of m-Kesh reached 45 000 clients, with most of these being situated in urban areas, particularly in Maputo city and the rest of Maputo Province.

There are currently three mobile network operators in Mozambique, comprising Vodacom, M-Cel and Movitel. M-Cel and Vodacom appear to be the leading MNOs in urban Mozambique,

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<sup>9</sup> Subscribed individuals who have transacted via the mobile money service within the past 30 days (USAID, 2012).

<sup>10</sup> A financial service provider specialising in cross-border money transfers (Western Union 2016).

<sup>11</sup> Mobile money service provided by the Mozambican MNO, M-Cel.

where the two MNOs have well-established infrastructure and thus a strong customer base. In contrast, these two MNOs lack sufficient network infrastructure in the rural parts of Mozambique where the largest competitor, Movitel, currently possesses the largest market share. The strategy by Movitel to target the rural mobile phone market has yielded satisfactory results, with the MNO possessing 44 percent<sup>12</sup> of the MNO market share, with most of this originating from rural subscribers. Although MCell was the first MNO to launch a mobile money service in Mozambique, it has lost its dominant market over the past five years to the other two MNOs – to Vodacom and particularly to Movitel.

Table 2.4 indicates that the Mozambican government owns more than a quarter of MCell, which may be indicative of the mismanagement of the telecommunications company, with MCell losing market share on a yearly basis to both Movitel and Vodacom. MCell, according to Hoering and Bourreau (2017) has a registered user-base of two million clients, although only 60 000 of these clients are considered active users.

**Table 2.4: Mozambican MNO ownership and market share**

<b>Mobile Network Operator</b>	<b>Ownership Structure</b>	<b>Ownership Share</b>	<b>Market Share<sup>13</sup></b>
<b>MCell</b>	<ul style="list-style-type: none"> <li>• Telecomunicações De Moçambique (TDM)</li> <li>• Institute for the Management of the State Holdings (IGEPE)</li> </ul>	74% 26%	31%
<b>Movitel</b>	<ul style="list-style-type: none"> <li>• Viettel</li> <li>• Gestão e Investimento (SPI)</li> <li>• Ivespar (SPI subsidiary)</li> </ul>	70% 20% 10%	44%
<b>Vodacom</b>	<ul style="list-style-type: none"> <li>• Vodacom International</li> <li>• EMOTEL</li> <li>• Intelec Holdings</li> <li>• Whatana Investments</li> <li>• Other</li> </ul>	85% 1.99999% 6.5% 6.5% 0.00001%	26%

Source: Adapted from Gillwald *et al.* (2016) and dos Santos (2014)

According to Hoering and Bourreau (2017), Vodacom introduced its well-known mobile money platform, M-Pesa, to the Mozambican market in May 2013, after which the M-Pesa network grew rapidly to one million clients by March 2016. Movitel, which only entered the Mozambican MNO sector in 2010, launched its mobile money platform, e-Mola, in 2017. The three mobile money services, M-Pesa, e-Mola and m-Kesh, are all linked to the Ponto24

<sup>12</sup> Including both the rural and urban markets.

<sup>13</sup> In 2015.

automated teller machine (ATM) network which enables users of these mobile money platforms to withdraw money from their mobile wallets at any of the 11 associated Ponto24 banks and their associated branches, without owning a bank card (Hoering & Bourreau, 2017).

In Mozambique, the M-Pesa mobile money service utilises Unstructured Supplementary Service Data (USSD) technology to facilitate mobile money transactions. USSD is described by Krugel (2007) as being a branch of SMS technology – the concepts of USSD and SMS are compared in Table 2.5. USSD technology transports messages with a maximum of 182 characters (versus 160 characters in SMSs) and is executed in “real time”, completing the back and forth sending and receiving of data in a single session (Dialogic Corporation, 2008). The user that is requesting a service sends USSD information directly to the USSD service platform, whereas with SMS technology, the sender sends a text message to a central SMS Centre which then only attempts to deliver the message to the final recipient. In simple terms, USSD technology is a menu-driven form of SMS (Krugel, 2007). USSD technology is characterised as crucial technology used in mobile financial services as it can be implemented at a low cost without the need to make alterations to the SIM card of the user. This low-cost technology is ideal for mobile money services as it allows customers and service providers to send and receive instructions while authenticating such transactions with the user’s PIN (Hanouch & Chen, 2015).

**Table 2.5: Differentiation between USSD and SMS**

<b>Primary features</b>	<b>Unstructured Supplementary Service Data (USSD)</b>	<b>Short Message Service (SMS)</b>
<b>Communication characteristic</b>	Session-based and in real time	Store and forward <sup>14</sup>
<b>Communication entities</b>	Sender mobile phone and USSD network	Sender mobile phone, network switching centre, receiver mobile phone
<b>Character limit</b>	182	160
<b>Message storage</b>	One-time cached <sup>15</sup>	Stored in either the mobile phone memory or in the SIM memory
<b>Communication analogy</b>	Chat	E-mail
<b>Costs</b>	Less costly due to operation being executed between only the sender and USSD network	Higher in cost as a result of the SMS having to go through an SMS switching centre.

<sup>14</sup> The transmission of communication data which is sent from the sender device to an intermediary device before sent to the receiver’s device.

<sup>15</sup> A memory type, limited in storage size, which stores repeated requests, thereby decreasing the time taken for a device to process and return data requests.

Source: Adapted from Taskin (2012)

## 2.5 Rural, smallholder agriculture and financial inclusion in Manica Province, Mozambique

Manica province is situated in central Mozambique<sup>16</sup> and is described by Hanlon and Smart (2013) as being one of Mozambique's richest areas in terms of agriculture. Notwithstanding this, the province does experience some food insecurity in years of poor rainfall (Holtzman *et al.*, 2012). The province of Manica is one of three provinces which form the Beira Corridor, which houses one of the most crucial transport routes in Southern Africa, linking significant parts of Malawi, Mozambique, Zambia and Zimbabwe to a main Indian Ocean export port, the Port of Beira (Bento *et al.*, 2015). The region is characterised by suitable agricultural soils, as well as a suitable agricultural climate with abundant access to land and water resources, highlighting the region's profound agricultural potential (Silici, Bias & Cavane, 2015). Yet, agricultural production primarily takes place on land areas ranging between 1.35 hectares and 1.7 hectares (Table 2.6), limiting the ability of these rural, smallholder farmers to take advantage of economies of scale (Borzaga *et al.*, 2016; Silici, Bias & Cavane, 2015).

**Table 2.6: Average area of small and medium Mozambican farms per province (hectares)**

Province	Area (ha)
Niassa	1.4
Cabo Delgado	1.3
Nampula	1.1
Zambezia	1.3
Tete	1.7
Manica	1.7
Sofala	1.1
Inhambane	1.0
Gaza	1.1
Maputo	0.2
<b>Country Average</b>	<b>1.2</b>

Source: Adapted from Inquerito Agrario Integrado, cited in Achicala *et al.* (2015, p. 31)

The region has a mostly sub-humid, tropical savannah climate with an annual rainfall average of 1 200 mm. The smallholder farmers in the region are primarily subsistence farmers who depend on the rain-fed production of staple crops of maize, sorghum and beans, while the cash crops exploited by these farmers include tobacco and cotton (BAGC, 2010; Borzaga *et al.*, 2016; Silici, Bias & Cavane,

<sup>16</sup> Central Mozambique is comprised of four provinces: Sofala, Manica, Tete and Zambezia (Holtzman *et al.*, 2012).

2015). In addition, products such as soybeans and sesame seed (dedicated for the growing domestic poultry industry in central Mozambique) and peanuts (destined for the export market) are being produced, although these products remain unprofitable on land areas below 1.5 hectares (Hanlon & Smith, 2014). Notwithstanding this, Silici *et al.* (2015) indicate that the smallholder agricultural production is predominantly maize, which represents 75 percent of the total smallholder production, while intercropping with products such as legumes, groundnuts, beans and pigeon peas takes place alongside maize. The inability of these smallholder farmers to expand their operations (BAGC, 2010; Borzaga *et al.*, 2016) is linked to:

- i. A lack of credit, which is fuelled by the fact that formal financial services are rare in these rural areas.
- ii. Expensive credit which, when available, has been extremely costly at 20 to 45 percent per annum, with lending rates having increased further to approximately 36 to 60 percent per annum since 2010.
- iii. Poor agricultural and general infrastructure in the form of poor MNO network coverage, poor road conditions and a lack of agricultural input producers, resulting in the importation of costly production inputs such as fertilisers and pesticides.
- iv. A lack of basic business, mobile technology and agricultural knowledge among farmers.

## **2.6 Conclusion**

From the review of the relevant literature pertaining to the financial inclusion of smallholder farmers in SSA, and Mozambique in particular, it can be concluded that the adoption rates of mobile phone technology are unprecedented in SSA. The continent's population has adopted a "mobile-first trajectory", and there are cases where more of the continent's inhabitants have access to a mobile phone than to water.

The sub-Saharan African region is highly dependent on agriculture for the livelihoods of its people. However, despite the fact that 60 percent of the region's labour force is involved in agriculture, the sector contributes a meagre 15 percent, on average, to the region's GDP (Kanu *et al.*, 2016). In Mozambique, the agricultural sector contributes 25 percent of the country's GDP, making it one of the largest economic sectors in Mozambique, while the sector employs 80 percent of the population (CGAP, 2017). A catalyst to this disproportionate contribution to the economy is the fact that much of the



region's agricultural productivity stems from smallholder farmers who make use of primitive productive practices, despite the technological advances that have been experienced in much of the developed world.

Having reviewed the status of financial inclusion of rural farmers in the developing world, and Mozambique in particular, it could be said that the driving force behind the inability of these smallholder farmers to adopt advanced agricultural production approaches include the fact that smallholder farmers, predominantly in rural areas, lack sufficient access to financial services. In addition to the high risks and unpredictable returns associated with smallholder farming practices, commercial banks shy away from servicing rural, smallholder farmers, particularly because of the vast dispersion of these farmers, which increases the cost of providing these services. The loan disbursements made by commercial banks are predominantly aimed at large-scale, commercial farms.

Finally, this chapter identified the mobile money services currently available and how these services have aided financial inclusion. From the research, it is evident that opportunities to service these "unbanked" smallholder farmers do exist. Due to the nature of the mobile technology revolution in developing countries, financial service providers can now tap into these previously excluded markets in rural communities. In an African context, the best example stems from the successes of M-Pesa in Kenya, indicating the potential to replicate such a model in Mozambique. It is the ubiquitous nature of mobile phone technology in SSA which lends itself to enhanced economic development that can be driven by enhanced levels of financial inclusion of rural, smallholder farmers.

## CHAPTER 3

### METHODS AND PROCEDURES

#### 3.1 Introduction

Smallholder farmers in SSA are experiencing high levels of financial exclusion, despite the fact that technological advancements such as mobile phone technology and the affordability thereof have improved drastically in favour of these individuals. The dependency on traditional, formal, banking institutions is no longer a necessary requirement for ensuring financial inclusion. The introduction of financial services by MNOs enables a greater proportion of the financially excluded population to gain access to financial services, even if such services are primitive, at most.

It is assumed that the majority of smallholder farmers own, or at least have access on a regular basis to, a mobile phone. This provides the premise, for this study, to establish the mobile phone and mobile money services utilisation, patterns and behaviours of rural farmers, particularly in the province of Manica, Mozambique. The objective of this chapter is to explain the methods and procedures followed, while the results are dealt with in Chapter 4.

The data obtained in the endeavour to establish mobile phone and mobile money service utilisation, patterns and behaviours among rural farmers constitutes primary data, and was obtained through the use of survey questionnaires that were conducted with each respondent at group meetings. However, each respondent was presented with his or her questionnaire, individually and voluntarily. The ultimate objective was to gain clarification on the study objectives through the utilisation of quantitative data, which is described by Williams *et al.* (2012) as comprising numerical values which aid in the description of a particular phenomenon.

This chapter sets out to establish that all ethical prescriptions, set out by the University of Pretoria regarding academic research, have been adhered to in the collection of research data.

#### 3.2 Description of research strategy and research design

The literature review does not reveal any substantial studies which have attempted to establish the mobile phone and mobile money service utilisation patterns and behaviour of rural farmers in Mozambique. A questionnaire survey was selected for the research design as it would best capture the

expected types of data points which are sought in an observational study of this kind. The survey ultimately comprised the only primary source of primary data.

### **3.2.1 Survey research defined**

Survey research is defined by Krosnick *et al.* (2014) as a specific field of study involving the collection of data from a well-defined population, in this case; rural farmers from villages surrounding three major towns in the province of Manica, through the use of a structured questionnaire. Such a questionnaire is described by Hussey and Hussey (1997, cited in Hartwigsen, 2013, p. 57) as comprising a list of questions which are clear and well organised.

The research team assisted the respondents throughout their completion of the survey questionnaires in order to ensure that the respondents understood each question. The purpose of the research team in assisting respondents with completing of the survey questionnaire was not to obtain any additional information, other than such data as was possibly obtainable from the survey questionnaire. There are numerous advantages in assisting respondents with survey questionnaires in the attempt to collect data. These advantages include (Bird, 2009; Zikmund *et al.*, 2013):

- i. Information about a population can be assessed in a time-efficient manner, as they are quick and easy to administer.
- ii. Data is collected in a structured way, in accordance to the desire of the researcher.
- iii. If requested by the respondent, anonymity is kept.
- iv. If the respondent does not understand a particular concept, the assistant has the ability to explain any such concept.
- v. Face-to-face survey questionnaires are ideal in circumstances where units within a sample population are unskilled or illiterate.

Although the respondents in this study are vastly dispersed across the province of Manica, the scheduling of farmer meetings, during which face-to-face survey questionnaires were completed, facilitated the completion and explaining of questionnaires with each of the respondents. Moreover, the majority of the respondents are semi-illiterate, which formed the premise for the decision of the research team to assist the respondents in completing the survey questionnaire.

The survey questionnaire consisted of primarily closed-ended questions, while there was a selected number of questions which were open-ended, making provision for the collection of unanticipated responses. Zikmund *et al.* (2013) provide a clear differentiation of open-ended and closed-ended questions, in the sense that open-ended questions are ideal in a situation where a researcher conducting exploratory research does not have a complete understanding of the possible range of responses, while closed-ended questions are ideal where the time available is limited, as well as for a case where the skills of the respondent and survey assistant are poor. In the consideration of both time and, in particular, the assumed uninformed nature of the respondents, closed-ended questions formed the basis of the survey questionnaire, while open-ended questions were utilised where unanticipated responses were expected. All questions provided to the respondents were in multiple-choice format which indicated the level of response detail which was expected from the respondents. However, it is a difficult task to include all possible responses, which ultimately required the inclusion of open-ended responses to particular questions.

### **3.3 Research sampling**

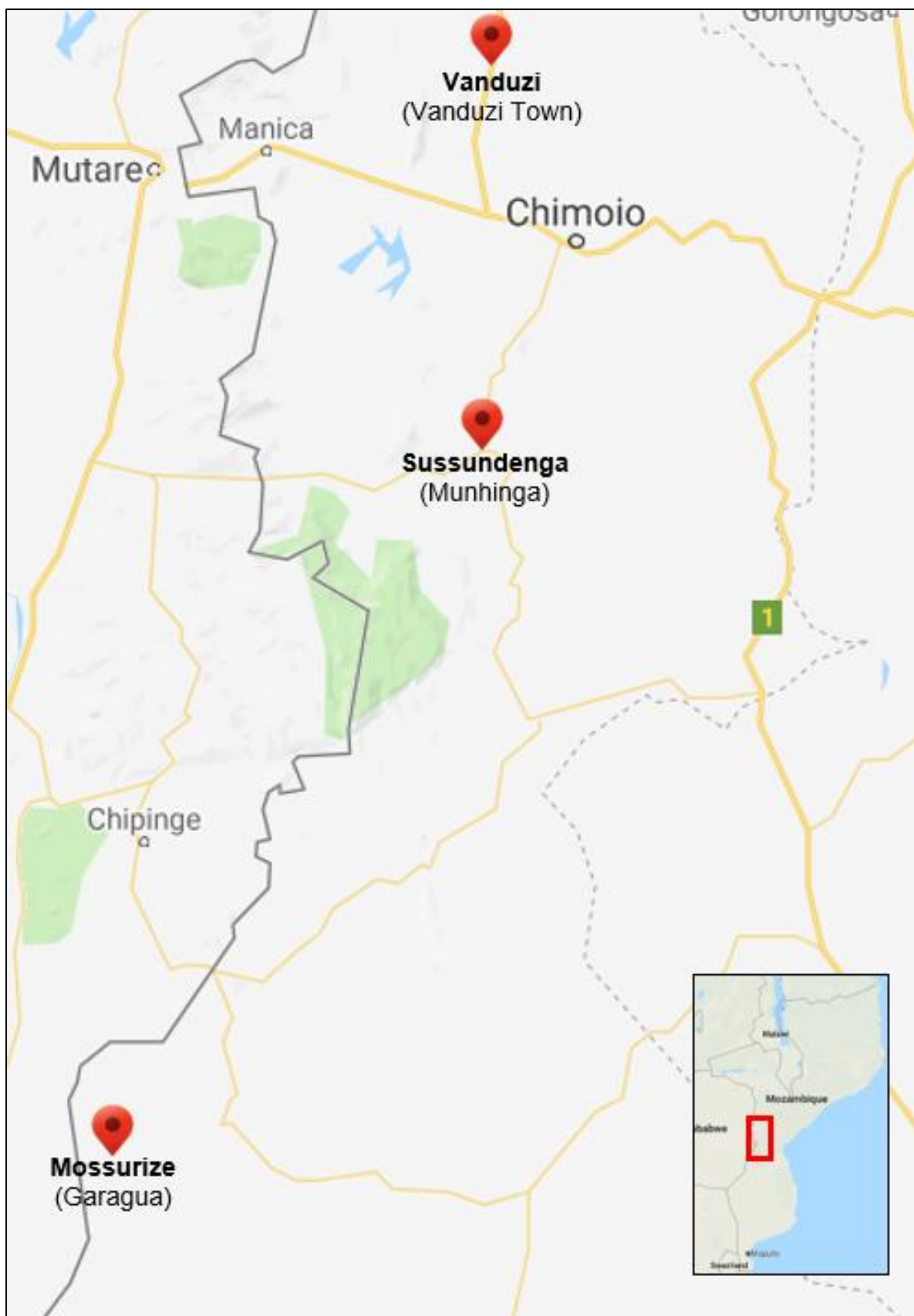
The province of Manica covers an area of 61 661 square kilometres, with smallholder farmers being vastly dispersed across this area, and with variations in access to general and telecommunication infrastructure. For this reason, it would be a near-impossible task to collect data from the entire population. The study has thus opted to survey farmers from three distinct districts in the province of Manica which are representative of all rural farmers in the province. In this study, the population refers to all rural farmers in the province of Manica Province, Mozambique. Therefore, a sample population will be taken.

Hanlon and Smart (2013) describe Manica Province as one of Mozambique's richest agricultural areas, rich in land, fertile soil as well as water resources. Moreover, the climate is favourable to agricultural production. In addition to the province's abundant natural resources, the province is equipped with key road infrastructure, linking the economic and agricultural centres of Malawi, Mozambique, Zambia and Zimbabwe to a crucial Indian Ocean port, the Port of Beira (Bento *et al.*, 2015). It is thus key to unlock the potential of the province through enhanced financial inclusion of rural households, which is likely to be a boon for agricultural production and ultimately the growth of the Manican economy.

#### **3.3.1 The research sample population**

The sample population includes rural farmers across three, pre-determined, districts. Again, it would be a near-impossible task to obtain data from all of the smallholder farmers in the three districts –

Mossurize, Sussundenga and Vanduzi – which ultimately meant that the sample population would constitute farmers who are the most representative of the population of the entire Manica Province in terms of an income distribution as well as access to financial and mobile services. These comprise rural farmers who were situated in close proximity to a pre-determined town within each district. These three towns are Munhinga (Sussundenga district) Vanduzi Town (Vanduzi district) and Garagua (Mossurize district). These three major towns each have respected and well-known (amongst the rural farmers) agro-dealers, where the rural farmers do business, if any. The agro-dealers are an important aspect of the study as they provided feedback on the use of mobile money services amongst rural farmers, from a business (vendor) perspective. It is assumed that a vendor would be able to substantiate the responses obtained from rural farmers whom perform economic activities with such a vendor, particularly relating to the spending patterns of rural farmers. In order to better understand mobile money service utilisation, preferences and habits, a prerequisite was that participants must own a mobile phone.



**Figure 3.1: Map indicating the location of the selected districts and towns of the sample population, Manica Province**

Source: Adapted from Google Maps (2018)

### **3.3.1.1 Sussundenga district**

The town of Munhinga was identified as being a meeting point for rural farmers in the district of Sussundenga and as a point of contact where these farmers could be issued with, and complete, survey questionnaires. Munhinga is situated 57 km south of the capital city of Manica Province, Chimoio. The town is accessible by paved roads, and has basic infrastructure such as small town shops and general household goods dealers. Farmers from this region typically produce maize on land areas between 1 hectare and 1.5 hectares.

### **3.3.1.2 Vanduzi district**

The town of Vanduzi is 25 km north-west of the provincial capital city, Chimoio. Farmers typically produce staple crops such as maize on tracts of land no larger than 1 hectare to 1.5 hectares. The district, as well as Vanduzi Town, is accessible by paved roads, although smallholder farmers are typically situated some distance away from the main roads, which are accessible by foot or by motorcycle.

### **3.3.1.3 Mossurize district**

The district of Mossurize is situated 300 km south-west of Chimoio and is in close proximity to the Mozambican border with Zimbabwe. The districts farmers differ from farmers in Sussundenga district and Vanduzi district in that rural farmers in Mossurize typically farm on larger areas of land and are slightly more sophisticated, although the level of sophistication remains low. Moreover, the agricultural land in this district has a higher level of fertility, with cotton and sesame seed being produced to a larger extent, in comparison with rural farmers in the districts of Sussundenga and Vanduzi. The district is less developed than both Sussundenga and Vanduzi districts due to the remoteness of the district, which is exacerbated by the extremely poor road conditions between the largest town, Espungabera, and the town on which this study will focus, Garagua. The district is therefore inaccessible without adequate transportation. Therefore, MNO coverage and infrastructure is low, with the Vodacom network being present only in certain areas, while Movitel covers a larger proportion of the district. Nevertheless, MNO coverage is relatively low and mostly limited near to district towns.

## **3.3.2 Justification of the research sample population**

The primary reasons behind the identification and selection of the sample population include:

- i. **Proximity of the population to a central meeting point:** The nature of the geographical landscape means that certain parts of the population are not viably reachable due to the poor roads and telecommunications infrastructure. For this reason, an agro-dealer must be in close proximity to the identified sample population.
- ii. **Adequate level of MNO network coverage:** The sample population should, ideally, have some access to an MNO network. If none of the respondents had access to an MNO network, responses to survey questions would be redundant.

### **3.3.3 Research sample population size**

In theory, all rural farmers in the province of Manica were considered for the sample. Due to the challenging geographical and infrastructural landscape of the province, there are some areas and farmers who did not qualify for the final sample size. However, the final sample size was chosen on the basis that it was still representative of the Province. The sample size was limited to rural farmers from villages which the three selected agro-dealers could indicate as being viably reachable – a number of villages were therefore proposed by each agro-dealer; however, the final selection was based on fair representation. Agro-dealers are, in most cases, village shops which supply key agricultural inputs such as seed, fertiliser and basic farming tools, in addition to supplying general household goods. Such agro-dealers typically service farmers from neighbouring villages. A secondary criterion was that each of the villages needed to form part of the agro-dealer's customer base. It must be noted that only farmers that had reasonable access to an agro-dealer were considered as this ensured that the farmers who form part of the sample are able to perform mobile transactions, while ensuring that such transactions were likely to contribute to agriculturally. The total number of individuals forming part of the sample population comprised 727 farmers and three agro-dealers.

### **3.4 Data collection**

The data collection tool utilised in the study comprised a survey questionnaire (Annexure A), composed of primarily closed-ended response options, while selected questions that were purposefully structured in an open-ended fashion to cater for unanticipated responses. The researcher was cognitive of the fact that, for a myriad of reasons, respondents could possibly provide inaccurate responses. For this reason, the number of observations was maximised, given the relative time constraints, in order to lessen the effect that inaccurate survey responses could have on the final survey results. The survey questionnaire utilised in this study is set out in Annexure A. The survey questionnaire consisted of a total of 18 questions which were completed, with the assistance of the research team, in approximately 15 minutes.



The survey questionnaire that was conducted with the three respected agro-dealers took approximately 30 minutes to complete and consisted of 14 questions.

The data was collected from smallholder farmers by three different Mozambican nationals who were able to converse with all respondents in their mother tongue (these three individuals will be referred to as 'field technicians' hereafter), while all data collected from the three agro-dealers was collected by the researcher and the research supervisor.

### **3.5 Data analysis**

The data collected for the study was analysed and interpreted using a descriptive statistical method which is described by Williams *et al.* (2012) as presenting "data that is summarised and presented in a form that is easy for the reader to understand".

The data which was collected by the three field technicians was transferred to an online database that made special provision for the structured survey questionnaire and all possible responses. This data was therefore made universally accessible to the researcher. All of data was downloaded from the online database into Microsoft Excel™ format, where after the researcher could conduct an analysis of the data. All graphs and figures were drawn up in Microsoft Excel™.

### **3.6 Ethical considerations of the research**

In the process of obtaining survey responses, this study employed the following approaches to obviate the potential ethical problems that are associated with survey studies:

- i. **Copyright and plagiarism:** The data utilised in this study is primary data. Furthermore, the results obtained in this study will be made available to study respondents should such a request arise.
- ii. **Anonymity:** Those respondents who requested to remain nameless were accommodated accordingly, and were not be pressured in any way to provide personal information which those respondents were reluctant to provide.
- iii. **Voluntary participation:** Prospective survey respondents were not influenced or actively persuaded in any way to complete the survey questionnaire. All respondents were advised that

they had the right to withdraw from the survey, should such a desire arise. The respondents were invited to participate in the survey through their village leader, who represents the interests of the villages in question.

### **3.7 Conclusion**

As set out in the objectives of this chapter, it is believed that this research survey followed all required standard methods and procedures, thus resulting in the collection of an accurate data set for analysis.

This study complies with the ethical considerations and requirements as set out by the University of Pretoria.

## CHAPTER 4

### RESULTS AND DISCUSSION

#### 4.1 Introduction

This chapter deals with the analysis of the primary data collected. The data will be discussed on a per-question basis. The results will assume a homogenous sample population. However, there are slight differences between the size of farming operations and spending patterns between villages and districts. This was not deemed material enough to impact on the general outcome of the survey questions. It must be noted that reference will be made to the towns of Garagua, Munhinga and Vanduzi, which are the three towns of each of the respective districts where the survey questionnaires were completed by respondents.

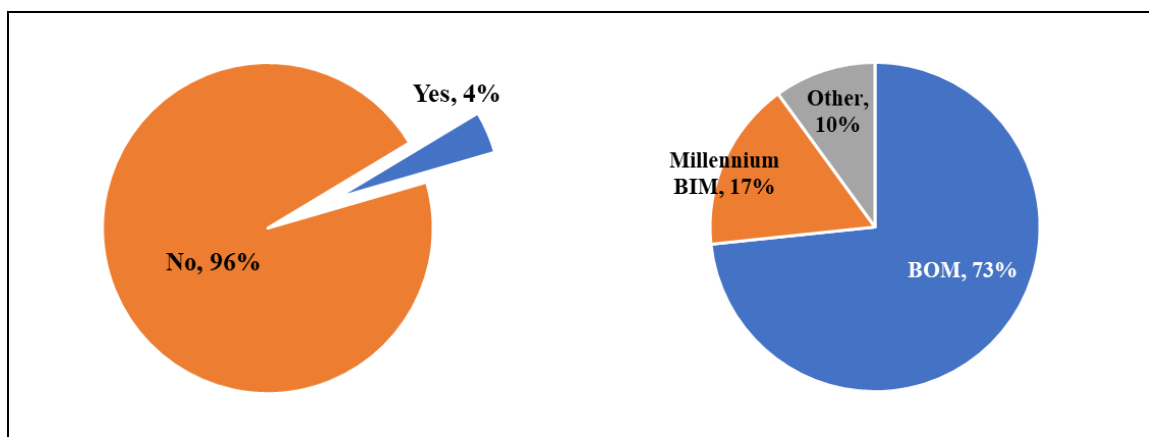
The primary objective of this chapter is to establish the levels of financial inclusion among rural farmers, as well as the mobile phone usage, preferences and behaviours of rural farmers. Moreover, the chapter attempts to determine the extent of the adoption of mobile money services by rural farmers, as well as the mobile money preferences of rural farmers. This will provide an indication of the inadequacies in the level of mobile money adoption, as well where focus should turn to in order to enhance adoption rates.

This chapter will conclude with a brief analysis of the interactions with agro-dealers in the three district towns which provide some background on mobile money utilisation from a point-of-sale perspective.

#### 4.2 Formal banking inclusion in Manica Province

The first question in the survey questionnaire endeavoured to gain an understanding of the level of financial inclusion amongst the sample population. Only four percent of the 727-sample population indicated that they had access to their own bank account, indicating that 679 smallholder farmers do not have their own bank accounts. This is consistent with a study by Hunguana *et al.* (2012) which reported that only 3.7 percent of rural farmers in Mozambique have access to credit, although that study was based on all farms, regardless of their farm size. The rural farmers have a clear preference for the Opportunity Bank Mozambique (BOM) in the province, with 73 percent of the 30 farmers indicating that they have access to their own bank account, indicating that they have a bank account with BOM. This result is not completely unexpected, as BOM has been actively involved in the smallholder agricultural sector in the province of Manica over the past seven years, providing smallholder farmers

with access to training, inputs, market access and tailored agricultural loans, particularly in the sesame seed and soybean value chains (Van der Vyver, Yamamoto & McVay, 2015). Moreover, BOM increases its reach to smallholder farmers in remote areas, particularly in Mossurize district and the town of Garagua, by making cash available to farmers through a mobile bank branch vehicle. Banco Internacional de Mozambique (Millennium BIM) has expanded rapidly over the past five years, which is indicative in the results, where 17 percent of farmers did indicate that they currently have an account with Millennium BIM (Hunguana *et al.*, 2012). Nevertheless, the results are evidence of the extreme lack of financial access which farmers are confronted with.



**Figure 4.1: Formal bank account access of smallholder farmers in Manica Province (n=727)**

Source: Own Data

The reasons why smallholder farmers do not have bank accounts fell outside of the scope of this study; however, the study by Hunguana *et al.* (2012) does suggest that the primary reasons include:

- i. In most cases, farmers do not believe that they have enough money to afford a bank account.
- ii. Bank branches are too far away from rural farmer dwellings.
- iii. Rural populations do not have adequate knowledge on how the formal banking system and its services work.
- iv. Rural respondents indicated that they believe that bank accounts were not for people like “them”.
- v. Transportation costs are too high.

### 4.3 Mobile phone ownership and MNO network access

While access to formal banking services was proven to be extremely poor, the developmental ability of these rural farmers is ultimately dependent on whether these farmers can potentially benefit from alternative financial services, such as mobile money services. For this reason, respondents were asked, in part one of Question 2 of the survey questionnaire, whether they owned one mobile phone or more than one mobile phone. A prerequisite for a particular rural farmer to take part in the survey was that the farmer must own at least one mobile phone. This is important as it is assumed that the probability of a rural farmer being able and willing to adopt mobile financial services is heightened if the farmer has more than one mobile phone. The reason for this is that, if the assumption is valid, farmers would be able to make use of a particular MNO mobile money service, even if the primary MNO network utilised by the farmer is not the same MNO which provides the mobile money service. This could be the case in areas where, for example, a particular MNO has the strongest network coverage, while the farmer nevertheless might have a preference for another MNO's mobile money service, which offers greater user benefits. The results show that only 46 farmers indicated that they own more than one mobile phone, which represents six percent of the population. In Sussundenga district, 41 of the total of 210 respondents (20 percent) indicated that they owned more than one mobile phone, which could be indicative of the fact that mobile phone technology has become relatively cheaper, and ultimately more accessible by rural, smallholder farmers due to the proximity of Munhinga to the provincial capital city, Chimoio. The district of Mossurize is a highly remote region. Ultimately, it can be assumed that mobile phone technology has not been introduced in Mossurize to the extent in which it has been introduced and made available in the districts of Sussundenga and Vanduzi. The cost of this technology may be relatively more expensive in Mossurize due to the extreme remoteness of the region.

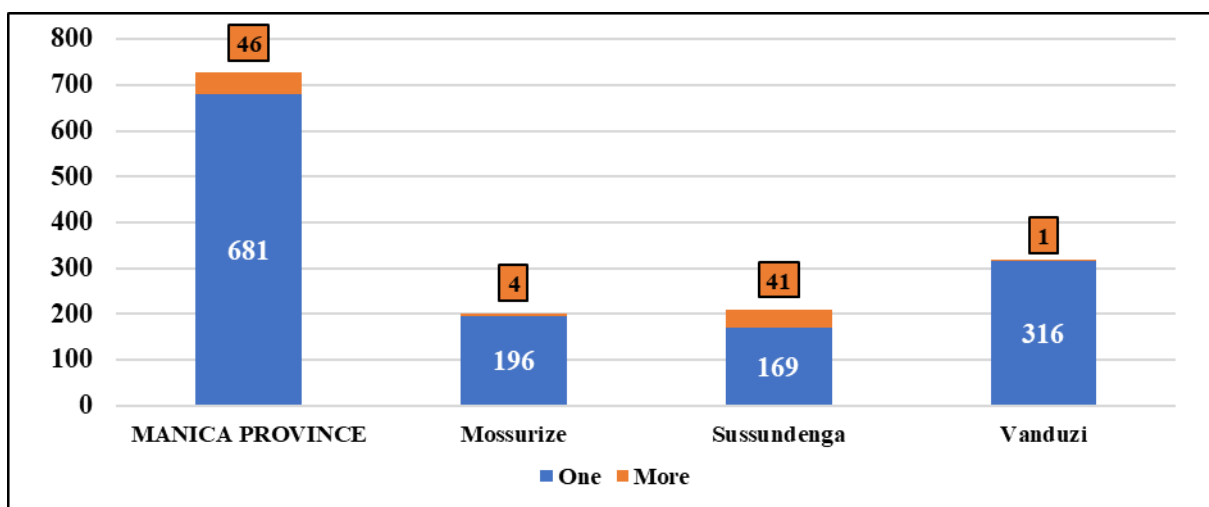
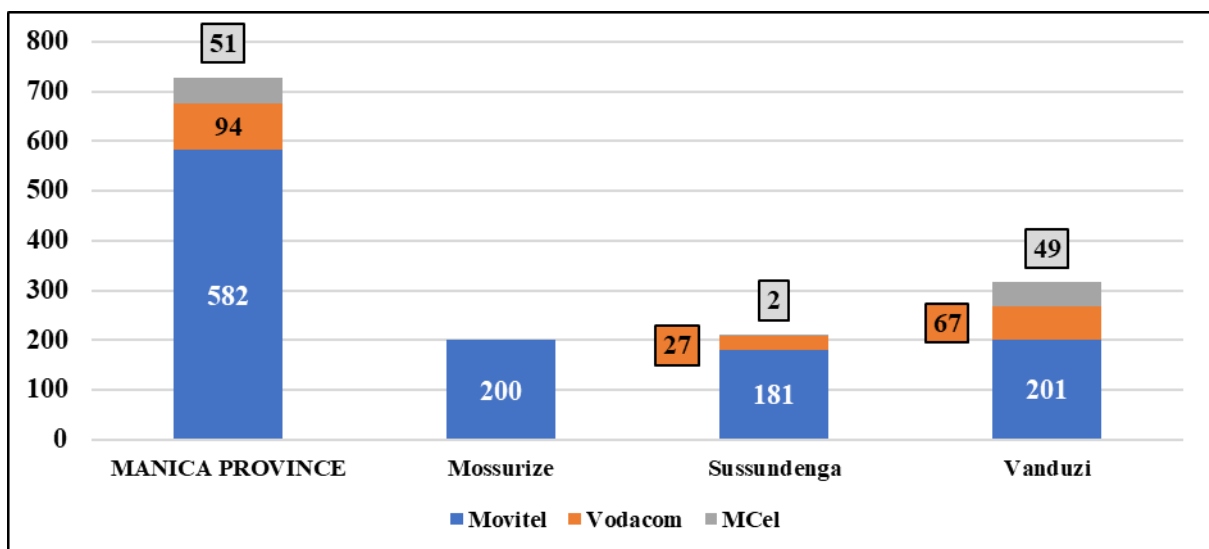


Figure 4.2: Mobile phone ownership amongst rural farmers, per district and cumulatively for Manica Province (n=727)

Source: Own Data

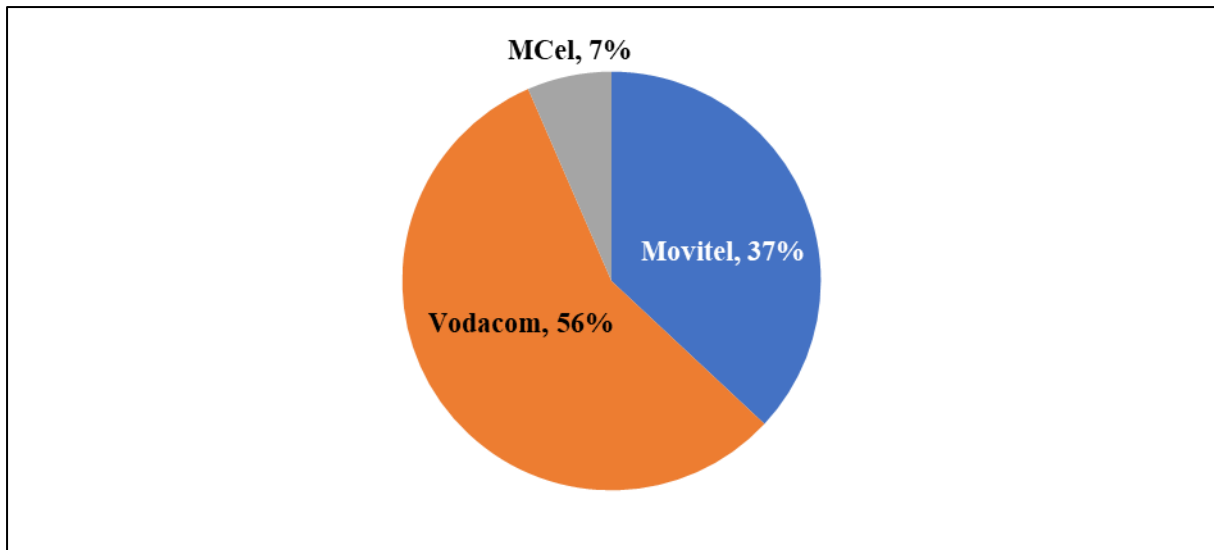
With respect to part two of Question 2, the survey questionnaire endeavoured to establish which MNO network was the most preferred among rural farmers. There are only three MNOs in Mozambique, and the utilisation of these three MNOs by rural farmers is illustrated in Figure 4.3. Movitel is the primary MNO network preferred by the respondents in the survey, which is in line with the researcher’s initial expectation. Movitel has been described in Chapter 2.4.1.4 as the MNO which has actively pursued the rural cellular market in Mozambique. Moreover, the strong preference in Mossurize for Movitel as the primary network explains the reasoning behind the strategy followed by Movitel, as there appears to have been a lack of service provision by the other two operators, Vodacom and MCell, historically. In Vanduzi, there was a greater variety in terms of the primary MNO network preference, which could be ascribed to the fact that there is simply a better network coverage by all three of the MNOs, when compared with the towns of Munhinga and Garagua.



**Figure 4.3: Primary MNO network preference by rural farmers, per district and cumulatively for Manica Province (n=727)**

Source: Own Data

Of the 46 farmers reflected in Figure 4.2 who indicated that they own more than one mobile phone, the majority indicated that the secondary MNO network which is most preferred by them is the Vodacom network. However, even in the case of a secondary MNO network, Movitel remains a highly preferred MNO network. Vodacom has a strong network coverage in urban areas and the areas surrounding urban areas, which could contribute to the fact that Vodacom is a preference, albeit a secondary preference, of farmers in the districts of Sussundenga and Vanduzi which are in close proximity to Chimoio where the Vodacom network is strong.



**Figure 4.4: Secondary MNO network preference by farmers in Manica Province (n=46)**

Source: Own Data

The final part of question 2 established which mobile phone model (or brand) the survey respondents mostly made use of. The purpose of this question was to determine if mobile phone models (which are often associated with a particular network) influence the choice of MNO. Against this backdrop, 241 (48 percent) of the 527 respondents from Sussundenga and Vanduzi indicated a clear preference for the iTel mobile phone model. The iTel models are made by an Indian mobile phone manufacturer that specialises in mobile phone devices with augmented features, such as acting as a portable charger which is capable of re-charging the battery of a secondary, external device, while a substantial number of the iTel phone models have a dual-SIM capability. The dual-SIM capability enables the user of the mobile phone to insert two different SIM cards into a single mobile phone. The benefit behind inserting two SIM cards into a single mobile phone is that the mobile phone user can alternate between the two SIM cards as necessary, without having to remove one SIM card and substituting it with another SIM card, known as SIM “churning”. It is these augmented features that render the iTel mobile phone brand ideal for the Mozambican landscape where electrical power sources are scarce in certain areas and where MNO networks are inconsistent, coupled with varying levels of service offerings between the different MNOs. Mobile phones which have a dual-SIM feature are therefore ideal in cases where farmers may have a preference for a service linked to one MNO, while preferring the network of another MNO to perform another service. Already, this is an advantage in the promotion of mobile money services since such services are not necessarily confined to the best MNO signal available for the customer. A mobile phone brand which is commonly used across all three districts is the Nokia mobile phone brand which has, historically, been a leading mobile phone brand in markets across the world, prior to the smartphone revolution. In Mossurize, however, there is a distinct preference for the Movitel mobile phone brand that is provided by the Movitel MNO. However, the fact that the majority of farmers in Mossurize make

use of the Movitel mobile phone brand is not necessarily indicative of a preference as such; it simply may be that the Movitel mobile phone brand has been made more widely accessible and more affordable by Movitel in the roll-out of the Movitel network in 2011. The iTel mobile phone brand may be lacking in preference in Mossurize due to the fact that this mobile phone manufacturer is a relatively new entrant into the mobile phone market in Mozambique, with the brand yet to penetrate the market in such highly remote regions.

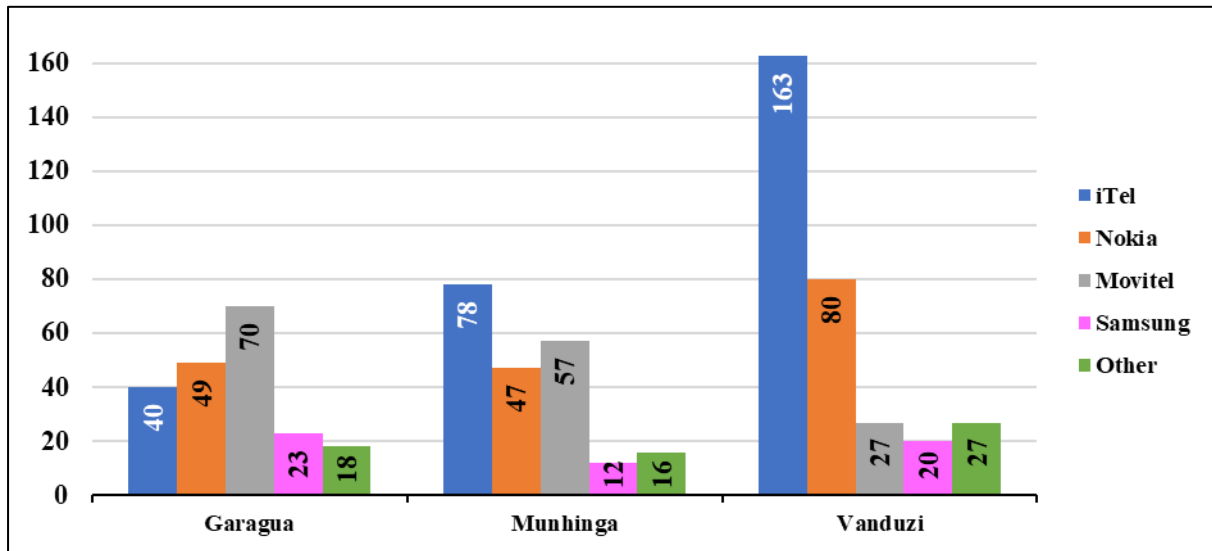


Figure 4.5: Mobile phone model (brand) preference by farmers, per district (n=727)

Source: Own Data

In Question 3, respondents were asked whether they have any MNO network coverage at their place of residence. The respondents were asked, in Question 4, to state which MNO network is the most prominent network near to their house. The objective of these two questions was to understand whether rural farmers typically have to travel in order to make use of their mobile phone services, or whether they had the convenience of performing mobile phone operations, requiring a MNO network, at their homes. An assumption made is that most farmers would have access to a MNO network at, or near, their home, which would enable these farmers to access mobile money services without needing to travel. The cost of travel was described in Section 4.2 above as being a major deterrent to obtaining a bank account by farmers. It is assumed that if farmers have to travel to make use of their network-bound services on their mobile phones, they would be discouraged to make use of such services. The results shown in Table 4.1 indicate that Movitel does, in fact, have the best network coverage near the homes of the majority of the respondents, while MCell has the poorest coverage near the homes of the respondents.



**Table 4.1: Best MNO network coverage near rural farmer homes, per MNO, by district and cumulatively for Manica Province (n=727)**

	<b>Mossurize district</b>	<b>Sussundenga district</b>	<b>Vanduzi district</b>	<b>MANICA PROVINCE</b>
<b>Movitel</b>	200	203	308	<b>711</b>
<b>Vodacom</b>	0	7	9	<b>16</b>
<b>MCel</b>	0	0	0	<b>0</b>

Source: Own Data

The second-best MNO network coverage near the homes of the respondents is presented in Table 4.2. It is evident that Vodacom is the best secondary network across all three districts, although this does not necessarily mean that the network coverage is sufficient for successfully performing network-related operations on mobile devices. It is further evident from Table 4.1 and Table 4.2 that MCell does not have a presence in the Mossurize district.

**Table 4.2: Second-best MNO network coverage near rural farmer homes, per MNO, by district and cumulatively for Manica Province**

	<b>Mossurize district</b>	<b>Sussundenga district</b>	<b>Vanduzi district</b>	<b>MANICA PROVINCE</b>
<b>Movitel</b>	0	7	9	<b>16</b>
<b>Vodacom</b>	200	200	308	<b>708</b>
<b>MCel</b>	0	3	0	<b>3</b>

Source: Own Data

#### **4.4 Mobile phone usage and spending patterns**

The following section of the survey questionnaire attempted to deal with the mobile phone usage and spending patterns by rural farmers. It is important to determine the rural farmers' spending patterns associated with the use of their mobile phones, as this is a key indication of the level of importance of a mobile phone in the day-to-day life of the rural farmers. The assumption is that the more airtime that a rural farmer spends in order to utilise his or her mobile phone, the more crucial the mobile phone may be in the day-to-day life of the rural farmer.

The primary reason behind Question 5, Question 6 and Question 7 is to determine the primary use of mobile phones amongst rural farmers, particularly between that of making mobile phone calls and that of Short Message Services (SMSs).

Question 5 asked respondents to indicate which services on their mobile phones they make use of the most in their day-to-day lives. This question was asked in a closed-ended format. However, the respondents did have the option of providing a response in an open-ended style. Of the 727 respondents, nearly 100 percent indicated that they did not use SMSs as a primary service on their mobile phones. The respondents thus overwhelmingly stated that they primarily use their mobile phones to make voice calls.

It must be noted that rural farmers were not surveyed on their usage of internet-bound mobile services, as the level of mobile technological advancement is still limited, in terms of both smartphone technology adoption and MNO network infrastructure which is not favourable for the use of internet services. The USSD technology, covered in Chapter 2.4.1.4, which is utilised by mobile money services, is ideal in rural areas where the internet infrastructure is still highly underdeveloped, and internet throughput remains limited (refer to Table 6.1 in Annexure C for a summary on mobile network generations and their associated capabilities).

The results from question 6 are presented in Figure 4.6. This closed-ended question required rural farmers to indicate how many times per week they successfully made mobile phone calls (voice calls). The overwhelming response is that rural farmers typically make more than six phone calls per week, which translates to at least one phone call per day. This is somewhat higher than the researcher’s initial expectations. However, what must be emphasised is that rural farmers do not typically have access to inexpensive internet messaging and voice-calling services such as WhatsApp<sup>17</sup> which, in the more developed world, reduce the typical mobile phone user’s dependency on traditional calling on a MNO network. Moreover, the fact that a substantial share of the sample population is semi-illiterate limits their usage of the SMS service.

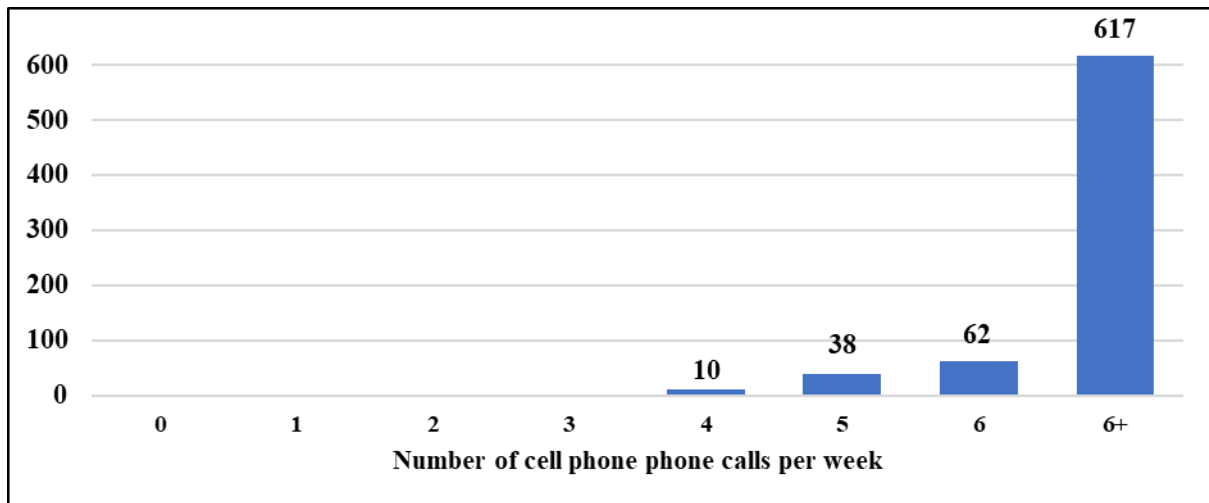
**Table 4.3: Smallholder farmer education levels, Mozambique**

Education level	Percentage of rural farmers
No schooling education	33%
Pre-primary education	3%
Primary school education	51%
Secondary school education	12%
Higher education	0%

Source: CGAP (2017)

<sup>17</sup> WhatsApp is a free messaging and calling service which optimises cell phone internet services, connecting more than 1 billion people across 180 countries around the world. Although the service is stated as “free”, mobile data costs do apply.

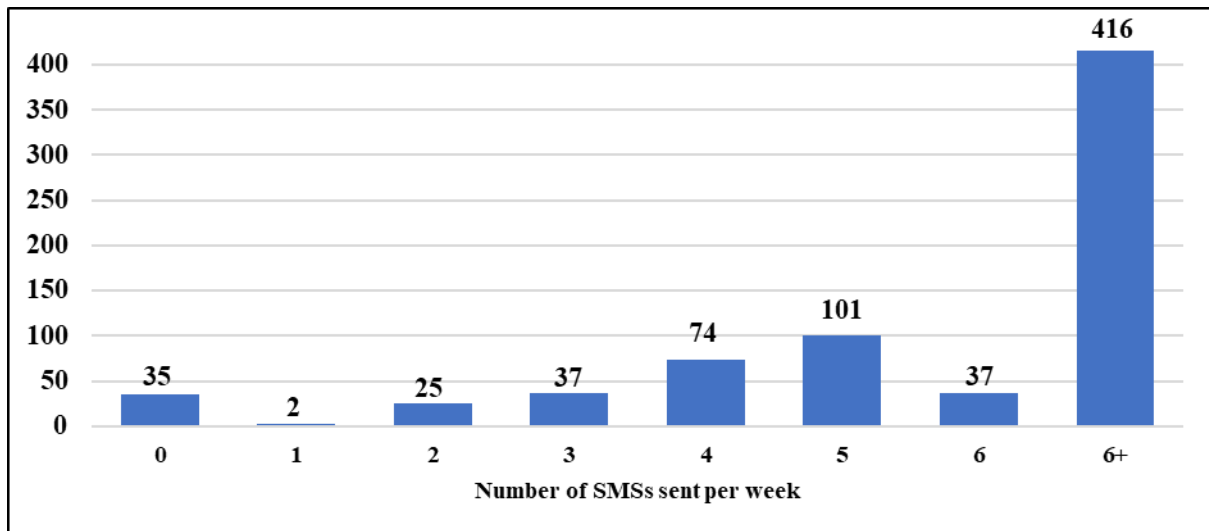
The results illustrated in Figure 4.6 were uniform across all three districts in which the survey was conducted; however, in Mossurize district, there was an even larger proportion of the rural farmers who indicated that they typically make more than six mobile phone calls per week. In contrast, in both Sussundenga and Vanduzi districts, there was more of a dispersion across the frequencies of four, five and six times per week. Nevertheless, across all three districts, the ordinary rural farmer responded that he or she typically makes more than six mobile phone calls per week.



**Figure 4.6: Number of mobile phone calls made per week by rural farmers on a provincial level (n=727)**

Source: Own Data

Question 7 was structured similarly to Question 6, although in this question, respondents were required to indicate their weekly SMS execution. The results indicate that 57 percent of rural farmers typically send more than six SMSs per week, again, translating to at least one SMS per day – these are typically rural farmers from the region of Mossurize. In Question 6, 85 percent of rural farmers indicated that they make more than six mobile phone calls per week. Accordingly, the frequency of SMSs sent per week are more widely dispersed than the number of mobile phone calls executed per week by rural farmers, which is indicative of a preference for mobile phone calling over the use of SMSs. In Figure 4.7, it is evident that 97 of the respondents (14 percent) send three or fewer SMSs per week (mostly respondents from the areas surrounding the town of Munhinga). Of the 97 respondents who send three or fewer SMSs per week, 35 do not send SMSs at all (36 percent). Other than those respondents who indicated that they send more than six SMSs per week, there is a relatively large share of the population which typically sends five SMSs per week, and these are mostly rural farmers from the region of Vanduzi.

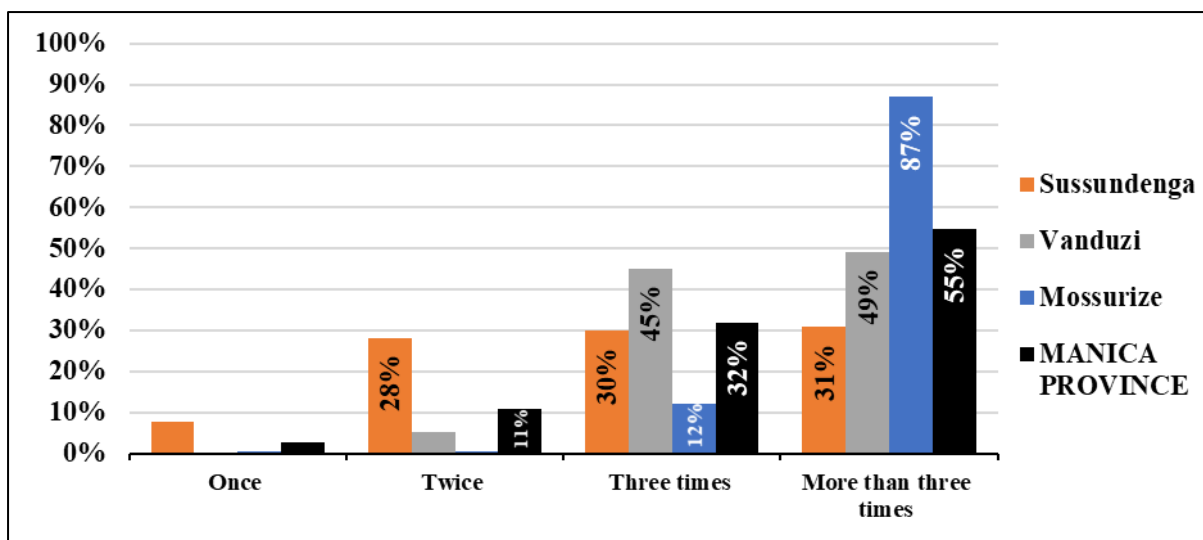


**Figure 4.7: Number of SMSs sent per week by rural farmers on a provincial level (n=727)**

Source: Own Data

The objective of Question 8 was to determine the frequency of mobile phone airtime (MNO-currency) purchases per week, while the objective of Question 9 was to establish the monetary value of airtime purchases per week. As part of Question 10, the objective was to determine where farmers usually make mobile phone airtime purchases, as this would provide an indication of the level of effort required by rural farmers to make use of their mobile phone services.

On a provincial level, 55 percent of the respondents indicated that they typically purchased mobile phone airtime more than three times per week, while 32 percent of the respondents indicated that they typically purchased airtime three times per week. The results, however, differ across the three districts. In Mossurize, for example, 87 percent of the 200 respondents indicated that they purchased airtime more than three times per week. The results could be attributed to the fact that rural farmers in the Mossurize region are slightly more educated, with a higher standard of living, than farmers from the areas surrounding Sussundenga and Vanduzi. The reason for this being that the that farmers from the region typically own larger tracts of land which is enhanced by the fact that the agricultural land and climate in the Mossurize region is more conducive for agricultural production. The ownership of larger tracts of land does not necessarily indicate wealthier farmers, but also emphasises the low population density of the region due to its challenging nature. This may thus be a contributor to the level of disposable income of these farmers, which is assumed to be higher in the Mossurize area than in the areas surrounding Sussundenga and Vanduzi. In comparison with the results from Mossurize, the results from the two other districts, Sussundenga and Vanduzi, indicated that only 31 percent and 49 percent of the respondents from each district, respectively, purchased airtime more than three times per week.

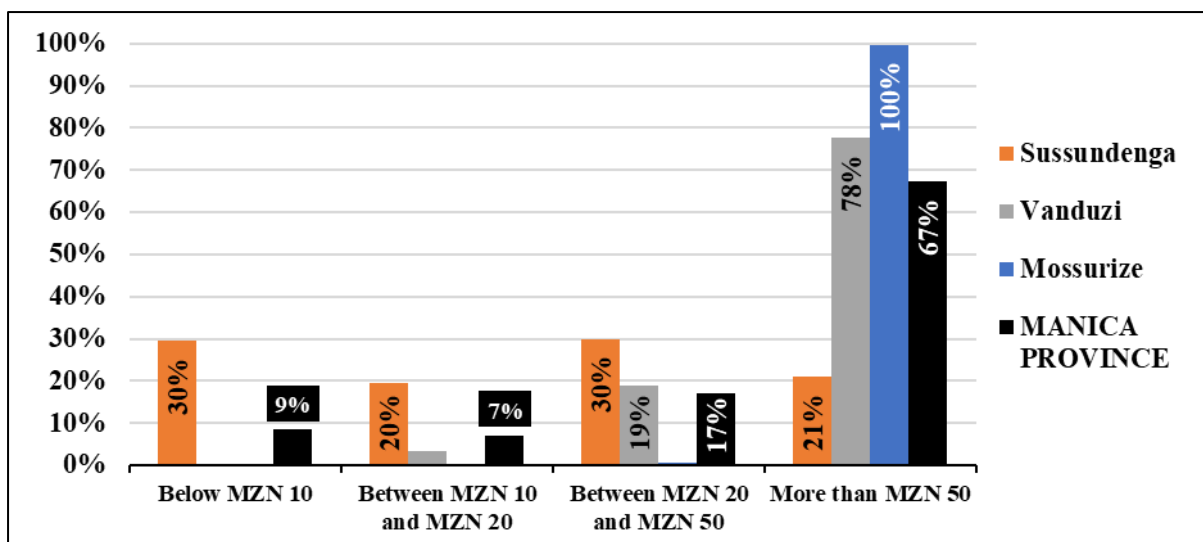


**Figure 4.8: Weekly airtime purchase frequency, per district and province, percentage of rural farmers (n=727)**

Source: Own Data

On a provincial level, the results presented in Figure 4.9 indicate that 67 percent of the respondents purchased in excess of MZN50<sup>18</sup> of airtime per week. It must be taken into consideration that the fact that 100 percent of the 200 respondents from Mossurize indicated that they purchased in excess of MZN50 of airtime per week, which does not correlate with the responses from the farmers from Sussundenga and Vanduzi. The primary assumption for this phenomenon is the fact that rural farmers in the Mossurize region are much more widely dispersed than those in the areas surrounding of Sussundenga and Vanduzi are, and are generally wealthier, which enables these farmers to make more phone calls. Ultimately, rural farmers in the Mossurize area are more reliant on mobile phones for communication between each other than their counterparts in Sussundenga and Vanduzi are. On a district basis, the results are uniformly distributed across all the response options for rural farmers from Sussundenga. There is a strong indication that some rural farmers from Sussundenga spend relatively heavily on airtime purchases, while there are also farmers who have minimal airtime expenditures per week. In the district of Vanduzi, it is evident that rural farmers usually spend more heavily on airtime than the farmers from Sussundenga do. The results indicate that the traditional rural farmer from Vanduzi spends more than MZN50 on airtime purchases per week. This is in line with the overall results from Manica Province, in which rural farmers do, in fact, tend to spend more than MZN50 on airtime purchases per week, with 67 percent of rural farmers confirming this result.

<sup>18</sup> The official currency of Mozambique, the Mozambican Metical (MZN) – at the time of writing, the Mozambican Metical was trading at MZN5.26 to the South African Rand (R).

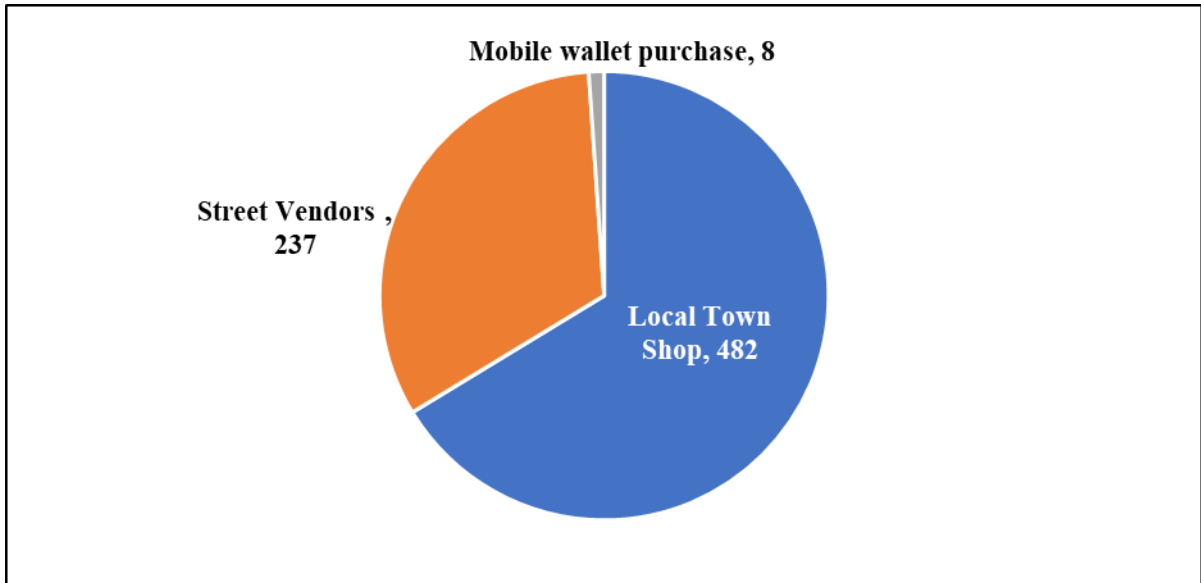


**Figure 4.9: Weekly airtime purchase values, per district and province, percentage of rural farmers (n=727)**

Source: Own Data

In the next question (Question 10), the survey endeavoured to determine how and where rural farmers typically made airtime purchases. This question ultimately leads into the mobile money aspect of the survey questionnaire, which will follow.

In Figure 4.10, it is evident that rural farmers typically purchase their airtime from local town shops, such as informal convenience shops and tuck shops, which trade in general household goods and possibly some agricultural goods too. The fact that 482 (66 percent) of the 727 respondents indicated that they make their airtime purchases from these local town shops is indicative of the fact that rural farmers still travel to local towns in order to stay connected to their networks. Of the 237 rural farmers who indicated that they typically make purchases from street vendors, nearly 100 percent of these respondents were from Vanduzi. Regardless, this indicates that farmers must typically travel away from their farm dwellings to purchase airtime, although this may not be exclusively for airtime purchases. Moreover, the fact that only 8 of the respondents indicated that they make airtime purchases via a mobile money service provides further grounds for the assumption that rural farmers typically travel in order to “re-charge” their airtime. This is suggestive that mobile money services remain largely unexploited by rural farmers.



**Figure 4.10: Source of airtime purchases (n=727)**

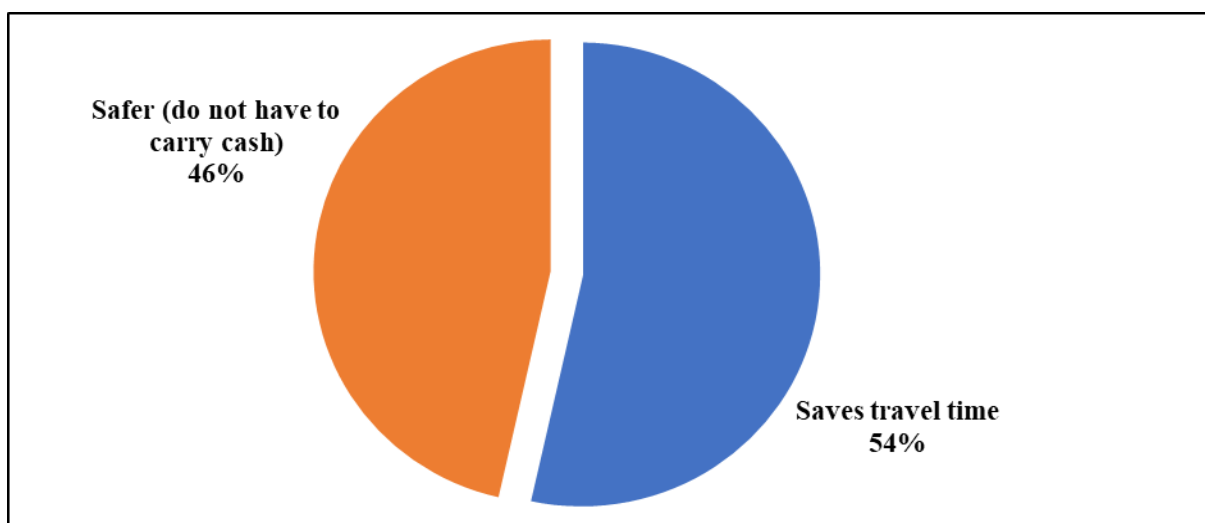
Source: Own Data

#### **4.5 Mobile money usage and preferences**

This section covers the core aspects of the survey which relate to questions regarding the current usages and preferences of mobile money services among rural farmers. Prior to this section, the survey questionnaire attempted to establish the extent to which rural farmers have access to financial services, while also attempting to establish the importance of mobile phone technology to the respondents. The results indicated that a negligible number of rural farmers had access to financial services, while their dependence on mobile phone technology is perceived to be high. This ultimately sets the foundation for the probable success of mobile money service utilisation. Accordingly, this section attempts to establish the reasons behind the adoption, or lack of adoption, of mobile money services.

Question 11 required the respondents to state whether they would prefer to purchase their weekly airtime through a mobile money service such as M-Pesa, versus traditional means of airtime purchases such as the sources illustrated in Figure 4.10. All 727 respondents responded positively. There were no pre-empted expectations that any of the respondents would respond negatively to Question 11. As part of question 11, and in particular as an augmented aspect of Question 11, the respondents were asked why they would prefer to make use of a mobile money service to make airtime purchases. The majority of the respondents (54 percent) indicated that they would prefer to make use of a mobile money service to purchase airtime, as it would save them a great deal of traveling time. The fact that a small proportion of the rural farmer population has access to financial services has been referred to in Section 4.2, where the costs of transport needed to travel to open banking accounts have been acknowledged as being a

deterrent. Therefore, the result indicating that farmers would prefer to make use of a mobile money service to make airtime purchases is in line with researcher's expectations. Just short of a majority, 46 percent of the rural farmers (338) indicated that making airtime purchases through a mobile money service would be safer, as it would enable rural farmers to avoid carrying cash with them while travelling. The fact that mobile money services enable users to avoid the risk of carrying cash, making it a safer option, has been described in detail in Subsection 2.4.1.1 as one being of the main benefits of making use of such a service. Respondents were given the opportunity to state other reasons why they would prefer to make use of a mobile money service to make airtime purchases, in an open-ended style question; however, none of the respondents indicated any other reasons.



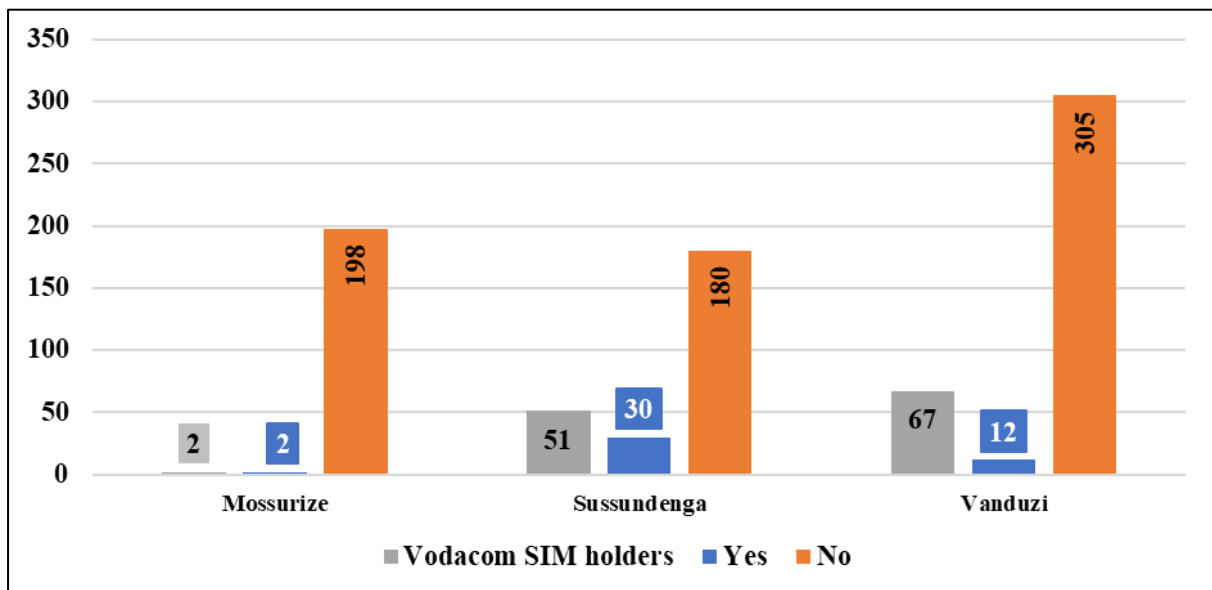
**Figure 4.11: Reasons why farmers would prefer making use of mobile money services to make airtime purchases (n=727)**

Source: Own Data

Question 12 of the survey questionnaire pertained particularly to rural farmers who are active users of the Vodacom network. The primary objective of this part of the survey was to establish the usage patterns and preferences of Vodacom's mobile money service, M-Pesa, in particular. The primary reason behind questioning the respondents specifically with regard to the M-Pesa mobile money service was the fact that the researcher made the informed decision that the M-Pesa mobile money service is the most well-known mobile money service amongst the Mozambican population (particularly the urban population), as well as the fact that the mobile money service delivered by Movitel (e-Mola) is still a relatively new entrant into the mobile money service industry. Movitel also has a relatively limited agency network, in comparison with that of Vodacom, which means that rural farmers would not have been exposed to the e-Mola mobile money service to the same extent as they would have been exposed to the M-Pesa mobile money service.



It is important to note that active Vodacom network users are not necessarily M-Pesa clients. Although the M-Pesa service is delivered by the Vodacom MNO, a Vodacom client must register an M-Pesa account in addition to registering as a Vodacom network client and user. A Vodacom account can thus exist without an M-Pesa account, although a user cannot have an active M-Pesa account without having an active Vodacom SIM card. Thus, Question 12 commenced by determining the number of Vodacom clients who are also active M-Pesa account holders. Of the 727 rural farmers, 44 respondents indicated that they have an active M-Pesa account. The lack of active M-Pesa accounts amongst rural farmers may be indicative of a lack of knowledge on the concept, a lack of physical points of presence by M-Pesa agents, and lastly, a lack of network coverage by Vodacom. The latter is likely to be the primary reason behind the lack of M-Pesa adoption in a district such as Mossurize where Vodacom has poor network coverage. The poor network coverage by both Vodacom and M-Cel has been illustrated in Figure 4.3, with a mere 94 respondents (13 percent) utilising the Vodacom network as their primary MNO network. There is thus a need for increased awareness surrounding mobile money services such as M-Pesa in all three districts, as well as, in particular, increased levels of MNO network coverage.



**Figure 4.12: Farmers with an active Vodacom SIM card and M-Pesa account, per district (n=727)**

Source: Own Data

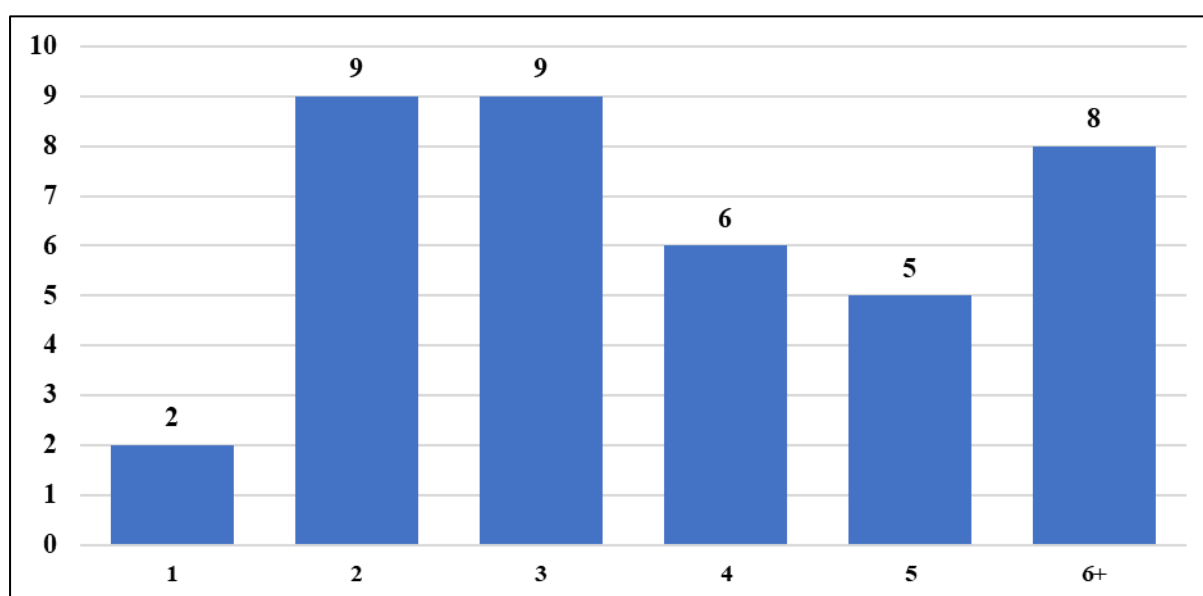
Of the 44 rural farmers who indicated that they had an active M-Pesa account, 39 of the respondents (87 percent) indicated that they had successfully performed a transaction through their M-Pesa account in the past.

**Table 4.4: Number of farmers which have successfully performed a M-Pesa transaction (n=44)**

	Area	Garagua Town	Munhinga Town	Vanduzi Town	Manica Province
Response	Yes	2	25	12	39
	No	0	5	0	5

Source: Own Data

To gain more clarity on the usage patterns of M-Pesa, a sub-question of Question 12 asked the respondents about the frequency of purchases, by the respondents, that were facilitated through M-Pesa on a monthly basis. This was an open-ended question. On a provincial level, most rural farmers execute between two and three M-Pesa transactions per month. There do appear to be some farmers who have come to terms with the benefits of utilising M-Pesa, with a fifth of the respondents indicating that they perform such a transaction six times or more per month, which can be translated to more than once per week.



**Figure 4.13: Number of transactions performed per month by active, rural farmer, M-Pesa users (n=39)**

Source: Own Data

The third part of Question 12 related to the mobile money spending preferences of rural farmers. Respondents were required to rank their most-preferred transaction type from 1 to 6, with 1 being the most-preferred type of M-Pesa transaction. In order to analyse the responses received, all rankings of 1 received a weighting of six, while the second most-preferred ranking was assigned a weighting of five, thereafter reducing the weighing by one unit for each consecutive higher-ranking value; a ranking of 6 was therefore assigned with a weighting of one. From the literature review in Subsection 2.3, it was

established that in both Kenya and Uganda, the primary use for mobile money services was that of person-to-person transferring of money, while the settling of utility bills was also identified as being a common transaction by mobile money users in both countries.

**Table 4.5: Most preferred M-Pesa transactions by rural farmers (n=39)**

<b>Transaction type</b>	<b>Rank</b>
Purchasing of airtime	1
Transferring of money (person-to-person)	2
Purchasing of food and drinks at a local shop	3
Paying electricity (utility) bills	4
Purchasing of farming inputs at a local shop or agro-dealer	5
Purchasing of household consumables at a local shop	6

Source: Own Data

Of the 39 respondents who were eligible to take part in part three of Question 12, most indicated that their most-preferred M-Pesa transaction was that of purchasing airtime. This is likely due to the fact that the transaction of purchasing airtime is usually low in value, as well as high in convenience, as the respondent does not need to travel to a local shop in order to “top-up” his or her mobile network account with a network currency. It is assumed that for lower-value transactions such as airtime purchases, the sensitivity to inconvenience would be heightened.

In line with the literature review, respondents ranked the transferring of money between two persons as the second most-desired transaction. Person-to-person transfers can range greatly in value. Regardless, the ability to avoid the risk of carrying cash, as well as the convenience factor associated with such a transaction, provides a basis for the responses obtained.

The rankings obtained from the respondents for the remaining transaction choices that were presented to the respondents are in line with researcher’s initial expectations, with the exception of the low ranking of “purchasing of household consumables at a local shop”. It was assumed by the researcher that the most-preferred transactions by rural farmers would be low-value transactions, particularly amongst rural farmers who are not entirely familiar with M-Pesa and other mobile money services. Thus, the purchasing of household consumables was expected, by the researcher, to be ranked third. Taking into consideration that the purchase of household consumables is ranked lower than anticipated, both the paying of electricity bills and the purchasing of farming inputs are ranked relatively low, which is according to the researcher’s initial expectation. The payment of utility bills such as electricity bills is not a highly ranked transaction, as this type of transaction may be relatively high in value. Similarly, the purchasing of farming inputs is also relatively high in value, which may be a reason behind the

typical rural farmer not ranking such a transaction highly. Additionally, rural farmers are not typically reliant on account-related electricity sources. The researcher assumes that the respondents are not particularly accustomed to mobile money services and therefore lack trust in such a service, which discourages farmers from taking such a high perceived “risk” with their money. Due to the small number of respondents, and the fact that respondents were not required to rank all the preferences which were presented to them in the question, the lower-ranked transactions could simply be an indication that most of the respondents had never performed any of the transactions which were presented as part of the survey.

The final part of Question 12 (Part iv) was an open-ended question which was presented with the aim of understanding what feature of the M-Pesa mobile money service rural-farmer users mostly appreciated. The outcome of this question indicated which of the features of M-Pesa (and mobile money, in general) farmers most appreciated, thereby finding a definitive preference between the results between question 11 and 12 (part iii).

The different responses by the 44 respondents who took part in the final part of Question 12 are grouped into their most relevant categories in Table 4.6. The categories were created by the researcher and the stated question responses were assigned to their most suitable group, according to the researcher’s discretion. The results obtained in Part Four (iv) of Question 12 are in line with the responses in Question 11 and Question 12, part three (iii). In question 11, respondents were asked to provide reasons as to why they would prefer to make airtime purchases through M-Pesa. The majority of the respondents (54 percent) to Question 11 indicated that they most appreciated the time saving aspects of mobile money services, versus the safety aspect of mobile money services. In Question 12, Part Three (iii), respondents ranked the person-to-person transferring of money as their second most-preferred transaction type. There thus appears to be a definitive desire by rural farmers to have access to financial services which are convenient in terms of time-saving, and linked to this, there exists a strong demand for more convenient person-to-person money transfers, such as that offered by mobile money services.

**Table 4.6: Grouping of stated most appreciated functionalities or benefits of M-Pesa (n=44)**

Stated preference categories	Preference count
M-Pesa saves time travelling and is more convenient	25
Person-to-person transferring of money	10
M-Pesa is safer than physically carrying money	6
Purchasing of MNO airtime	2
Paying utility bills (such as electricity)	1

Source: Own Data

The subsequent question, Question 13, comprised three parts intended for those rural farmers who do not have access to an active M-Pesa account, of whom, there are 683 respondents. The purpose of Question 13 was to determine why rural farmers typically do not make use of mobile money services, and in particular the M-Pesa mobile money service, while similarly establishing whether rural farmers do have a definite demand for such services.

Part one of Question 13 was an open-ended question which required respondents to indicate the reasons why they do not make use of M-Pesa. The researcher grouped the reasons stated by the respondents according to their most relevant category. The researcher created each category which best described the responses. Of the 683 respondents who were required to provide a response to the first part of Question 13, only 137 rural farmers (20 percent) provided a legitimate response. Of the valid 137 responses, the overwhelming majority of rural farmers indicated that there is a lack of sufficient knowledge on M-Pesa. This is in line with the researcher’s initial anticipation, as Vodacom has poor network coverage in most of the rural areas in Manica Province. This suggests that the roll-out of M-Pesa and the introduction of the service to rural farmers would have been limited, resulting in inadequate levels of knowledge of the benefits, potential and physical utilisation of such a service by potential rural users.

**Table 4.7: Grouping of stated reasons behind the lack of M-Pesa adoption (n=683)**

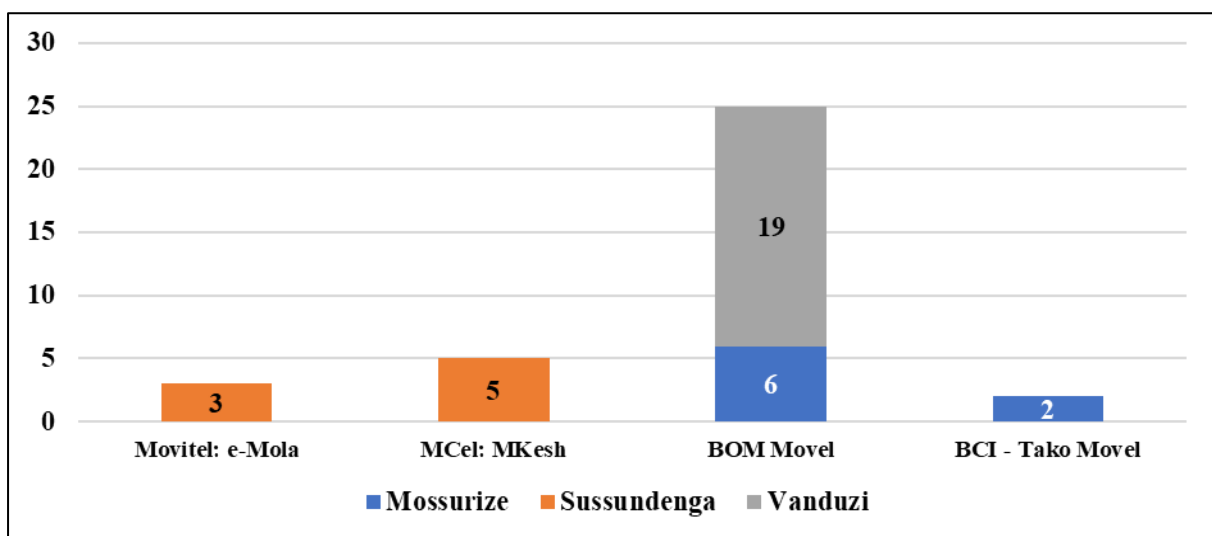
Stated reason categories	Reason count
No response	546
The respondent lacks sufficient knowledge on the M-Pesa mobile money service	131
The respondent does not have a Vodacom SIM card or does not have access to the Vodacom network	6

Source: Own Data

The objective of the second part to Question 13 was to understand the demand for a mobile money service such as M-Pesa. The response options available to respondents were a simple “yes” response or a “no” response. The expectation by the researcher prior to the results was that all rural farmers would be interested in making use of such a mobile money service. In the event, all respondents reacted positively to being asked whether they would like to try out such a service.

Question 14 was designed to gain an understanding of mobile money service adoption by rural farmers, in general, and not with a particular mobile money service in mind. The question was posed to the respondents in a closed-ended manner, although provision was made for an open-ended response in a case where respondents were making, or wished to make, use of a mobile money service unbeknown to

the researcher. The results of Question 14 are presented in Figure 4.14. Only 35 (5 percent) of the 727 farmers indicated that they are actively making use of a mobile money service other than M-Pesa. Interestingly, the most commonly used mobile money service is the mobile service offered by BOM – BOM Movel. In the literature, however, this is described as a mobile banking service and not a mobile money service. Regardless, it is considered as forming part of this study purely for the mobile aspect of the service. In Section 4.2, BOM is described as a bank that is actively pursuing rural farmer bank account openings, particularly in the region of the Mossurize district. The fact that, other than the M-Pesa mobile money service, 71 percent of respondents across Mossurize and Vanduzi have an active BOM Movel account is indicative of the relatively aggressive nature of BOM in obtaining rural farmer bank account openings. Against the researcher’s expectations, M-Cel’s m-Kesh mobile money service was actively used by more rural farmers than those farmers who are actively making use of the leading rural network provider’s mobile money service, e-Mola. The reason for this may be the fact that Movitel’s mobile money service is the most recently introduced mobile money service in Mozambique, coupled with the fact that the service lacks severely in terms of the e-Mola agency network, when compared with the agency network established by Vodacom’s M-Pesa. Moreover, m-Kesh is the longest-serving mobile money service in Mozambique, and as a result, the few farmers who have an m-Kesh account had adopted the service after its introduction as far back as the year 2011, but had not been actively using the service since. Those respondents who indicated that they were making use of a mobile money service, other than the mobile money service options presented in the survey questionnaire, reported that they made use of the mobile banking service offered by BCI, called BCI Tako Movel. This can be explained by the fact that there is a BCI bank branch in the town Garagua (Mossurize district), as both the respondents who indicated that they make use of this BCI mobile banking service originated from Mossurize.



**Figure 4.14: Mobile money services utilised by rural farmers, per town, other than M-Pesa (n=727)**

Source: Own Data

To conclude, the results suggest that rural farmers value the time-saving aspect which is offered by mobile money services, as the responses indicate that these rural farmers typically prefer to perform low-value transaction through their mobile money services. The convenience that is related to not having to travel when completing low-value transactions is reflected in the fact that the rural farmers distinctly indicated that their most-preferred mobile money transactions include airtime purchases and person-to-person money transfers. Moreover, a substantial number of rural farmers lack a basic understanding of what a mobile money service such as M-Pesa has to offer, which is represented in the discouraging low levels of mobile money service adoption rates.

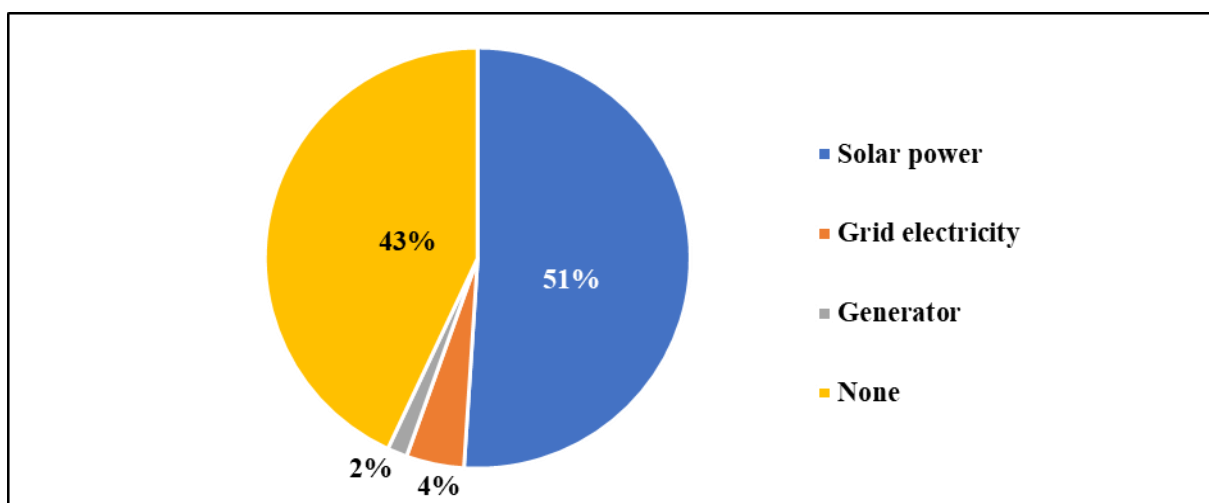
#### **4.6 Restrictive conditions to mobile technology utilisation among rural farmers**

Having established the mobile money usage patterns and preferences of rural farmers, the survey questionnaire now turns to determining the factors which limit the utilisation of mobile technology, and consequently, mobile money services.

In Question 15, the respondents were asked to provide an indication of the electricity source which they make use of at their homes, if any. It must be highlighted that a lack of an electricity source at the home of a respondent will result in the respondent being discouraged from making use of a mobile money service due to the fact that such a service may consume the much-valued battery life of the respondent's mobile phone. The implication of this is that the respondent will, in the best case, have to travel to a relative or acquaintance to charge his or her mobile phone battery, which may lead to additional monetary costs being borne by the respondent.

Against the researcher's expectation, the results depicted in Figure 4.15 show that 57 percent of the 727 rural farmers surveyed indicated that they do have some form of electricity source at their homes. The lack of national grid electricity infrastructure in the highly remote areas of rural Manica Province is reflected in the fact that 51 percent of respondents make use of solar power as a source of electricity at their homes. It is presumed by the researcher that there are governmental or donor programmes which encourage the use of solar power electricity sources, or that the technological developments in the developing world have prompted rural farmers to find a solution to their lack of access to grid electricity, thus making use of solar electricity sources. Of the respondents who indicated that they had access to grid electricity at their homes, 78 percent were from Sussundenga, which reflects the fact that these rural farmers' homes are situated in close proximity to the district town of Munhinga. The extreme remoteness of the rural farmers situated in Mossurize is emphasised by the fact that all respondents to this question stated that they made use of a petrol generator as a source of electricity. Petrol generators are typically expensive items of equipment, particularly in relation to the disposable income available

to rural farmers. The capital outlay needed for such an investment is most likely out of the reach of an individual rural farmer, thus suggesting that such investments by rural farmers could be made by a group of farmers who invest in a communal petrol generator. In Mossurize, all respondents indicated that they had a power source at their home, while in the areas of Sussundenga and Vanduzi, 78 percent and 12 percent of the respondents, respectively, indicated that they had an electricity source at their home. The substantial difference may indicate that respondents did not understand the question correctly, as it was expected that the responses would be similar, particularly between the two districts of Sussundenga and Vanduzi, as they are both situated substantially closer to the provincial capital city, Chimoio.

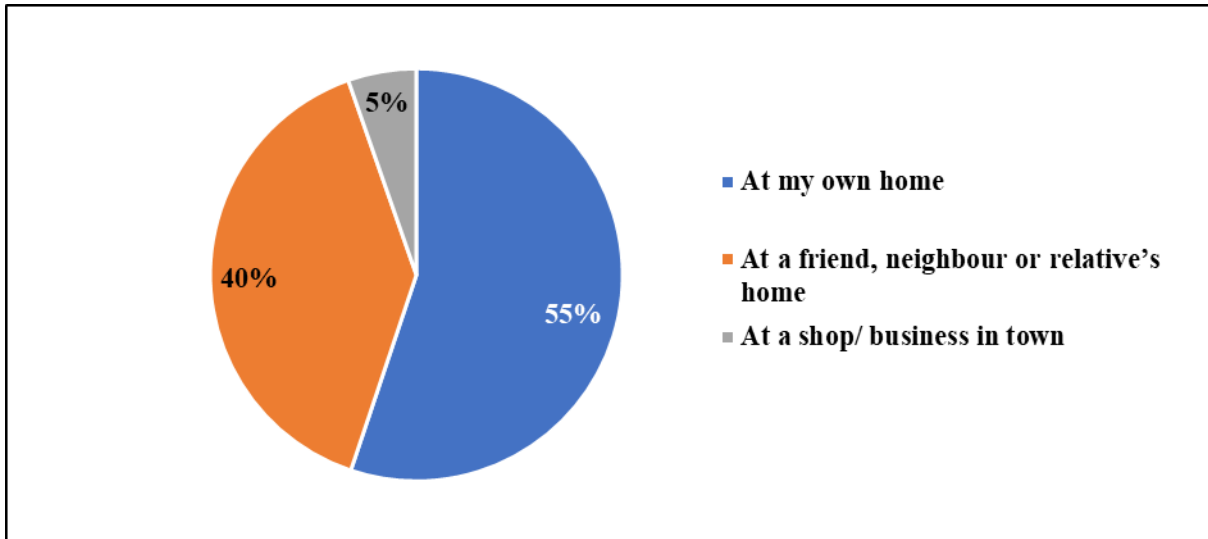


**Figure 4.15: Electricity source at the home of rural farmers, by electricity source type (n=727)**

Source: Own Data

Question 16 was presented to the survey participants in order to establish how rural farmers made use of their mobile phones, which are reliant on an electricity source. The respondents were asked to indicate where they usually charged their mobile phone batteries. The importance of this question is that it leads to Question 17 which determines whether rural farmers have to pay, and at what cost, to charge their mobile phone battery. In line with the results of Question 15 which established that 57 percent of rural farmers have access to an electricity source at their home, 55 percent of rural farmers charge their mobile phone batteries at their own home, making use of their own sources of electricity, being solar power, petrol generators or national grid electricity. The other two percent indicated that they charge their mobile phone batteries elsewhere. Nearly half of the respondents (326) who charge their mobile phone batteries elsewhere because of a lack of an electrical source at their home, charge their mobile phone batteries at the homes of their friends, neighbours or relatives in the community, while a small number of rural farmers charge their mobile phone batteries at a local shop or a business in town, at a cost.

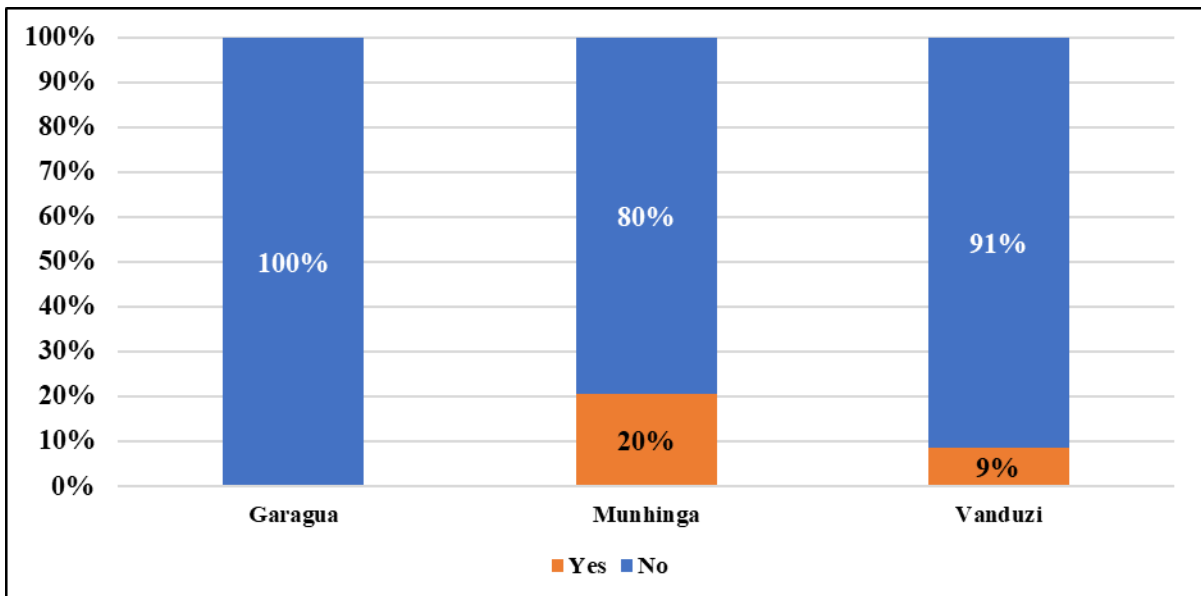




**Figure 4.16: Mobile phone battery charging location (n=727)**

Source: Own Data

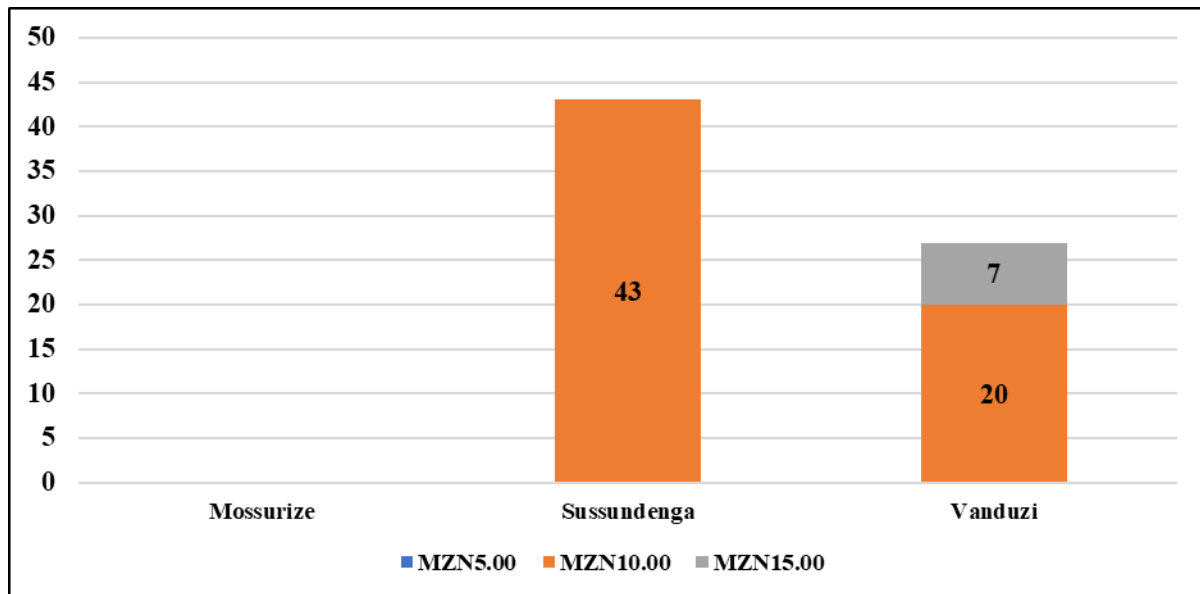
Figure 4.17 presents the responses to Part one of Question 17, which asked respondents to state whether they experienced monetary obligations when charging their mobile phone batteries. In Mossurize, where respondents have access to an electricity source near at their homes, the answer was “no”. In Sussundenga, 20 percent said there was a cost. In Vanduzi district, only nine percent of the respondents indicated that there was a cost associated with charging their mobile phone batteries.



**Figure 4.17: Payment versus non-payment in charging mobile phone batteries among rural farmers (n=727)**

Source: Own Data

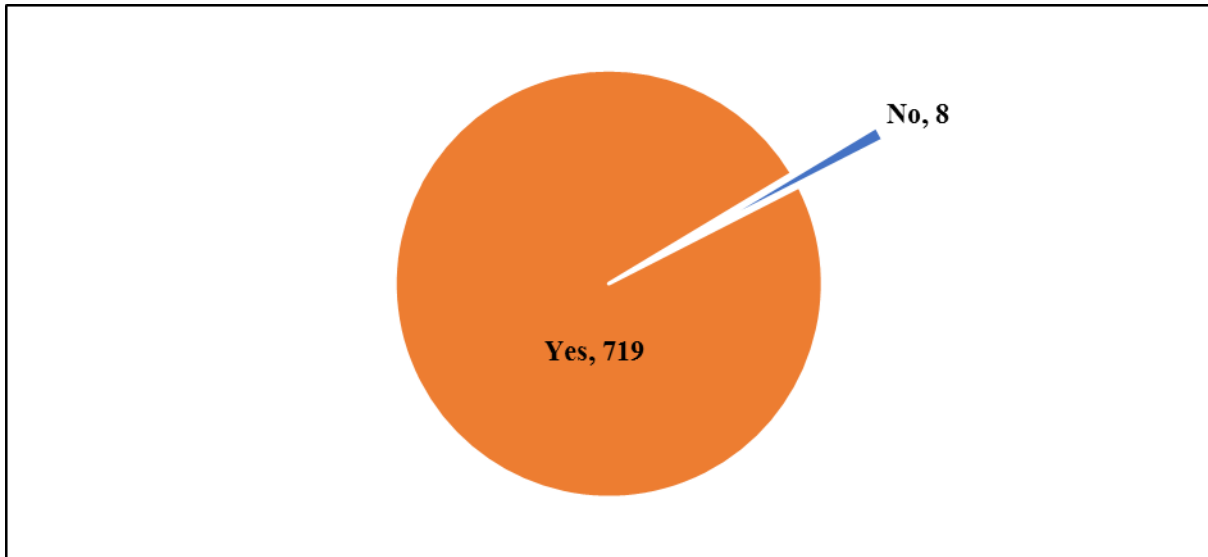
In Part Two of Question 17, farmers were asked how much they typically pay to charge their mobile phone batteries. In Sussundenga, farmers indicated that it costs them MZN10. Similarly, in Vanduzi, farmers mostly pay MZN10, while a number of farmers indicated that they pay an MZN15 per charge. The results are depicted in Figure 4.18. If it is assumed that the typical rural farmer must charge his or her mobile phone battery once in every two days, the cost would therefore be approximately MZN152 per month.



**Figure 4.18: Monetary cost estimate for a rural farmer to fully charge his/her mobile phone, per district (n=70)**

Source: Own Data

The final question of the survey, Question 18, aimed to establish the primary reason as to why a rural farmer would typically switch off his or her mobile phone, with the expectation being that rural farmers would do so to save the battery life of their mobile phones. Contrary to the researcher's expectation, only eight of the 727 respondents (slightly more than one percent) switched their cell phones off, with all of these respondents doing so to save their mobile phone battery. It appears that farmers regard a mobile phone as a very important tool for communication and have become dependent on this technology, which opens up other opportunities, such as financial services, with the mobile phone as the main medium of communication.



**Figure 4.19: Number of farmers that keep their mobile phone switched on at all times (n=727)**

Source: Own Data

To conclude, it was determined in this section of the survey that at least half of the rural farmers have access to an electricity source at their home and can thus charge their mobile phones without any monetary cost. Of those farmers who indicated that they have to charge their mobile phone batteries elsewhere, less than a fifth have to pay for charging. However, the costs could add up to about MZN150 per month for those farmers who are required to pay. It is significant, though, that 98.9 percent of the rural farmers prefer to keep their mobile phones switched on at all times. This is an indication of their dependency on their mobile phones as a communication tool and a mechanism to reach out to other farmers, as well as for gaining access to non-traditional financial services.

#### **4.7 Verification of rural farmer responses from an agro-dealer perspective**

In order to verify the results obtained from the rural farmer survey questionnaire on mobile and associated mobile money usage, preferences and behaviour of rural farmers, three rural agro-dealers, one in each of the towns, Garagua (Mossurize district), Munhinga (Sussundenga district) and Vanduzi (Vanduzi district), were approached to gain an understanding of rural farmers' spending patterns from a point-of-sale perspective. Moreover, the agro-dealers would play a critical part in realising the potential of providing mobile money services in rural areas of Manica Province, as they could typically comprise one of the few mobile money physical points of reference, with whom farmers could transact. The three agro-dealers identified are all at least a Vodacom M-Pesa agent. Although these three M-Pesa agents are referred to as agro-dealers, all three of these agents are primarily general dealers who sell farming inputs in addition to general household consumables. The results from the three survey questionnaires are analysed in this section.

Initially, the researcher attempted to gauge the customer base of the various agro-dealers. The reason is that the survey results have already determined that the most-preferred mobile money transactions by farmers are those of purchasing airtime and transferring of money (Table 4.5). However, when it comes to retail transactions, it is required to determine whether the agro-dealer responses are aligned with the responses obtained from the rural farmers, as this would indicate that the agro-dealers' businesses are set up in such a way that facilitates mobile money sales to rural farmers. This was an open-ended question. The agro-dealers in all the three towns made reference to the fact that they believe that they service all rural farmers in the areas surrounding their towns, which made it difficult for these agro-dealers to state exactly which districts and villages they service. The agro-dealer in Garagua made reference to 12 specific villages which he services in the region surrounding the town of Garagua. The agro-dealer in Munhinga indicated that he services around 5 300 rural farmers, located across the province of Manica. These estimates cannot be verified by the researcher. It is emphasised that, although these agro-dealers appear to be operating successful businesses, they remain largely unskilled in an academic sense, while their entrepreneurial ability is not questionable. Therefore, their responses to the survey questions cannot be taken as factual, but rather as subjective opinion.

According to the researcher's estimates, rural farmers may have to travel excessive distances in order to get crucial farming inputs, which are often only stocked by a selected number of agro-dealers such as the two agro-dealers in Munhinga and Vanduzi Town. These two agro-dealers are part of a program initiated under the World Food Program, through which farmers make agricultural input purchases using a credit card issued by the Food and Agriculture Organization of the United Nations (FAO). Figure 3.1 indicates the location of each of the agro-dealers. The agro-dealer in the Garagua region is presumed to be servicing villages south of the town with entry and exit routes to the north, towards the province capital city, Chimoio, which is highly inaccessible for rural farmers. Therefore, the agro-dealer in Munhinga is assumed to service most farmers south of Munhinga, between Munhinga and Espungabera, the nearest town with commercial activity, to Garagua. The agro-dealer in Vanduzi Town is assumed to service rural farmers to the north of the town, away from the provincial capital, Chimoio.

In Question 2 and Question 3, all three agro-dealers responded similarly, indicating that they accept mobile money transactions in order to sell goods to rural farmers. The agro-dealers do not have any reservations on what items are sold through mobile money transactions and there are also no limits on the value of transactions. The researcher initially assumed that there could be a minimum spend required to make a mobile money transaction worth the while of the agro-dealer; however, this assumption was dispelled. This is important for the growth of the mobile money economy, specifically with respect to rural farmers, as respondents to Question 12 of the rural farmer survey indicated that they prefer to perform low-value M-Pesa transactions, such as airtime purchases and person-to-person money

transfers. While this is indicative of rural farmers not being entirely trusting of mobile money services for high-value transactions, the ability of rural farmers to initially start off with low-value purchase transactions at agro-dealers will reinforce their trust in such services. This will, in turn, lead to a greater adoption of mobile money services by rural farmers, with the progression of time.

Table 4.8 summarises the responses by agro-dealers when questioned on which mobile money services they utilise in their daily business (Question 3). All three of the agro-dealers indicated that they make use of the mobile money services offered by Vodacom (M-Pesa) and Movitel (e-Mola). The general consensus, though, is that Movitel's e-Mola mobile money service is still relatively new in the mobile money industry and that rural farmers lack sufficient knowledge regarding the service, rendering it largely unutilised by rural farmers. The three agro-dealers indicated unanimously that they appreciated the mobile money services as these enable transactions to be made which would not have been possible in cases where rural farmers lacked physical cash. However, the two agro-dealers in the towns of Munhinga and Vanduzi indicated that the percentage of mobile money transactions of all daily transactions is still low, specifically responding that these transactions represent less than 5 percent of all transactions. In Garagua, the agro-dealer indicated the number of mobile money transactions per day was 50, although the agro-dealer was not able to quantify the value of these transactions. The agro-dealers unanimously indicated that despite mobile money transactions representing a small proportion of their daily transactions, it is a growing aspect of the business.

The two agro-dealers in the towns of Munhinga and Vanduzi did indicate that they make use of two additional financial services. Both these agro-dealers form part of a programme of the FAO which provides rural farmers with credit cards, through which farming inputs can be purchased. This credit card is accepted by both of the agro-dealers in Munhinga and Vanduzi Towns. Moreover, the agro-dealer in Vanduzi Town makes use of a service offered by BIM called "Jaja", which enables the agro-dealer to accept debit card and credit card payments by BIM clients (Table 4.8).

**Table 4.8: Financial service used for transactions by agro-dealers**

<b>Town</b>	<b>Mobile money service used<sup>19</sup></b>
<b>Garagua</b>	Vodacom M-Pesa Movitel e-Mola
<b>Munhinga</b>	Vodacom M-Pesa Movitel e-Mola FAO Credit Card
<b>Vanduzi</b>	Vodacom M-Pesa Movitel e-Mola FAO Credit Card BIM Jaja Card

Source: Own Data

It must be noted that debit card and credit card facilities at rural agro-dealers are not as common as they are at urban area retailers. Although a study into alternative payment mechanisms is beyond the scope of this study, the researcher assumes that the ease of doing mobile money transactions, as compared with obtaining credit or debit card point-of-sale infrastructure, would lead to their domination over traditional payment methods such a debit and credit card facilities, especially in rural areas. It is assumed that rural farmers would thus adopt mobile money services before adopting traditional accounts such as debit and credit accounts with formal banking institutions. The basic functions of mobile money services, mobile banking services, and traditional banking services are summarised in Table 4.9.

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<sup>19</sup> Although reference is made to mobile money services, non-traditional financial services are included for the purpose of emphasising the adoption of these non-traditional financial services.

**Table 4.9: Comparison of the functionalities of selected financial services**

	<b>Mobile money</b>	<b>Mobile banking</b>	<b>Traditional banking</b>
<b>Functionalities</b>	<ul style="list-style-type: none"> <li>• Deposits</li> <li>• Withdrawals</li> <li>• Send and receive person-to-person money transfers</li> <li>• Execute person-to-business payments</li> <li>• Bill payments</li> <li>• Balance enquiry</li> <li>• Receive loan disbursements</li> </ul>	<ul style="list-style-type: none"> <li>• Send and receive person-to-person money transfers</li> <li>• Execute person-to-business payments</li> <li>• Intra-account transfers</li> <li>• Bill payments</li> <li>• Balance enquiry</li> </ul>	<ul style="list-style-type: none"> <li>• Deposits</li> <li>• Withdrawals</li> <li>• Send and receive person-to-person money transfers</li> <li>• Execute person-to-business payments</li> <li>• Bill payments</li> <li>• Balance enquiry</li> <li>• Financial and account advisory</li> <li>• Loan applications</li> </ul>
<b>Target population</b>	Unbanked and rural	Banked, rural, with focus on urban	Both banked and unbanked, rural, with focus on urban
<b>Dependency</b>	MNO and mobile phone	MNO, mobile phone and bank branch	Physical bank branch
<b>Facilitating platform</b>	Unstructured Supplementary Service Data (at least 2G)	Internet (GPRS, 3G)	Bank branch, Human resources, Automated Teller Machines (ATMs), Debit/credit card point-of-sale infrastructure

Source: Adapted from Firpo (2009), Etim (2014) and LaFleche (2010)

The agro-dealers were requested to indicate whether they felt that mobile money services are safer for them, in terms of cash theft. All three agro-dealers indicated positive responses. Although mobile money is generally considered safer by both agro-dealers and rural farmers, there remains a threat to mobile money service users who are uneducated and ignorant of the intrinsic threats which exist with such a service. The three respondents consistently indicated that they believe that mobile money services are, however, safer for both agents and rural farmers who make use of such services.

The respondents were asked to rank the mobile money transactions mostly performed through mobile money services. The results are ranked in Table 4.10. The three agro-dealers indicated that rural farmers typically made use of the mobile money function for executing person-to-person transfers of money. In Table 4.5 in Section 4.5, farmers ranked the person-to-person transfer of mobile money second. However, this discrepancy can be explained by that fact that the agro-dealer has included rural farmers who are not M-Pesa clients.

It is apparent that rural farmers who are not M-Pesa clients approach M-Pesa agents, such as the agro-dealers, and request these agents to make mobile money transfers to a friend or relative who does have an M-Pesa account. The rural farmers provide the mobile money agent with the cash that finances the transaction. This emphasises the need for mobile money services, but at the same time illustrates the lack of knowledge on mobile money services and thus the lack of adoption thereof. The fact that person-to-person transfers of money and the purchasing of airtime are ranked as the two most-preferred mobile money transactions by rural farmers, from a vendor point-of-view, validates the rankings by rural farmers in Table 4.5 of Section 4.4

**Table 4.10: Ranking of transactions mostly executed by rural farmers at agro-dealer shops**

Transaction type	Rank
Transferring of money (person-to-person)	1
Purchasing of airtime	2
Settlement of utility bills (water, electricity and TV)	3

Source: Own Data

The respondents were asked whether they prefer to facilitate mobile money transactions for low-value or high-value transactions. All three respondents indicated that they do not have a preference and that any value of transaction is facilitated, although from a profit point-of-view, higher value transactions are always preferred. The fact that there are no preferences with regard to the value of transactions facilitated through mobile money services is indicative of the fact that there is sufficient commission to be earned by agro-dealers, who are mobile money agents, on all types of transactions. Moreover, the agro-dealers indicated that there are no restrictions on the types of products which are sold through mobile money services. Therefore, although mobile money services do not form a large part of the businesses transactions, these services appear to be utilised to maximise sales where there may have been a lack, historically, due to a lack of cash carried by potential customers.

A drawback to the use of mobile money services, from an agent or vendor point-of-view, is identified by the survey. The respondents were asked, in Question 11, whether they experienced any cash float<sup>20</sup> problems, and in particular, a cash-float deficit. The only agro-dealer who responded positively to this question was the agro-dealer in Munhinga. The agro-dealer indicated that there had been times when the number of cash-outs by M-Pesa clients exceeded the number of cash-ins by clients, thus creating a shortage in the cash float. The agro-dealer in Munhinga is a well-established agro-dealer and has been making use of the M-Pesa mobile money service for a substantial number of years, which could indicate

<sup>20</sup> 'Cash float' refers to cash which is supplied by the MNO for facilitating the cash-out process, whereby mobile money clients withdraw their electronic money and exchange this electronic money for physical cash.



that this may have been a historical problem which has been resolved by the MNOs, in partnership with super agents such as commercial banks, as the respondents in both towns of Garagua and Vanduzi indicated that they have not experienced such issues. The fact that cash must still be transported to highly remote areas remains a limiting factor of mobile money, and for the supply of cash in general. Regardless, the imbalance between cash-in and cash-out frequencies is a trend which is changing as more farmers become accustomed to mobile money services and the agency networks grow. It must, however, be noted that this trend lacks empirical evidence, as the evaluation of this trend fell outside the scope of this survey.

In Question 9 and Question 10, the objective was to determine the cash-in and cash-out frequencies by rural farmers, per week. The respondents indicated, in Question 9, that the number of cash-in frequencies varied from week-to-week, although the estimated number of transactions per week was 15 cash-in transactions. In terms of the frequency of cash-out transactions per month, the respondents indicated that these transactions typically occurred at the end of the month when mobile money clients received salaries that are paid into their mobile money accounts. The number of cash-out transactions per month was indicated to be as much as 20 per month, with the value of these transactions ranging between MZN500.00 and MZN2 000.00 per transaction.

As part of Question 11 and Question 12, the agro-dealers were questioned on initiatives which would increase the use of mobile money. Question 11 specifically identified a voucher system which would provide mobile money clients an opportunity to obtain discount on purchases at an agro-dealer shop. The agro-dealer respondents indicated that this would positively increase sales. Conversely, the agro-dealers were asked whether such voucher systems would increase the number of mobile money clients which performed transactions at an agro-dealer. The three agro-dealers consistently indicated that this would positively affect the number of users of mobile money clients. The responses to both Questions 11 and Question 12 indicate that there is potential in mobile money services, although rural farmers may simply lack incentives to make adopt these services in, at least, the initial stages of such services being introduced.

The results obtained indicate that there is a sufficient level of mobile money service physical points of reference available to rural farmers, as the three agro-dealers who were surveyed were each a mobile money service agent for at least two MNOs. There are no restrictions on what rural farmers can purchase at agro-dealers through their mobile money service, which is indicative of an acceptable commission structure, making mobile money transactions worthwhile from a vendor point-of-view. Despite this, the proportion of mobile money transactions represent a small proportion of the agro-dealers' businesses. However, the three agro-dealers believe it may grow in importance.

## 4.8 Conclusion

This chapter had the primary objective of establishing the levels of financial inclusion among rural farmers, as well as their mobile phone usage, preferences and behaviours. Accordingly, the following conclusions can be drawn from the analysis of the survey data:

The number of rural farmers in the province of Manica who are financially excluded is substantially high, with only four percent of the rural farmer respondents to the survey questionnaire indicating that they have access to their own bank account. This is in line with Section 2.3, in which it is emphasised that, of the rural farming population in Mozambique, a mere 4.7 percent of farmers have access to financing. The lack of financial access to the typical rural farmer thus suggests that the traditional “brick-and-mortar” bank is not the solution for overcoming this gap in financial inclusion.

Of the 727 rural farmers who formed part of the study, only six percent indicated that they had more than one mobile phone. The most-preferred MNO network by rural farmers is that of Movitel, the latest entrant into the Mozambican MNO sector. The survey results are indicative of Movitel’s successful penetration of the rural cellular market. This has at least two implications: either that farmers will soon start using Movitel’s e-Mola mobile money service because it is linked to the most-widespread MNO network (particularly in rural areas), or that the growth of mobile money will remain constrained by the inconvenience of churning between networks. Buying a second mobile phone or replacing an existing single-SIM mobile phone with a dual-SIM mobile phone is also a possibility, but this is likely to be a lengthy process. The survey also determined that the farmer’s mobile phone brand is important, either in combination with the MNO promotion package or because of its functionality – the iTel phone is such an example.

The mobile phone service that is mostly utilised by farmers is that of voice-calling services. In contrast, SMSs are not that frequently used by rural farmers, which may be indicative of the semi-illiterate status of the representative rural farmer. The survey results indicated that mobile phones are an important aspect of the rural farmers’ day-to-day lives, with the numbers of mobile voice-calls and airtime purchases being substantial on a weekly basis. Moreover, only a negligible number of rural farmers usually turned their mobile phones off for battery saving purposes. However, mobile money services remain unexploited, as 66 percent of rural farmers in Manica Province continue to make their airtime purchases at a local village or town shop, despite the possibility of making such a purchase through a mobile money service.

The lack of mobile money service adoption is represented in the results, which indicate that only six percent of the rural farmers make use of the M-Pesa mobile money service. This is indicative of three crucial mobile money adoption deterrents:

- i. There is poor network coverage by the Vodacom MNO, while the agency network of the Vodacom M-Pesa mobile money service is not conducive for facilitating mobile money transactions in rural areas.
- ii. The Movitel MNO network coverage is strong; however, the MNO's mobile money service, e-Mola, is severely lacking in its agency network.
- iii. Rural farmers generally lack a sufficient level of understanding of mobile money services and the benefits and functionalities of such services.

Moreover, of the six percent of rural farmers who actively make use of the M-Pesa mobile money service, 89 percent have successfully executed an M-Pesa transaction, with the typical number of transactions per month by rural-farmer M-Pesa users ranging between once and six times per month. The most-preferred type of M-Pesa transaction indicated by rural farmers is that of person-to-person money transfers, followed by the purchasing of mobile phone airtime. The two most-preferred transactions are both considered as being low-value transactions, which suggests that rural farmers are risk-averse, as it is likely that they are not completely trusting of mobile money services. These preferences are also highlighted by the three respondent agro-dealers as being the transaction types most preferred by rural farmers. Similarly, both the rural farmer respondents and the agro-dealer respondents indicated that rural farmers lack sufficient knowledge about mobile money services, which might be a deterrent to the adoption thereof. This achieved the secondary objective of this chapter, which set out to briefly analyse the interactions with the three agro-dealers, one in each district. Other than M-Pesa, farmers are actively making use of BOM's mobile banking service, BOM Movel. The mobile money service offered by MNO Movitel, e-Mola, is the mobile money service used the least by rural farmers.

The fact that 57 percent of rural farmers have access to some source of electricity near their homes is encouraging, as rural farmers can make full-use of their mobile phone services, with low levels of mobile phone battery-saving efforts.

Other relevant factors that came to light from the survey include:

- i. Rural farmers are aware of some of the benefits of utilising mobile money, despite the lack of adoption. The respondents indicated that they would mostly appreciate the fact that mobile money services are likely to increase the level of safety associated with carrying money.
- ii. Agro-dealers have mostly confirmed the farmer survey results. Although mobile money business still makes up only a small percentage, the agro-dealers perceive it as a growing segment for the future, and for this reason they are already offering the full range of mobile money services to their farmer clients.

## CHAPTER 5

### THE NEED FOR FARMER TRAINING MATERIAL AND COURSES

#### 5.1 Introduction

It was noted in Chapter 2 that rural farmers in the developing world lack sufficient access to financial services, while the adoption of mobile technology among these farmers has taken a “mobile first trajectory”, in which mobile phone technology is ubiquitous in nature. It is this paradox which presents an opportunity for enhancing the well-being of a substantial proportion of the population in the developing world, and in particular, the livelihoods of rural farmers. The results of the survey questionnaire of this study, which are discussed in Chapter 4, illustrate some key parallels between rural farmers in the developing world and rural farmers in the province of Manica, Mozambique.

The shortcomings attributed to the lack of mobile money services adoption has been attributed to a lack of adequate knowledge about mobile money services by rural farmers, amongst other things. While this knowledge gap is relevant to mobile money services, in isolation, it can further be attributed to a lack of financial literacy levels, which encompass financial services such as mobile money. The objective of this chapter is therefore to delve into the knowledge gaps of farmers, predominantly related to mobile money services, and how such knowledge gaps could possibly be overcome.

#### 5.2 Financial education and financial literacy

The global financial crisis experienced between 2007 and 2009 resulted in a heightened interest in financial literacy, not only in the developing world, but also in the developed world, particularly as much of the financial system failure was attributed to a lack of sound financial decision making on the part of consumers (Refera, Dhaliwal & Kaur, 2016). Since the financial crisis, the role of financial literacy has become central to gaining access to productive credit, while it has also been described as being a crucial element in the sound and efficient management of any particular business (Boekhold, 2016). Although financial education and financial literacy are two distinct concepts, these two concepts go hand-in-hand. Financial education is described by Kailanya (2014) as comprising the process with which individuals improve their understanding of financial concepts, services, and products, which leads to a heightened level of empowerment and better decision making. Financial literacy, however, is the combination of various skills and attitudes that are developed through an awareness and knowledge-building process, which is a prerequisite for sound financial decision making (Atkinson & Messy,

2012). The benefits of financial literacy have been categorised into three broad categories by Capuano and Ramsey (2011), as follows:

- i. **Individual benefits:** Individuals benefit from increased levels of financial literacy, as the likelihood of the individual's propensity to save will increase. Moreover, the individual's bargaining power in financial transactions and arrangements is heightened. Ultimately, increased levels of financial literacy are likely to increase the well-being of individuals.
- ii. **Benefits to the financial system:** Increases in the level of financial literacy among populations is likely to increase overall market discipline, while the reliance on the financial system for productive capital (such as production loans) is lowered.
- iii. **Benefits to the broader economy:** Economies are likely to benefit from increased level of financial literacy as levels of financial inclusion are expected to rise, which is likely to increase the well-being of society, while government regulatory policies are likely to be enhanced.

The fact that financial literacy is associated with improved financial decision making by households and increased savings and higher levels of welfare, coupled with the fact that it is described as a low-cost intervention, necessitates its inclusion in developmental strategies, as well as in farmer training (Cole, Sampson & Zia, 2009; Refera, Dhaliwal & Kaur, 2016). Rural farmers are described by Boekhold (2016) as lacking financial knowledge, skills and financial confidence, which is elaborated as constituting a lack of an understanding of their personal finance issues and the inability to apply knowledge to enhance their financial self-assurance. Financial literacy is thus considered as being a key pillar in the quest for enhancing levels of financial inclusion along with the three remaining pillars, being private sector development, microfinance, and public-sector support (Chibba, 2009). It has been illustrated in Chapter 4 that, despite the supply of mobile money services, there is a lack of adoption by rural farmer of such services, which ties in with Sayinzoga *et al.* (2013) who describe financial literacy interventions as being a crucial aspect of developmental strategies. This is evident in the results seen from a programme instituted by Vodacom M-Pesa in 2016, in which their Mozambican customer base grew by 200 000 customers after introducing a financial literacy campaign for its customers and agents (African Development Bank, 2017).

### 5.3 Linkages between financial literacy and mobile money services

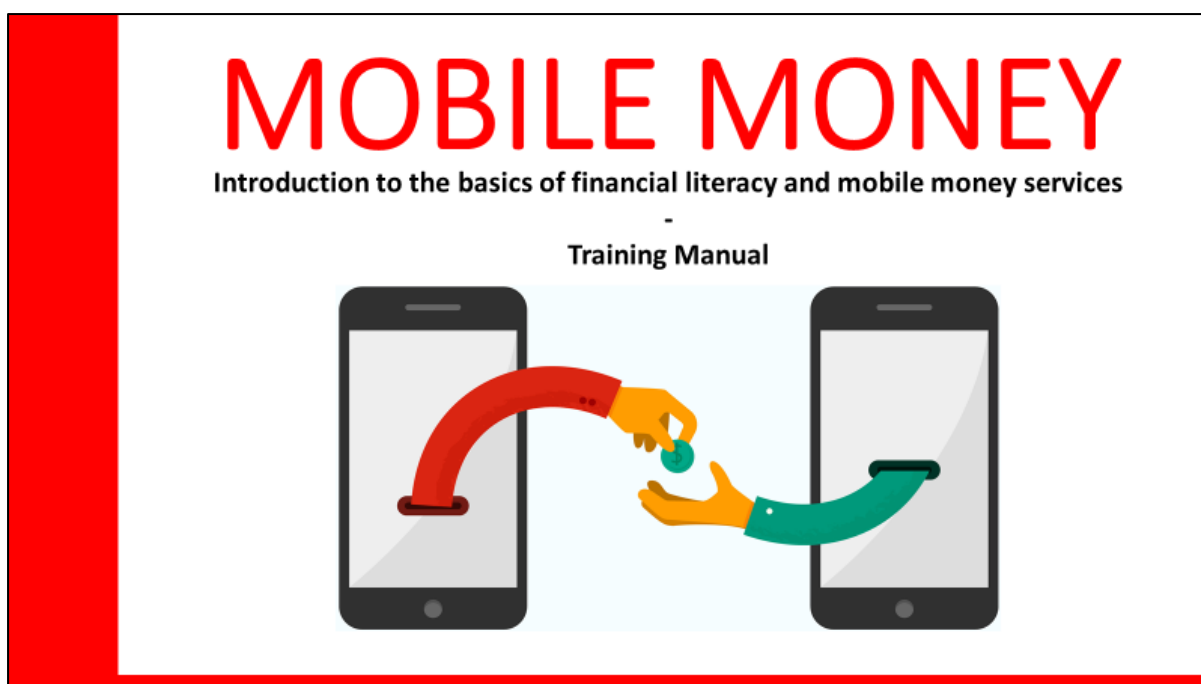
The results from the survey questionnaire in Chapter 4 have indicated that there is a certain lack of knowledge of mobile money services among rural farmers. While the survey focussed on the typical

rural farmer's preferences and behaviours with respect to mobile money services, the low levels of adoption of mobile money services and formal financial services justify the assumption that a general lack of financial education and literacy levels exists. This study has highlighted the potential of mobile money services for combating financial exclusion. Therefore, it is recommended that future financial development projects, which have a specific focus on mobile money services, should take account of the basic shortages of knowledge which have been identified in consequence of the survey responses discussed in Chapter 4. This chapter highlights some of the key areas of mobile money services in which a knowledge gap has been identified, as well as the manner in which prospective skills training manuals should be designed in order to overcome these knowledge gaps among rural farmers. It must be noted that the recommended design of training manuals referred to in this chapter takes the low education levels of rural farmers into consideration. Most importantly, it attempts to address the pertinent aspects that were highlighted by the survey necessary as being needed to accomplish increased mobile money service adoption and, ultimately, financial inclusion.

### **5.3.1 Introduction and overview of mobile money services**

A training manual is a crucial requirement in the attempt to harness the potential of mobile money to promote financial inclusion. The survey results indicated that 93% of rural farmers actively use either the Movitel or Vodacom networks. Despite this, more than 88 percent of rural farmers lack access to a mobile money or mobile banking account. The design and utilisation of mobile money and financial training efforts will thus be central in the introduction of mobile money services.

The introduction of training on mobile money services must assume that the rural-farmer audience that is receiving such training has very little, to no, understanding of mobile money services. Therefore, a training manual should describe to the audience what mobile money services are, as well as by whom such services can be used, and by which MNO such services are being provided. Additionally, such a training manual must not focus solely on mobile money training, but should also cover basic financial literacy principles and concepts. The introduction page of the training manual is of vital importance. The visual depiction of mobile money services must immediately capture the attention of rural farmers. In this training manual, the image on the introduction page depicts money changing hands. This image contains three important elements: firstly, hands that are reaching out through the mobile phones, which evokes a sense of the personal aspect of the training; secondly, the money, which is changing hands, is core to the financial aspect of the training; and thirdly, the mobile phones illustrate the capability that the technology has in stimulating improvements in the audience's daily lives.



**Figure 5.1: Mobile money training manual cover page**

Source: Verwey (2017)


Thus, the differences between physical, cash currency, MNO currency (airtime), and mobile money and electronic money (e-money) should be well differentiated and explained. Particularly, the difference between e-money and MNO-currency (airtime) should be well differentiated. Of the rural farmers who were surveyed, 88 percent are likely candidates for the adoption of mobile money services, whether M-Pesa or e-Mola. Stated otherwise, less than 12 percent of Movitel or Vodacom subscribers are active e-Mola or M-Pesa account holders. Those rural farmers who have active Movitel or Vodacom SIM cards must be convinced of the fact that, although their physical, cash currency is converted to e-money, the e-money serves as legal tender with an equivalent value to that of physical, cash currency, while this electronic money is not to be considered as airtime. Derived from the survey results, Figure 4.13 illustrates the point that, of those rural farmers who have an active mobile money account, the bottom 80 percent of users generally transact between once and five times per month, while 20 percent of the respondents usually transact six times or more per month. This is indicative of the potential of mobile money utilisation, once it is adopted and the benefits of such a service are understood. Therefore, the training of rural farmers on the basic concepts of mobile money services is likely to unlock the potential utilisation of such services among rural farmers. If all the rural farmers who participated in this survey, alone, were to adopt a mobile money service such as M-Pesa and transact two to three times per month, this would make a substantial difference over a very short period. There is a sense that rural farmers still generally prefer cash transactions, as very few rural farmers have in fact adopted a mobile money service, although those farmers who have adopted such services (such as M-Pesa) have provided a positive indication on their spending patterns (Question 12, Figure 4.13). Farmer training and education



on financial and mobile services is thus crucial to the growth in the adoption of mobile money services. The introduction of mobile money services to rural farmers must thus cover the most basic concepts of mobile money, as well as the basic mobile money transaction opportunities that are available to rural farmers. Moreover, rural farmers must be informed that loans from formal financial institutions can be disbursed through mobile money services, while loans can similarly be repaid to financial institutions.

## What is Mobile Money?

- Money which is on your mobile phone **BUT** it is **NOT** airtime
- It can be **transferred** between mobile phones which can be used to pay someone or even a shop (agent) – representing cash
  - ✓ Purchase airtime, groceries (Coca-Cola)
  - ✓ Pay Bills – Water Bill, TV Bills
  - ✓ (DStv, GOtv, Startimes...)
  - ✓ Money can be sent to friends/ family
  - ✓ Loans can be received/ re-paid



**Figure 5.2: Introduction of mobile money services and the differentiation between mobile money and physical cash currency**

Source: Verwey (2017)

Figure 5.3 illustrates the key stakeholders in the mobile money environment, from a rural farmer's point-of-view. It must be noted that there is an interconnectedness between all actors within the mobile money ecosystem. Moreover, it is important to educate rural farmers on the idea of a mobile money ecosystem in which money rotates<sup>21</sup> as this is central to the growth and potential of the mobile money economy. From the survey results, it has been established that rural farmers, as well as agro-dealers, typically cash-out any surplus e-money (cash-out frequencies are considered to exceed cash-in frequencies), which results in a lack of growth in the mobile money ecosystem. This is also evident in the fact that mobile money transactions, from an agro-dealer point-of-view, still represent less than 5 percent of daily sales transactions. Notwithstanding this, there appears to be a shift occurring in this imbalance in recent months, as an increasing number of mobile money service users become familiar

<sup>21</sup> The frequency of mobile money leaving the mobile money ecosystem must be less than the frequency of physical cash currency entering the mobile money ecosystem, thereby growing the mobile money economy while mobile money changes hands at an increasing rate, within the mobile money economy.

with the service and mobile money agency networks grow. As a result, the cash-out frequencies are reducing, while cash-in frequencies are growing. A concerted effort must be made to educate rural farmers on the importance of growing the mobile money economy, as this will benefit rural users of mobile money in the sense that the mobile money service agency networks will grow, providing clients with a greater opportunity to utilise such services in their day-to-day lives. Consequently, this is expected to further reduce rural farmers' dependency of traditional methods of transacting, which will transition the economy within which the typical rural farmer operates, moving it towards a cashless economy.



**Figure 5.3: Training manual introduction to key mobile money stakeholders**

Source: Verwey (2017)

It must be noted that the initial introduction of mobile money services is not limited to a differentiation between mobile money and physical money, and the key role-players within the mobile money ecosystem. A typical mobile training manual should involve key illustrations of mobile money service providers within the mobile money ecosystem. These service providers include the three MNOs in Mozambique – M-Cel, Movitel and Vodacom. Moreover, an emphasis should be placed on the formal banking sector's involvement in the mobile money ecosystem and how such "mobile banking" services could be utilised with the necessary mobile technology. Figure 4.3 illustrates the point that Movitel is the most widely used MNO among rural farmers, with 80 percent of rural farmers having an active Movitel SIM card. Yet, it is evident that rural farmers lack sufficient knowledge about Movitel's e-Mola mobile money service, as less than one percent of the active Movitel SIM card holders have an

active e-Mola account. It is important to demonstrate to rural farmers how mobile money services, as well as mobile banking services, regardless of the network or bank with which it is associated, present an opportunity for rural farmers to become part of the formal financial system.

While the researcher is cognitive of the fact that it is ideal to promote and introduce all mobile money services to rural farmers with equivalent efforts, the researcher will focus on the mobile money service offered by M-Pesa, as it has been proven to be the most-developed mobile money service in Mozambique. Moreover, of the rural farmers who indicated that they are actively making use of a particular money service related to their mobile phone, 56 percent indicated that they have an active M-Pesa account. BOM Movel is actively utilised by 32 percent of these rural farmers; however, BOM Movel is not considered to be a mobile money service, but rather a mobile banking service (the comparison between mobile money services, mobile money banking, and traditional banking is summarised in Table 4.9). A mere 4 percent and 6 percent of rural farmers actively make use of m-Kesh and e-Mola, respectively. The development of M-Pesa is thus considered, by the author, as being the ideal mobile money service to introduce to rural farmers. Ideally, all mobile money services should be introduced to rural farmers, however, due study constraints, M-Pesa is identified as the mobile money service which is most likely to gain adoption by rural farmers in the immediate future due to the development of the M-Pesa services infrastructure. Once farmers are familiar with a particular mobile money service, it is assumed that these farmers would adopt other mobile money services with greater ease, should such a desire arise.

## Why M-Pesa?

- M-Pesa is a mobile money platform which widely used at shops in Mozambique (well developed agency network)
- Banks can pay loans via M-Pesa & you can re-pay these loans via M-Pesa
- M-Pesa is seen as a more developed mobile money service than most other mobile money platforms (mKesh/ eMola)

**Figure 5.4: Reasoning behind selecting M-Pesa as the mobile money service intervention of choice**

Source: Verwey (2017)

### 5.3.2 Registering for an M-Pesa mobile money account

In Mozambique, the process of obtaining a bank account, which facilitates financing, is a highly complex process that is highly regulated in terms of the documentation required, and this acts as a barrier to financial inclusion. As part of the documentation required to open such a traditional bank account, rural farmers must have a valid official identification document. However, not all official identification documentation is accepted by banks when opening bank accounts. A voter card, which is considered as an official identification document, is only accepted by banking institutions in the case where such documents are accompanied by the names of the mother and father of the applicant for the account, together with proof of residence. The latter is problematic in the case of rural farmers, who generally do not have a well-defined physical address. This barrier to entry is exacerbated by the fact that 76 percent of smallholder farmers in Mozambique have a voter card for identification purposes (CGAP, 2017).

The fact that an M-Pesa applicant is required to have some form of official identification document (there are nine such official types)<sup>22</sup> presents an opportunity for those rural farmers who cannot access the traditional banking system. The training of rural farmers must emphasise such benefits of mobile money services in order to persuade these farmers to adopt mobile money services, thus transitioning the 96 percent of financially excluded rural farmers (Figure 4.1) to financially included rural farmers in a way that would traditionally not be possible. While mobile money services are not likely to replace traditional banking institutions, these services do have the potential to complement such traditional institutions. The collaboration between mobile money services and Ponto24<sup>23</sup> is evidence of how mobile money services can prompt unbanked individuals to introduce themselves to traditional banking institution services, in this case, the use of ATMs.

The process of obtaining an M-Pesa account requires the possession of an active Vodacom SIM card. To obtain an active Vodacom SIM card, the potential SIM card holder must present a Vodacom M-Pesa agent with a valid official Mozambican identification document, together with an account opening fee of MZN20. The fee of MZN20.00 is credited to the M-Pesa account holder's account, and once the account has been activated, the account holder must make an airtime purchase of at least MZN10.00 to

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<sup>22</sup> B.I., Carta de condução, Passaporte, DIRE, Cartão de desmobilizado, Cartão de combatente, Cartão de eleitor, Identificação de refugiado, Cartão de recenseamento military (Vodacom, 2017).

<sup>23</sup> Ponto24 is an interbank network which consists of 11 official Mozambican banks, providing both Ponto24 and Visa point-of-sale terminals and ATMs, as well as mobile money transaction facilitation for, amongst others, e-Mola, m-Kesh and M-Pesa.

activate the functions of the M-Pesa account. The minimum balance permitted on the account is MZN5.00.

**iv. Registering for M-Pesa**

- Go to your nearest M-Pesa agent with your Identification Document (ID, Driver's licence, Passport, Demobilisation ID, Voter card, Military card, Refugee ID or Residence permit).
- First need a Vodacom sim card, then M-Pesa
- You must give the Agent an initial cash-in of **20.00MT**



The diagram illustrates the process of opening an M-Pesa account. It starts with a Mozambican ID card (BILHETE DE IDENTIDADE) and a stack of money. An arrow points to a Vodacom agent counter with a PIN display (71589). Another arrow points to a mobile phone receiving a transaction.

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**Figure 5.5: The process of opening an M-Pesa account**

Source: Verwey (2017)

### 5.3.3 Account settings and security features of M-Pesa

While it is important for rural farmers to be introduced to mobile money features and their benefits, an aspect which must be considered with great importance is the security aspects of mobile money. The lack of confidence and trust in mobile money transactions has been referred to in Chapter 4, as farmers tend to prefer low-value M-Pesa transactions, which is evident in the ranking of transaction types in Table 4.10. In Table 4.10, farmers indicated that their most-preferred transaction types are airtime purchases and person-to-person money transfers. In order for rural farmers to gain confidence and to maintain that confidence in mobile money services, it is important that the rural farmers be well trained on ensuring the safety of their e-money, ensuring that all rural farmer adopters of mobile money services are familiar with the security features of these mobile money services.

Rural farmers who adopt M-Pesa as a mobile money service must be introduced to, and be made familiar with, the concept of a PIN. It is important to emphasise the purpose of a PIN, as well as the fact that a PIN is a confidential number that should not be shared with anyone. In a discussion with one agro-dealer, the agro-dealer did indicate that he had been a victim of theft from his M-Pesa account after providing an M-Pesa representative with the PIN number for his M-Pesa account. It is thus crucial for

mobile money clients to be familiarised with the process for changing their mobile money account PIN, prior to any transactions being performed, as this will ensure trust and confidence in mobile money services.

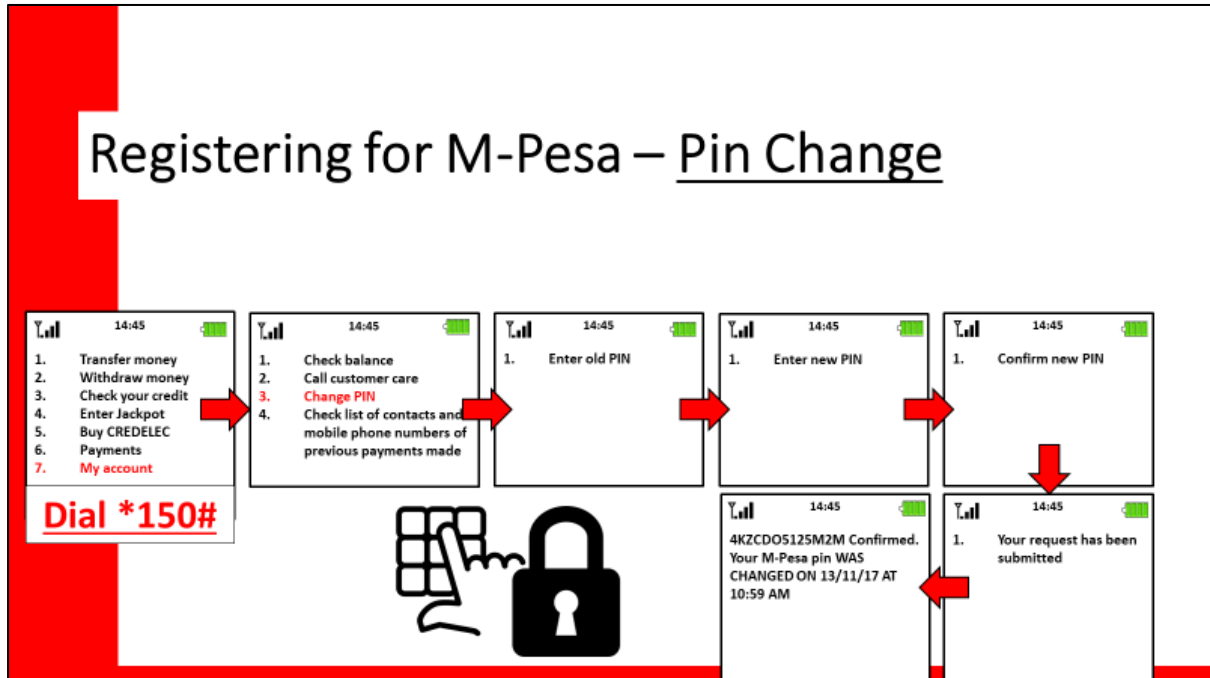


Figure 5.6: Accounts settings – changing of an M-Pesa account PIN

Source: Verwey (2017)

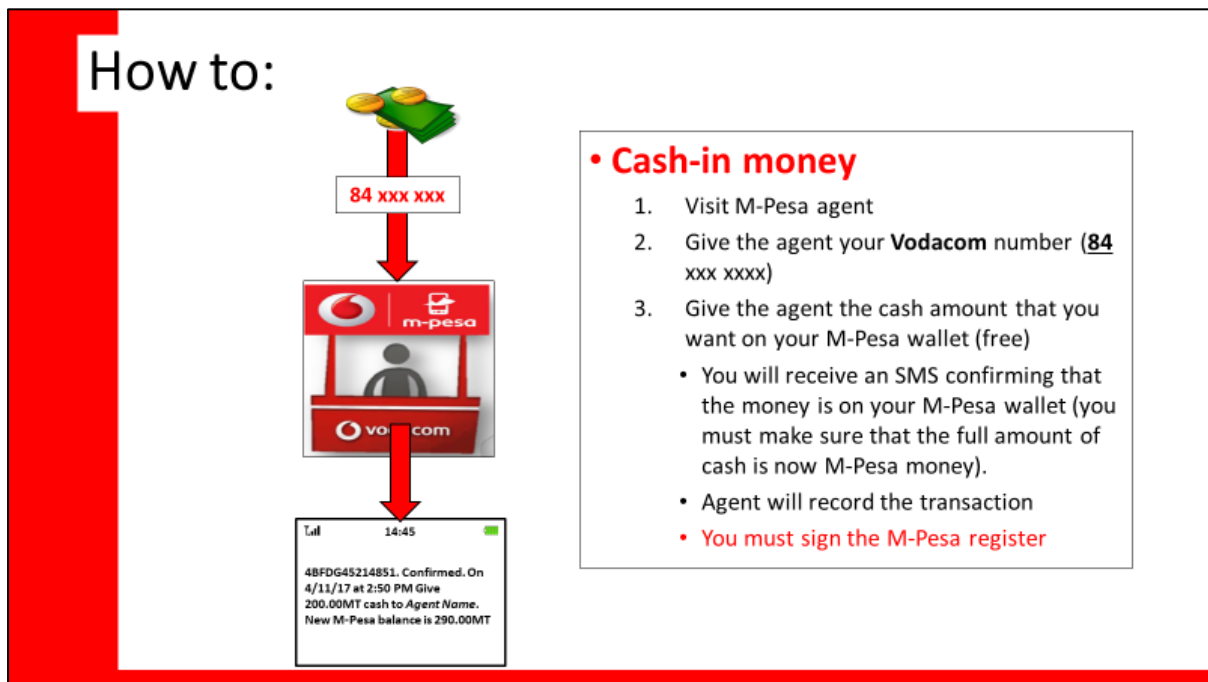
### 5.3.4 The concepts of cash-in and cash-out

The two concepts of “cash-in” and “cash-out” are both central to the successful utilisation of M-Pesa and other mobile money services, alike.

The prospective clients of mobile money services must be familiar with the concept of “cashing-in” as this enables the mobile money client to successfully convert physical, cash currency to e-money, by crediting their mobile money account with this converted e-money. This process is completed by the rural farmer who supplies a mobile money agent with physical cash. The mobile money agent enters this physical cash currency amount into a till. Once this physical cash currency enters the agent’s till, the agent initiates the process of crediting the rural farmer’s mobile money wallet<sup>24</sup> with e-money. Once the agent has credited the client’s mobile wallet, the client will receive a confirmation SMS. For security

<sup>24</sup> The mobile money wallet is the account of the mobile money client in which electronic money is stored.

and record-keeping purposes, the M-Pesa client must sign a Vodacom register which confirms that the client has received the e-money.



**Figure 5.7: The process of crediting a mobile wallet with electronic money (cash-in)**

Source: Verwey (2017)

Conversely, the prospective rural-farmer mobile money client must be introduced to the concept of debiting his or her mobile money wallet, thereby exchanging e-money for physical, cash currency. The cash-out process is not as straight-forward as the cash-in process is. The rural farmer must be familiarised with the five particular steps that are required to perform this transaction, although this five-step process will be considered as trivial, once the user is familiar with each step. Once the prospective mobile money client is able to navigate the menu platform of the mobile money service, the client may find each consecutive step to be a logical progression. The process is initiated by the mobile money client dialling \*150# which enters the client into the M-Pesa USSD service menu. It is a logical process, with the client being presented with menu options and the client responding through the menu option that is most relevant to the process which the client wishes to fulfil. Although this section explains the process of cashing-out e-money, the process of dialling \*150# is applicable to most of the transaction initiations by the mobile money client. Importantly, the mobile money client must be made aware of the agent's five-digit till-code, which is the agent's mobile money account number that must be utilised to identify to whom the e-money must be transferred. Once the process is initiated and completed by the client, both the agent and the client will receive a confirmation SMS that legitimises the transaction, after which the agent will remove physical cash currency from his or her mobile money

till and provide the physical cash currency to the M-Pesa client. The cash-out process can also be performed at an automated teller machine (ATM); however, the illustration of this process is beyond the scope of this study as it involves training rural farmers on making use of ATMs, which is considered to constitute traditional banking training and not mobile money training. Moreover, CGAP (2017) suggests that 64% of smallholder farmers in Mozambique must travel more than an hour to an ATM, which suggests that it is not a service which would typically be utilised by rural farmers.

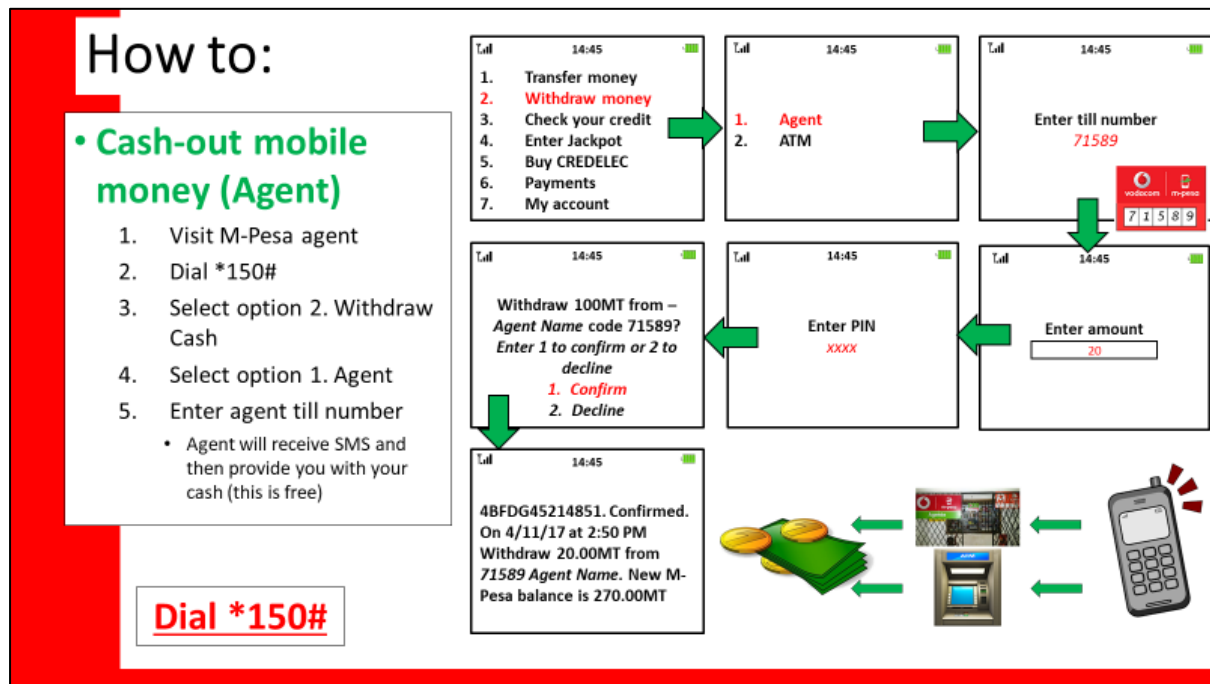


Figure 5.8: Process of exchanging e-money for physical cash currency (cash-out)

Source: Verwey (2017)

### 5.3.5 MNO-currency (airtime) purchases

In Table 4.5, the M-Pesa transaction types most preferred by rural farmers are ranked. The most-preferred M-Pesa transaction is the purchasing of airtime through the M-Pesa service. It is thus important to illustrate the process of executing such a transaction to potential, rural farmer mobile money clients. The process is initiated by dialling \*150#, in the same way that any other transaction initiated by the client would be initiated. The client must follow each consecutive step by responding with the most relevant transaction option until the client successfully executes the airtime purchase. Importantly, it is possible for the client to purchase airtime for the mobile phone number linked to his or her M-Pesa account, or to another Vodacom number which is or is not linked to an M-Pesa account. Once the transaction has been successfully executed, the client will receive an SMS notification which indicates that the transaction has been successfully completed.



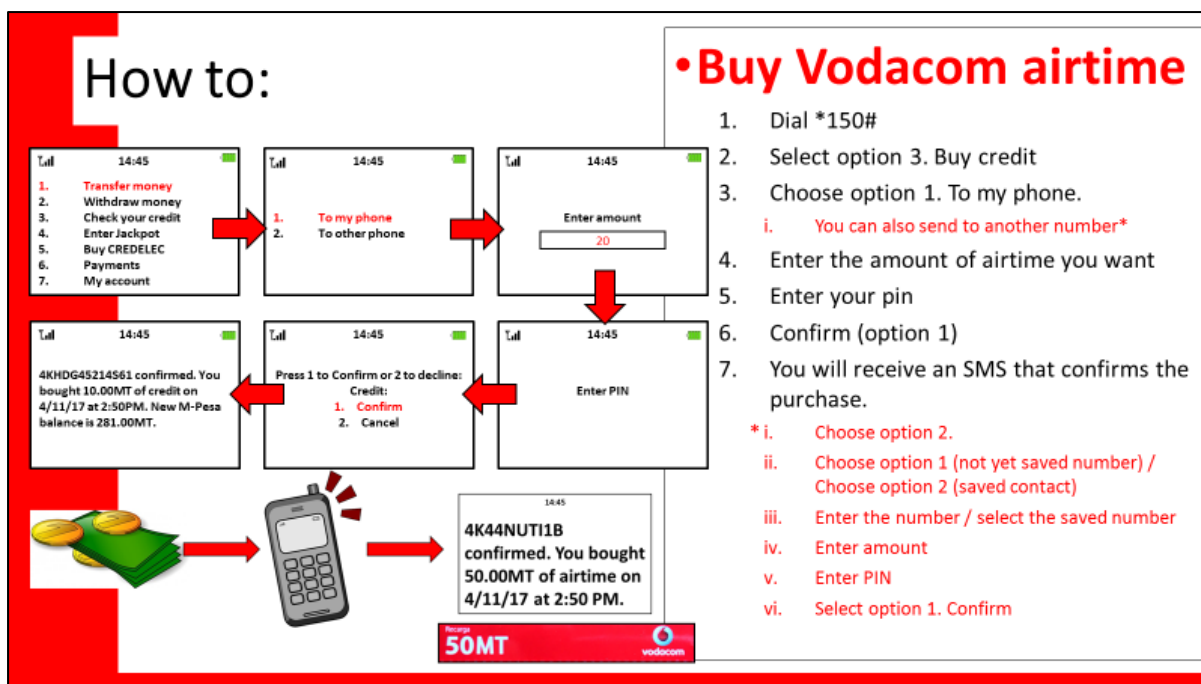


Figure 5.9: Purchasing MNO airtime through M-Pesa

Source: Verwey (2017)

### 5.3.6 Person-to-person money transfers

The second most-preferred M-Pesa transaction by rural farmers, as illustrated in Table 4.5, is that of person-to-person money transfers. The ability for M-Pesa clients to perform person-to-person e-money transfers enables rural farmers to transfer money from anywhere in Mozambique to anywhere else within Mozambique, regardless of the distance between the two parties to the transaction. This transfer can be initiated to a corresponding M-Pesa mobile wallet or to the mobile wallets of m-Kesh and e-Mola. The latter two services will SMS an “off-network voucher” to the recipient, which must be presented to an M-Pesa agent when the recipient wishes to cash-out this transfer. Rural farmers must be made aware of the fact that transfers to non-M-Pesa mobile wallets have particular terms and conditions, such as different transaction fees<sup>25</sup> as well as a condition which requires the non-M-Pesa mobile wallet recipient to cash-out the received e-money transfer at an ATM or Vodacom agent within seven-days to avoid the transaction being reversed. The transfers between M-Pesa mobile wallets are, however, less complicated than e-money transfers to non-M-Pesa mobile wallets are. Although person-to-person transfers were ranked as the second most-preferred M-Pesa transaction type, rural farmers must also be acquainted with the functionality of transferring money to a Standard Bank or BCI client’s bank account. This is likely to be a functionality which a typical rural farmer does not know about. The

<sup>25</sup> Annexure D contains a comprehensive overview of M-Pesa service fees.

M-Pesa functionality of transferring money to a bank account arises from a unique agreement between Vodacom, Standard Bank and BCI, which thus excludes other banks from this functionality.

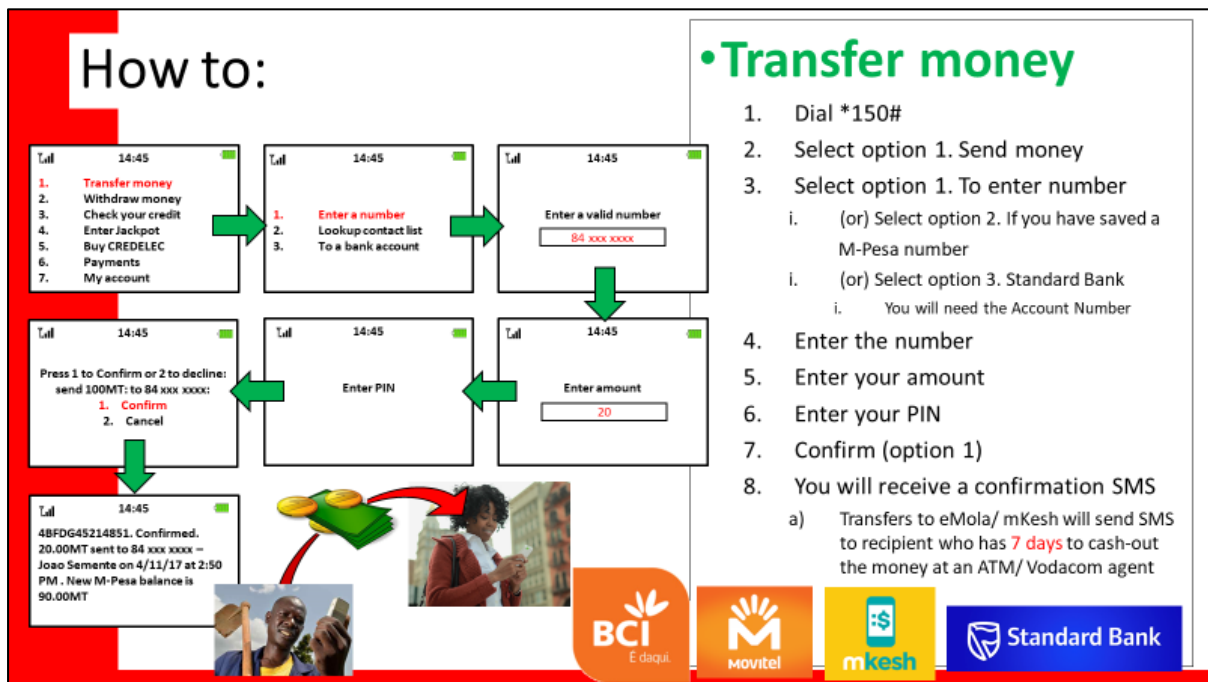


Figure 5.10: Performing e-money transfers (person-to-person and to a bank account)

Source: Verwey (2017)

### 5.3.7 Goods purchases from Vodacom agent shops (agro-dealers)

Once farmers gain trust in mobile money services and their related transactions, less-preferred transactions, such as goods purchases from agro-dealers (such as production inputs) that are normally higher-value transactions, can be introduced to rural farmers. Figure 5.11 demonstrates the process of making a payment for goods from a local shop that is also an M-Pesa agency. The process is initiated by dialling \*150#, followed by making a selection from various menu options, leading to the transaction being executed.

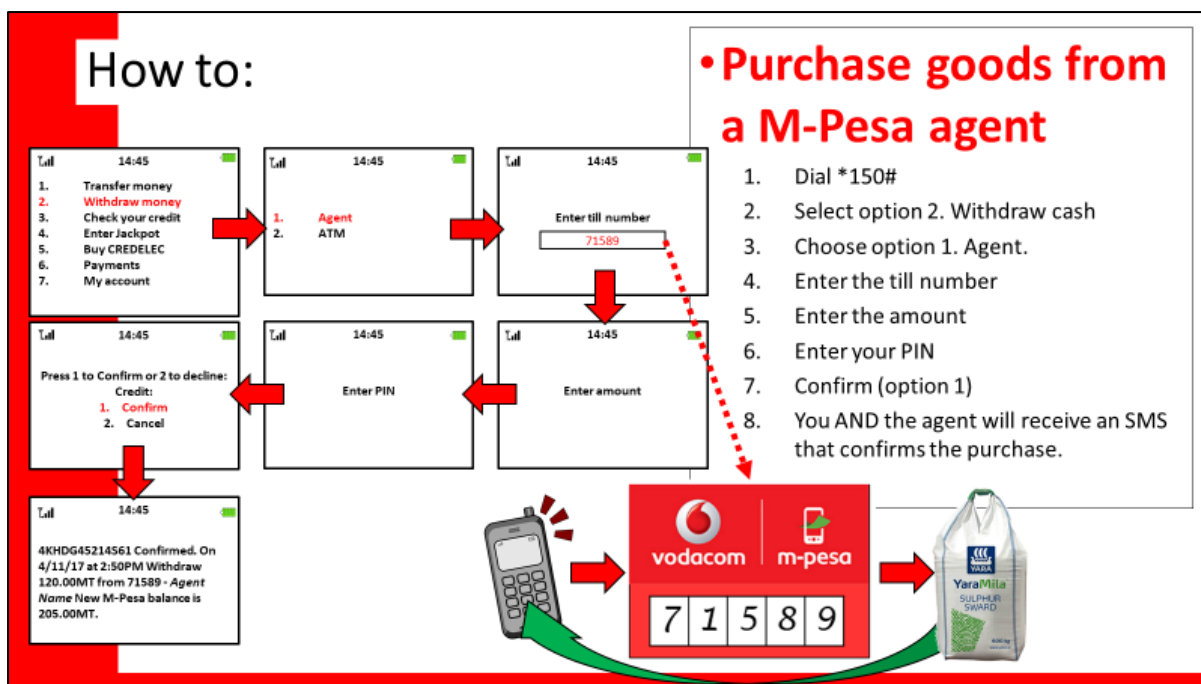


Figure 5.11: Process of purchasing goods from an M-Pesa agent shop

Source: Verwey (2017)

## 5.4 Conclusion

The objective of this chapter was to investigate the lack of knowledge about mobile money services that farmers may experience and how such knowledge gaps might be possibly overcome in order to increase the rate of adoption of mobile money services.

Transacting through a mobile money service, such as M-Pesa, is a highly rudimentary process that comprises sequential menu-option responses, leading to the desired transaction type. Although this process may initially be daunting for a semi-illiterate rural farmer, it is assumed that the repetition of similar menu-option responses would result in the process becoming familiar to most rural farmers, after successfully executing a relatively small number of transactions. The success of M-Pesa, as well as of MTN Mobile Money in Kenya and Uganda, is indicative of the fact that such a service is user-friendly, regardless of a user's education levels.

The ease of opening an M-Pesa account for a typical rural farmer is an encouraging aspect of using mobile money services in the endeavour to combat the high rates of financial exclusion among these farmers in Mozambique. The success of increasing adoption rates of mobile money services, however, requires a concerted effort to be made to enhance financial literacy and mobile money literacy among rural farmers, which is likely to reduce the knowledge gap that is ascribed as being the reason for the

low levels of financial service adoptions. Moreover, farmers must be familiarised with all of the transaction possibilities of mobile money services, in addition than the two most-preferred transactions of airtime purchases and person-to-person money transfers, which most active users already understand. In achieving the objective of this chapter, the point has been identified that the various transaction possibilities, as well as the various benefits of mobile money services, must be introduced to rural farmers in training and education opportunities as being pull factors, which are likely to increase the number of rural farmers who adopt mobile money services, and ultimately become part of the formal financial system. Moreover, a training manual must be utilised to overcome any knowledge gaps and illustrate to farmers how they can benefit from utilising mobile money services.

## CHAPTER 6

### CONCLUSION AND RECOMMENDATIONS

#### 6.1 Conclusion

The overall objective of this study was to determine whether there is potential in mobile money services to enhance the levels of financial inclusion among rural farmers, as well as how the introduction of such technology should be introduced and rolled-out in a rural setting. The study indicates that there are strong similarities between the typical rural farmers in Mozambique and those farmers in the rest of the SSA region. A commonality exists between these farmers of low levels of production and low levels of agricultural development. This common thread among rural farmers is not necessarily attributable to a lack of determination, but rather to a lack of knowledge as well as opportunity. In Manica Province, Mozambique, rural farmers typically produce staple crops on an average of 1.2 hectares with no, or minimal, use of fertiliser, insecticides and mechanisation. Ultimately, the region remains vulnerable to food insecurity, which is exacerbated by volatile climates and volatile market conditions. One of the key development limitations of these rural farmers is the inability of the formal financial sector to cater for such rural farmers. An overwhelming proportion of the rural, smallholder farmer population cannot gain access to formal financial services such as much-needed production loans. As a result of the low levels of financial inclusion among rural farmers, there is a lack of farmer development which is a result of rural farmers not having the financial means to benefit from advances made in agricultural production methods, as well as of the inability to gain access to agricultural financing. In Subsection 2.2, reference has been made to the importance of enhanced levels of knowledge in economic growth. Often, rural farmers do not have the financial means to access the relevant knowledge bases that could potentially enhance their production methods, and ultimately their well-being.

While rural farmer development and financial inclusion is significantly inadequate in rural Mozambique, significant strides have been made in the adoption of mobile phone technology by a substantial proportion of the rural-farmer population. This corresponds with the whole of the African continent, where a strong mobile phone technology adoption trend has been realised across regions and countries. The significant strides made in the adoption of mobile technology among rural farmers can thus be considered as constituting a catalyst in achieving financial inclusion among rural farmers.

This research set out to provide an indication of the mobile technology and mobile money service usage, preferences and behaviours among rural farmers, and how such mobile money services could translate into increased levels of financial inclusion among rural farmers. Based on the primary data which was

collected, the research had the secondary objectives of determining, firstly, the levels of financial inclusion among rural farmers, and secondly, the mobile technology platforms that could possibly be utilised to overcome any deficiencies in the level of financial inclusion among rural farmers. Additionally, the limitations of such platforms were to be identified.

Accordingly, the survey questionnaire attempted to establish whether rural farmers generally have access to financial services in the form of an active bank account. The survey concluded that the overwhelming majority of farmers in Manica Province are financially excluded, as a mere four percent of rural farmers have access to a personal bank account. This ultimately suggests that rural farmers face severe entry barriers, which can only be overcome through alternative financial services such as mobile money services.

Thirdly, the secondary objective aimed at establishing the extent to which farmers are familiar with mobile money services. Consequently, the focus of the survey turned towards mobile phone technology adoption and usage preferences among rural farmers, as this is a crucial aspect of determining the potential for mobile money services in promoting financial inclusion. Moreover, the research needed to establish the importance of mobile phone technology in the day-to-day lives of rural farmers, as the success of mobile money services would be highly dependent on the extent to which rural farmers are reliant on their mobile phones. The research established that rural farmers primarily make use of the Movitel mobile network, which is in line with Movitel's strategy of targeting the unserved rural areas in Mozambique. The survey results indicated that both Vodacom and MCell are lagging behind in the reach of their network coverages in rural areas. However, in rural towns, the coverage of all three MNOs is adequate.

The survey results convincingly indicated that rural farmers make substantial use of their mobile phone services on a daily basis. In most instances, farmers prefer to make phone calls rather than SMSs, with the respondents indicating that they usually make at least one phone call per day. In contrast, 14 percent of farmers indicated that they do not send SMSs at all. This contrast is evidence that rural farmers may limit the number of SMSs sent due to the fact that most rural farmers have no formal education, which means that these farmers would be unable to compose an SMS. Moreover, most farmers always keep their mobile phones switched on, and do not turn them off to save their mobile phones' battery life. This aspect of the survey was important as it determined that rural farmers are already highly dependent on their mobile phones, and that the introduction and adoption of mobile money services, with their dependency on a mobile device, would be perceived as presenting an opportunity by rural farmers, and not an inconvenience.

The conclusion that rural farmers are highly dependent on their mobile phones in their day-to-day lives is buoyed by the fact that rural farmers typically spend MZN50.00 on purchasing airtime, per week.

While rural farmers are highly dependent on their mobile phone devices, they do not typically utilise any MNO services other than those of voice calling and SMSs. Ultimately, rural farmers continue to travel to nearby towns to execute general transactions, many of which are already possible to transact on their mobile phones through mobile money services. This is substantiated by the survey results which indicated that less than 40 percent of the respondents who are active Vodacom subscribers utilise M-Pesa, while these respondents only execute M-Pesa transactions between one and six times per month.

The results indicated that rural farmers typically lack sufficient knowledge on mobile money services, which is made apparent by the risk-averse nature of mobile money transactions which are mostly preferred by rural farmers. The respondents indicated that their two most-preferred M-Pesa transaction types are person-to-person transfers of money and airtime purchases. Both of these transaction types are assumed to be relatively low in value, which suggests that farmers might not have enough funds available, while also lacking sufficient trust in mobile money services to perform higher-value transactions. The results did, however, reveal that rural farmers are enticed by the convenience that is offered by mobile money services.

The survey results show that 51 percent of rural farmers indicated that they do have an electricity source at their own home, or have sufficient access to such a source near to their home. This means that spending time on their phones to utilise services is not a problem from a battery-life perspective. A small percentage of farmers do have to pay to charge their phones. An important discovery was that most farmers do not switch their phones off, thus already showing their dependency on mobile phones and services.

Vodacom M-Pesa has a well-developed mobile money service and agency network, although it is backed by poor network coverage, while Movitel's e-Mola mobile money service is highly underdeveloped, but is backed by strong network coverage in rural Manica Province. This paradox is the basis behind the lack of adoption of mobile money services by rural farmers, while the lack of knowledge on mobile money services further limits the adoption of such services.

Finally, the secondary objective set out to determine how mobile money services should be introduced and rolled-out to rural farmers. Subsequently, the study established that a well-structured training campaign should be introduced. A training manual would be crucial to such a training campaign, as that

manual would serve to illustrate and cover some of the more predominant knowledge deficiencies that prohibit the adoption of mobile money services.

In accordance with the hypothesis of this study, the literature review, coupled with the survey results, have provided evidence that mobile money platforms have the potential to greatly enhance the reach of financial services with respect to rural farmers. To unlock this potential, it is crucial that farmers be introduced to such services in a well-structured and planned process.

## **6.2 Recommendations**

In the short term, the researcher makes the following recommendations:

- i. While the survey has confirmed that rural farmers are familiar with mobile phone technology, these rural farmers do not utilise any services other than that of voice calling and SMSs. Thus, all stakeholders who are attempting to enhance the adoption of mobile money among rural farmers must invest in promoting such services through marketing campaigns and the training of rural farmers. Providing rural farmers with education and training on mobile money services is bound to increase the number of rural farmers who adopt such services, even if the transactions which are executed by these farmers are limited to transactions which do not utilise the network of mobile money agents (such as airtime purchases and person-to-person money transfers). This is likely to build farmer confidence to the extent that once mobile money agency networks are more developed, farmers would have sufficient trust to execute a greater variety of transactions.
- ii. A focus should be placed on training and education activities that not only focus on the adoption of mobile money services, but also focus on basic financial literacy. Rural farmers must become familiar with basic financial knowledge in order to adequately utilise mobile money services to receive and re-pay, for example, agricultural production loans.
- iii. Rural farmers lack sufficient incentives for adopting mobile money services. Stakeholders who have a vested interest in enhancing financial inclusion through mobile money services must provide a short-term incentive which encourages rural farmers to adopt such mobile money services. Rural farmers appear to be hesitant in adopting mobile money services, as they do not understand how they might benefit from utilising such services. It is in the best interest of all stakeholders to invest in encouraging the initial adoption of mobile money services, which is



anticipated to be self-fulfilling thereafter in the sense that this would allow rural farmer to gain first-hand exposure to the many benefits of utilising mobile money services.

- iv. Increased efforts should be made by both Vodacom and Movitel to increase the numbers of agents in rural areas (agency network expansion).
- v. MNOs must provide an incentive for private businesses that execute business transactions with rural farmers, such as agricultural trading companies, for their execution of such business transactions through mobile money services.
- vi. Vodacom and Movitel must enter into improved agreements with businesses (mobile money agents) which encourage and facilitate the adoption of mobile money services. Businesses which actively execute business transactions through mobile money services must be compensated in such a way that is conducive to the increased adoption and utilisation of the services. Such compensation should, ideally, be in the form of higher commissions earned on M-Pesa account adoptions that were facilitated by a particular business (mobile money agent), while subsequent M-Pesa transactions should provide the mobile money agent who encouraged and facilitated the adoption with a commission, at least on the initial transactions performed.

Over the longer term, the researcher makes the following recommendations:

- i. Microfinanciers and donors, alike, should actively encourage the adoption of mobile money services by disbursing financing solely through mobile money services, which would stimulate rural farmers into adopting mobile money services, if they wish to obtain financing. This would encourage rural farmers to familiarise themselves with mobile money services, while also reducing the barriers to financing associated with brick-and-mortar banking institutions.
- ii. MNO should re-strategise with respect to the provision of mobile money services. The rural-farmer mobile money market is likely to be captured by the first mover that actively targets the rural-farmer economy. For Vodacom, this is likely to involve substantial capital requirements, as their current network infrastructure in the rural areas of Manica Province is inadequate. With respect to Movitel, a concerted effort should be made to at least match the number of M-Pesa agencies across the province of Manica, as rural farmers require a physical point of reference which will encourage mobile money transactions. It is assumed that e-Mola will remain underutilised for as long as its agency network remains underdeveloped.

- iii. A contentious issue in the mobile money service sector is that of the interoperability of different mobile money services. In order for mobile money services to become a true means to overcome the lack of financial inclusion, it is recommended that the Bank of Mozambique (BoM) investigate policies which promote increased levels of interoperability between various financial services, and particularly between the various mobile financial services. However, such interoperability agreements between competitors should be arranged in a mutually beneficial way, such that all parties to such an agreement find benefit.

## REFERENCES

- Achicala, R., Lampeao, S., Lopes, L.S., Salustiano, V., Mabota, A., Matlombe, H., Miguel, A., Fumo, F., Zezela, F., Camisa, F. & Dioga, D. 2015. *Anuário de Estatísticas Agrárias 2015*. Maputo: Ministério da Agricultura e Segurança Alimentar.
- African Development Bank. 2017. *Africa Economic Outlook 2017 ENTREPRENEURSHIP AND INDUSTRIALISATION*. African Development Bank; Organisation for Economic Co-operation and Development; United Nations Development Programme.
- Agrawal, B. 2003. Gender and Land Rights Revisited: Exploring New Prospects via the State, Family and Market. *Journal of Agrarian Change*, 3(1 and 2):184-184-224.
- Aker, J.C. & Mbiti, I.M. 2010. *Mobile Phones and Economic Development in Africa*. Center for Global Development.
- Akudugu, M.A. 2012. Estimation of the Determinants of Credit Demand by Farmers and Supply by Rural Banks in Ghana's Upper East Region. *Asian Journal of Agriculture and Rural Development*, 2(2):189-189-200.
- Anriquez, G. & Stamoulis, K. 2007. *Rural Development and Poverty Reduction: Is Agriculture Still the Key?* Rome: The Food and Agriculture Organization of the United Nations.
- Asante-Addo, C., Mockshell, J., Siddig, K. & Zeller, M. 2016. *Agricultural credit provision: What really determines farmers' participation and credit rationing?* Addis Ababa: African Association of Agricultural Economics.
- Atkinson, A. & Messy, F.A. 2012. *Measuring Financial Literacy: Results of the OECD/ International network on financial education (INFE) pilot study*. Paris: OECD.
- Auma, D. & Mensah, P.A. 2014. *Determinants of credit access and demand among small-holder farmers in Tigray region, Ethiopia*. Norwegian University of Life Sciences School of Economics and Business.
- BAGC. 2010. *Beira Agricultural Growth Corridor: Delivering Potential*. Beira Agricultural Growth Corridor (BAGC).
- Baiyegunhi, L.J.S. & Fraser, G.C.G. 2014. Smallholder farmers' access to credit in the Amathole District Municipality, Eastern Cape Province, South Africa. *Journal of Agriculture and Rural Development in the Tropics and Subtropics*, 115(2):78-78-89.
- Batista, C. & Vicente, P.C. 2013. *Introducing Mobile Money in Rural Mozambique: Evidence from a Field Experiment*. Lisboa: NOVAFRICA.
- Becvar, Z., Mach, P. & Pravda, I. no date. *Mobile Networks*. Prague: Czech Technical University in Prague.
- Bento, A., Buramo, D., Goncalves, E., Greenber, S., Mateus, J. & Muianga, D. 2015. *Agricultural investment opportunities in the Beira Corridor, Mozambique: Threats and opportunities for small-scale farmers*. Johannesburg: African Centre for Biodiversity.

- Bird, D.K. 2009. *The use of questionnaires for acquiring information on public perception of natural hazards and risk mitigation – a review of current knowledge and practice*. Natural Hazards on Earth System Sciences.
- Boekhold, H. 2016. *Financial Literacy to Facilitate Access to Finance in Eastern Africa*. Global Coffee Platform, Cafe Africa.
- Borzaga, C., Navarra, C., Franchini, B., Tolotti, F. & Tonini, A. 2016. *Identifying Processes and Policies Conducive to Cooperative Development in Africa Mozambique Country Report*. European Research Institute on Cooperative and Social Enterprises.
- Capuano, A. & Ramsay, I. 2011. *What causes suboptimal financial behaviour? An exploration of financial literacy, social influences and behavioural economics*. Melbourne: Centre for Corporate Law and Securities Regulation, The University of Melbourne.
- CGAP. 2018. What is Financial Inclusion and Why is it Important? [Online] Available from: <http://www.cgap.org/about/faq/what-financial-inclusion-and-why-it-important> [Accessed: 12 July 2018].
- CGAP. 2017. *Advancing financial inclusion for smallholder households in Mozambique*. Maputo: FSDMoc.
- CGAP. 2016. *National Survey and Segmentation of Smallholder Households in Mozambique Understanding Their Demand for Financial, Agricultural, and Digital Solutions*. Washington DC: CGAP.
- Chibba, M. 2009. Financial Inclusion, Poverty Reduction and the Millennium Development Goals. *European Journal of Development Research*, 21(2):213-213-230.
- Cieslikowski, D.A., Halewood, N.J., Kimura, K. & Zhen-Wei Qiang, C. 2009. *Information and Communications for Development Extending Reach and Increasing Impact*. Washington DC: The International Bank for Reconstruction and Development/ The World Bank.
- Cole, S., Sampson, T. & Zia, B. 2009. *Valuing Financial Literacy Training*. The World Bank.
- Cook, W. & McKay, C. 2017. *Banking in the M-PESA Age: Lessons from Kenya*. Washington DC: Consultative Group to Assist the Poor (CGAP).
- de Aghion, B.A. & Morduch, J. 2005. *The Economics of Microfinance*. Cambridge: Massachusetts Institute of Technology.
- Dermish, A., Kneiding, C., Leishman, P. & Mas, I. 2012. Branchless and Mobile Banking Solutions for the Poor: A Survey of the Literature. *Innovations*, 6(4):81-83-93.
- Dialogic Corporation. 2008. *USSD Services for Interactive Mobile Users*. Montreal: Dialogic Corporation.
- Donovan, K. 2012. *2012 Information and Communications for Development: Maximizing Mobile*. Washington DC: International Bank for Reconstruction and Development / The World Bank.
- dos Santos, G.V. 2014. *The Telecoms Sector in Mozambique: Going with the flow*. s.l.: Eaglestone Securities.

- Etim, A.S. 2014. Mobile banking and mobile money adoption for financial inclusion. *Research in Business and Economics Journal*, 91.
- Fanta, A.B., Mutsonziwa, K., Goosen, R., Emanuel, M. & Kettles, N. 2016. *The role of mobile money in financial inclusion in the SADC region: Evidence using FinScope Surveys*. FinMark Trust.
- Firpo, J. 2009. [Online] Available from: <http://blogs.worldbank.org/psd/e-money-mobile-money-mobile-banking-what-s-the-difference> [Accessed: 2018, April 18].
- Gillwald, A., Khan, S. & Redeman, B. 2016. *The Movitel Miracle - New dynamism in the Mozambican mobile market*. Cape Town: Research ICT Africa.
- Google. 2018. Map of the districts of Mossurize, Sussundenga and Vanduzi in relation to the city of Chimoio, Manica Province, Mozambique.
- GSMA. 2016. *The impact of mobile money interoperability in Tanzania*. London: GSMA.
- Hananu, B., Abdul-Hanan, A. & Zakaria, H. 2015. Factors influencing agricultural credit demand in Northern Ghana. *African Journal of Agricultural Research*, 10(7):645-645-652.
- Hanlon, J. & Smart, T. 2013. *Small farmers or big investors? The choice for Mozambique*. Maputo: Ciedima.
- Hanlon, J. & Smith, T. 2014. *Chickens and beer on the road to growth*. Maputo: Ciedima.
- Hanouch, M. & Chen, G. 2015. *Promoting Competition in Mobile Payments: The role of USSD*. s.l.: CGAP.
- Harris, S.D. 2005. *The state of Microcredit Summit Campaign Report 2005*. Washington D.C.: Microcredit Summit Campaign.
- Hartwigsen, J. 2013. *Trends in SAFEX trading of Western Cape wheat producers*. University of Pretoria.
- Hoering, S. & Bourreau, M. 2017. *Interoperability of mobile money: International experience and recommendations for Mozambique*. London: International Growth Centre.
- Hollinger, F., Rutten, L. & Kiriakov, K. 2009. *The use of warehouse receipt finance in agriculture in transition countries*. St. Petersburg: The World Bank.
- Holtzman, J., Zhou, E., Teyssier, S., Abdulla, D. & van de Velde, P. 2012. *Agribusiness Indicators: Mozambique*. Washington DC: The World Bank.
- Hughes, N. & Lonie, S. 2007. M-PESA: Mobile Money for the “Unbanked”: Turning Cellphones into 24-Hour Tellers in Kenya. *Innovations*, (Winter/ Spring):63-63-81.
- Hunguana, H., Ribeiro, P., Mata, T., Dlamini, M., Mahlati, V. & Fitzpatrick, K. 2012. *Status of Agricultural and Rural Finance in Mozambique*. FinMark Trust.
- IFC. 2014. *Access to Finance for Smallholder Farmers: Learning from the Experiences of Microfinance Institutions in Latin America*. Washington DC: International Finance Corporation (IFC).

- Jack, W. & Suri, T. 2011. *Mobile money: The economics of M-Pesa*. Cambridge: National Bureau of Economic Research.
- Jenkins, B. 2008. *Developing Mobile Money Ecosystems*. IFC; World Bank; Harvard Kennedy School of Government.
- Kailanya, M.D. 2014. *The effect of financial literacy on financial returns of Miraa farmers in Meru country*. University of Nairobi.
- Kanu, B.S., Odhiambo, W., Yamdjeuu, A.W. & Sile, E. 2016. *Africa agriculture status report 2016 Progress towards Agricultural Transformation in Africa*. Alliance for a Green Revolution in Africa.
- Kirui, O.K., Okello, J.J. & Nyikal, R.A. 2012. *Impact of mobile phone-based money transfer services in agriculture: evidence from Kenya*. Foz de Igauçu: International Association of Agricultural Economists.
- Kramer, W.J., Jenkins, B. & Katz, R.S. 2007. *The Role of the Information and Communications Technology Sector in Expanding Economic Opportunity*. Harvard College.
- Krosnick, J.A., Lavrakas, P.J. & Kim, N. 2014. Survey Research. In: Reis, H., T. & Judd, C., M. (eds.) *Handbook of research methods in social and personality psychology*. Second ed. New York: Cambridge University Press.
- Krugel, G.T. 2007. *Mobile Banking Technology Options: An overview of the different mobile banking technology options, and their impact on the mobile banking market*. s.l.: FinMark Trust.
- LaFleche, T. 2010. [Online] Available from: <https://idc-community.com/financial/financial-services-technology/mobile-payments-vs-mobile-banking-an-important-dis> [Accessed: 2018, April 18]
- Lwanga, M.M. & Adong, A. 2016. *A pathway to financial inclusion: Mobile Money and Individual Savings in Uganda*. Kampala: Economic Policy Research Centre (EPRC).
- Machethe, C.L. 2004. *Agriculture and poverty in South Africa: Can agriculture reduce poverty?* Pretoria: Overcoming Underdevelopment Conference.
- Macmillan, R., Paelo, A. & Paremoer, T. 2016. The “Evolution” of Regulation in Uganda’s Mobile Money Sector. *The African Journal of Information and Communication*, (17):89-89-110.
- Mas, I. & Morawczynski, O. 2009. Designing mobile money services: Lessons from M-Pesa. *Innovations: Technology, Governance, Globalisation*, 4(2):77-77-91.
- McKay, C. & Pickens, M. 2010. *Branchless Banking 2010: Who's serve? At what price? What's next?* Washington DC: CGAP.
- Meyer, R.L. 2015. *Financing agriculture and rural areas in sub-Saharan Africa: Progress, challenges and the way forward*. London: International Institute for Environment and Development.
- Muya, C. 2015. *Mobile money in Africa*. London: Barclays Bank PLC.

- Nalere, P., Yago, M. & Oriel, K. 2015. The contribution of rural institutions to rural development: Study of smallholder farmer groups and NGOs in Uganda. *International NGO Journal*, 10(4):37-37-51.
- Nghiem, H.S., Coeilli, T. & Rao, P. 2007. *The welfare effects of microfinance in Vietnam: Empirical results from a quasi-experiment survey*. Queenstown: The University of Queensland.
- Niebal, D., Kopp, G. & Beerfeltz, H. 2013. *Information and communications technology (ICT) Key technologies for sustainable development*. Bonn: Federal Ministry of Economic Cooperation and Development (Germany).
- Oji, C.K. 2015. *Promoting Financial Inclusion for Inclusive Growth in Africa*. Johannesburg: South African Institute of International Affairs.
- Okech, K., Kiragy, A., Sing'ora, B., Ndonga, S., Olan'g, P. & Kenyanito, L. 2017. *Bridging the Gap: The Role of Data in Deepening Smallholder Farmer Financing*. Nairobi: Alliance for a Green Revolution in Africa (AGRA).
- Pew Research Center. 2014. *Emerging nations embrace internet, mobile technology: Cell phones nearly ubiquitous in many countries*. Washington DC: Pew Research Center.
- Prinima, D. & Pruthi, J. 2016. Evolution of Mobile Communication Network: from 1G to 5G. *International Journal of Innovative Research in Computer and Communication Engineering*, 4(4):224-224-227.
- Refera, M.K., Dhaliwal, N.K. & Kaur, J. 2016. Financial literacy for developing countries in Africa: A review of concept, significance and research opportunities. *Journal of African Studies and Development*, 8(1):1-1-12.
- Salami, A., Kamara, A.B. & Brixiova, Z. 2010. *Smallholder Agriculture in East Africa: Trends, Constraints and Opportunities*. Tunis: African Development Bank.
- Sayinzoga, A., Buite, E. & Lensink, R. 2015. Financial Literacy and Financial Behaviour: Experimental Evidence from Rural Rwanda. *The Economic Journal*, 126(594):1571-1571-1599.
- Schware, R., Kenny, C., Foster, V., Wellenhuis, B., Dokeniya, A., Wheeler, D., Kerr-Smith, B., Zhen-Wei Qiang, C., McNamara, K., Smith, P., Durier, S. & Kirchner, L. 2002. *Communication and Communication Technologies: A World Bank Group Strategy*. Washington DC: The International Bank for Reconstruction and Development/ The World Bank.
- Shaw, E.S. 1973. *Financial Liberalisation in Economic Development*. New York: Oxford University Press.
- Silici, L., Bias, C. & Cavane, E. 2015. *Sustainable agriculture for small-scale farmers in Mozambique*. London: IIED.
- Subia, M.P. & Martinez, N. 2014. *Mobile money services: "A bank in your pocket" Overview and opportunities*. Pretoria: International Organization for Migration; ACP Observatory on Migration.
- Taskin, E. 2012. *GSM MSC/VLR Unstructured Supplementary Service Data(USSD) Service*. Uppsala: Uppsala University.

- The World Bank. 2018. Financial Inclusion: Financial inclusion is a key enabler to reducing poverty and boosting prosperity. [Online] Available from: <http://www.worldbank.org/en/topic/financialinclusion> [Accessed: 12 July 2018].
- Toth, I.J. & Arvai, Z. 2002. *Liquidity constraints and consumer impatience*. Budapest: National Bank of Hungary.
- United Nations. 2014. *World Economic Situation and Prospects 2014*. New York: United Nations.
- USAID. 2012. *Uganda mobile money assessment and case study: Examining cash payment streams and their electronic alternatives amongst USAID implementing partners*. Washington DC: United States Agency for International Development (USAID).
- van Biljon, J. & Kotze, P. 2008. *Modelling the factors that influence mobile phone adoption*. New York: ACM.
- Van der Vyver, A., Yamamoto, G. & McVay, M.P. 2015. *Soy and sesame in central Mozambique: Value chain analysis*. Chicago: Feed the Future.
- Verwey, B. 2017. M-Pesa mobile money training manual for rural farmers in Manica Province, Mozambique.
- Vincent, G. 2004. [Online] Available from: [http://gdrc.org/icm/micro/guy\\_sust-micro.pdf](http://gdrc.org/icm/micro/guy_sust-micro.pdf) [Accessed: 2018, February 11].
- Vodacom Mozambique. 2016. [Online] Available from: <https://www.vm.co.mz/en/M-Pesa2/Tariff-Plan> [Accessed: 2018, March 10].
- Western Union. 2016. [Online] Available from: <https://corporate.westernunion.com/index.html> [Accessed: 2018, February 13].
- Williams, T.A., Sweeney, D.J. & Anderson, D.R. 2012. Categorical and Quantitative Data. In: Calhoun, J., W. (eds.) *Contemporary business statistics*. Fourth ed. South-Western Cengage Learning.
- Zambrano, R. & Seward, R.K. 2012. *Mobile Technologies and Empowerment: Enhancing human development through participation and innovation*. New York: United Nations Development Programme.
- Zeller, M. & Meyer, L.R. 2002. *The Triangle of Microfinance: Financial sustainability, Outreach, and Impact*. Baltimore, London: The International Food Research Institute, John Hopkins University Press.
- Zikmund, W.G., Babin, B.J., Carr, J.C. & Griffin, M. 2013. *Business research methods*. Ninth ed. Cengage Learning.



## ANNEXURE A: FARMER SURVEY

<b>Date</b> :	_____	<b>Register ref.</b>	:	_____
		<b>number</b>	:	_____
<b>Village</b> :	_____	<b>First Name</b>	:	_____
<b>Second Name</b> :	_____	<b>Surname</b>	:	_____
<b>ID Number</b> :	_____	<b>Signature*</b>	:	_____

\*I hereby give consent for the researcher to use my responses in research and associated publications.

### 1. Do you have a bank account?

- a. *Yes*
- b. *No*
- c. If yes, with which bank(s) – more than one bank can be selected
  - i. *Barclays*
  - ii. *BCI*
  - iii. *BIM*
  - iv. *BOM (Opportunity Bank)*
  - v. *BTM*
  - vi. *FNB*
  - vii. *Standard Bank*
  - viii. *Other, please specify* \_\_\_\_\_

### 2. Do you have a cell phone? One or more?

#### a. Cell numbers and networks:

- i. Cell no. (1) : \_\_\_\_\_
- ii. Network (1) : \_\_\_\_\_ (e.g. Vodacom)
- iii. Model/ Type (1) : \_\_\_\_\_ (e.g. Samsung)
- iv. Cell no. (2) : \_\_\_\_\_
- v. Network (2) : \_\_\_\_\_ (e.g. MCell)
- vi. Model/ Type (2) : \_\_\_\_\_ (e.g. Nokia)

### 3. Do you have signal at your house?

- a. *Yes*
- b. *No*

**4. Which network signal is the best nearest to your house?**

*Best* \_\_\_\_\_

*2<sup>nd</sup> best* \_\_\_\_\_

**5. Which do you mostly do with your phone?**

- a. *Make phone calls*
- b. *Send SMSs*
- c. *Other* \_\_\_\_\_ (e.g. WhatsApp)

**6. How many times per week do you make a phone call?**

1	2	3	4	5	6+
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**7. How many times per week do you send an SMS?**

1	2	3	4	5	6+
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**8. How often do you purchase airtime per week?**

- a. *Once per week*
- b. *Twice per week*
- c. *Three times per week*
- d. *More than three times per week*
- e. *Once per month*

**9. How much money do you spend on airtime per week?**

- a. *Below MZN 10.00*
- b. *Between MZN 10.00 and MZN 20.00*
- c. *Between MZN 20.00 and MZN 50.00*
- d. *More than MZN 50.00*

**10. Where do you purchase your airtime?**

- a. *At a local village shop*
- b. *From street vendors (network specific sellers)*
- c. *Through mobile wallet such as MPesa*
- d. *Other, please specify:* \_\_\_\_\_

**11. Do you/ would you prefer to buy airtime using a mobile wallet (such as MPesa)?**

- a. *Yes*
  - i. *If yes, why?*

1. *Saves travel time*
2. *Safer (do not have to carry cash)*
3. **Other, please specify:**

b. *No*

**12. If you use Vodacom, are you registered for MPesa?**

- a. *Yes*
- b. *No*

**i. If yes, have you ever performed a transaction?**

- a. *Yes*
- b. *No*

**ii. How many times a month do you use your MPesa account for payments?**

**iii. What do you buy most with MPesa, please rank from MOST purchased (1) to LEAST purchased (7)? (leave open if not applicable)**

- a. *Food/ Drinks*
- b. *Household consumables (soap, washing powder etc.)*
- c. *Tools/ equipment*
- d. *Farming inputs (seed, fertilizer, pesticides etc.)*
- e. *Airtime*
- f. *Electricity*
- g. *Transfer of money*

<u>RANK</u>

**iv. What do you like most about MPesa?**

**13. If you do NOT use MPesa,**

**i. Why not?** \_\_\_\_\_

**ii. Would you like to try it out?**

- a. *Yes*
- b. *No*

**14. Do you use any of the following as a mobile wallet?**

- a. *Movitel: e-Mola*
- b. *BOM Movel*
- c. *BTM Movel*
- d. *MCel: M-Kesh*
- e. *Other, please specify:* \_\_\_\_\_

**15. What electricity source do you use at you home?**

- a. *Grid electricity*
- b. *Solar power*
- c. *None*

**16. Where do you charge your phone?**

- a. *At my own home*
- b. *At a friend, neighbour or relative's home*
- c. *At a shop/ business in town*
- d. *Elsewhere, please state where:*

\_\_\_\_\_

**17. Do you pay to charge your phone?**

- a. *Yes*
- b. *No*
- i. *If yes, how much do you pay to fully charge your phone?*

\_\_\_\_\_ (e.g. MZN5.00 to fully charge)

**18. Do you ever switch you phone off?**

- a. *Yes*
- b. *No*
- c. *If yes, why?*

\_\_\_\_\_

## ANNEXURE B: AGRO-DEALER SURVEY

Full Name and Surname: \_\_\_\_\_

### 1. Areas Serviced:

Province: \_\_\_\_\_  
District: \_\_\_\_\_ Village: \_\_\_\_\_  
District: \_\_\_\_\_ Village: \_\_\_\_\_  
District: \_\_\_\_\_ Village: \_\_\_\_\_  
District: \_\_\_\_\_ Village: \_\_\_\_\_

### 2. Do you accept mobile wallet payments such as MPesa as a payment method in your shop?

- a. Yes
- b. No

### 3. Which mobile wallet service do you use?

- a. VodaCom: MPesa
- b. Movitel: e-Mola
- c. Mcel: M-Kesh
- d. Other, please specify: \_\_\_\_\_
- e. None

### 4. Do you like to get paid for your products on your mobile wallet (such as MPesa)?

- a. Yes
- b. No

### 5. Have you had any theft from your MPesa account?

- a. Yes
- b. No

### 6. How many mobile money (e.g. MPesa) transactions do you conduct daily? \_\_\_\_\_ (e.g.50).

#### a. Of all your transaction, does this represent:

Less than 5%	5% - 10%	10% - 15%	15%-20%	More than 20%
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**7. Which products or type of transaction are mostly purchased using MPesa, please rank according to mostly purchased (1) and least purchased (4)?**

- a. *Drinks/ Sweets (Snacks) etc.*
- b. *Groceries/ Household Items (bread, flour, soap, washing powder etc.)*
- c. *Tools/ equipment*
- d. *Farming inputs (seed, fertilizer, pesticides etc.)*
- e. *TV*
- f. *Recharge airtime*
- g. *Electricity & water*
- h. *Groceries*
- i. *Transfers of money elsewhere*

<b><u>RANK</u></b>

**8. Do you allow payment for farming inputs (such as seed and fertiliser) through a mobile wallet such as MPesa?**

- a. *Yes*
- b. *No*
- c. *Comments* \_\_\_\_\_

**9. Cash-in frequency (by clients) per week**

<i>Less than 5</i>	<i>10</i>	<i>15</i>	<i>20</i>	<i>30+</i>
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**10. How often do you cash-out mobile money for clients per week?**

<i>Less than 5</i>	<i>10</i>	<i>15</i>	<i>20</i>	<i>30+</i>
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**11. Would you say that your cash float is a problem (you do not always have enough cash float)?**

- a. *Yes*
- b. *No*
- c. **If yes, why?**
  - i. *Customers are too eager to cash out their mobile wallets*
  - ii. *It is too costly for me to keep the necessary cash float which will keep my cash float at a stable level*
  - iii. *Other, please specify?*

\_\_\_\_\_

**12. What do you (as business/ agro-dealer) typically do with most of your mobile money (1- most) (6 - least)?**

- a. *Buy stock from wholesalers*
- b. *Buy farm inputs from suppliers*
- c. *Buy airtime*
- d. *Pay for electricity*
- e. *Transfer money to another mobile wallet*
- f. *Transfer money to a bank account*

<u>RANK</u>

**13. Do you think that a voucher system which works with a mobile wallet (such as MPesa) which allows the customer to get a discount will increase sales for you?**

- d. *Yes*
- e. *No*

**14. Do you think that a voucher system which works with a mobile wallet (such as MPesa) which allows the customer to get a discount will increase the number of customers who use mobile wallets?**

- f. *Yes*
- g. *No*

## ANNEXURE C

**Table 6.1: Mobile network generation characteristics**

	<b>First generation (1G)</b>	<b>Second generation (2G)</b>	<b>General Packet Radio Service (2.5G)</b>	<b>Third generation (3G)</b>
<b>Mobile phone services supported</b>	Voice	Voice, data (SMS, Email)	Voice, data (SMS, instant messaging services)	Voice, data (video streaming)
<b>Data speed or throughput (peak)</b>	None	14.4 kbps	171 kbps	14 mbps
<b>Period of peak utilisation</b>	1980 – 1995	1995 – 2000	2000 - 2005	2000 - 2010 <sup>26</sup>

Source: Adapted from Becvar *et al.* [no date], Prinima and Pruthi (2016)

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<sup>26</sup> Primarily in developed countries. Third generation technology remains inaccessible in large parts of the developing world.



## ANNEXURE D

**Table 6.2: Vodacom M-Pesa tariff plan (MT = Mozambican Metical)**

<b>1. Send money to non-registered customer</b>	
<b>Amount to send (MT)</b>	<b>Fee (MT)</b>
5 - 100	8
101 - 500	20
501 - 1.000	20
1.001 - 2.000	30
2.001 - 5.000	60
5.001 - 10.000	120
10.001 - 25.000	180
<b>2. Send money to registered customer</b>	
<b>Amount (MT)</b>	<b>Fee (MT)</b>
20 - 500	2
501 - 1.000	4
1.001 - 1.500	6
1.501 - 2.000	8
2.001 - 2.500	10
2.501 - 3.000	12
3.001 - 4.000	14
4.001 - 5.000	16
5.001 - 10.000	20
10.001 - 25.000	25
<b>3. Transfer money from a M-Pesa account to a Standard Bank or BCI account</b>	

Amount (MT)	Tariff (MT)
100 - 1.000	10
1.001 - 2.000	20
2.001 - 5.000	40
5.001 - 10.000	80
10.001 - 15.000	100
15.001 - 20.000	120
20.001 - 25.000	150

#### Money Withdrawal (Registered customers)

Amount (MT)	Fee (MT)
20 - 100	4
101 - 1.000	10
1.001 - 2.000	20
2.001 - 5.000	40
5.001 - 10.000	80
10.001 - 15.000	100
15.001 - 20.000	120
20.001 - 25.000	150

For unregistered customers, this service is free.

#### 4. Other transactions

Type of transaction	Fee (MT)
<b>Credelec purchase</b>	
10 a 100 MT	2
101 a 200 MT	3

From 201 MT	5
Money Transfer reversals	50
Balance Enquiry	Free
Changing PIN	Free
Change Language	Free
Call Customer Care line 84111	Free
Buy airtime (10-2.000)	Free
Pay GoTv, DSTV, Zap, Startimes or TVCabo bills	Free
All amounts above include VAT (17%) thus these are the final costs to be applied to the customer.	

Source: Vodacom (2016)