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Analysis of Factors Affecting Market Outlet Choices by Rice Cooperative Members in Zambia

MASTER'S THESIS

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Declaration

I hereby declare that I have done this thesis entitled '**Analysis of Factors Affecting Market Outlet Choices by Rice Cooperative Members in Zambia'** independently, all texts in this thesis are original, and all the sources have been quoted and acknowledged by means of complete references and according to Citation rules of the FTA.

In Prague 23 April 2021

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Liberty Tapiwa Mubhau

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Abstract

Improving access to the market by smallholder farmers in developing countries is crucial as a poverty alleviation strategy since 70 % of the rural population relies on agriculture for their livelihood. In most developing countries smallholder farmers are excluded from markets due to lack of transparency, poor market organization, long value chains, and poor policies by the respective governments. In Zambia, rice is produced mainly in Northern, Eastern, and Western provinces. Agriculture marketing in Zambia moved from the use of marketing boards to a liberalized and diverse system. This has given the farmer a wide variety of market outlets and understanding how they choose where to sell is important. The main objective of the study was to analyze the factors that influence the marketing decision of rice cooperative farmers in Zambia. A sample of 123 rice farmers was purposively selected using the snowballing technique in Limulunga and Mongu Districts. Descriptive statistics and ANOVA were used to describe the value chains and show the differences in prices in the market outlets. The multinomial logit model was used to analyze the factors influencing the market outlet choices. From the results, there were four marketing channels available to the farmers and these were cooperative, middlemen, farmgate, and spot market with the latter being the most utilized. There were also significant differences in the prices of the outlets with the cooperative offering the highest and the farmgate the lowest. The results of the regression model showed that education, age, access to training, access to extension services, access to input subsidies, time of payment, selling price of rice, access to market information, distance to market were statistically significant in affecting the marketing decision of the farmers.

Keywords: Mongu, Multinomial Logit Model, Utility Maximisation Theory, Value Chain, Spot Market

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List of the abbreviations used in the thesis

ANOVA- Analysis of Variance

FRA- Food Reserve Agency

HDI- Human Development Index

MNL – Multinomial Logit Model

MT- Metric tonnes

MVP- Multivariate Probit Model

1. Introduction and Literature Review

1.1. Introduction

Most of the countries in Sub-Saharan Africa have most people living in rural areas and most of the people are exposed to absolute and extreme poverty. According to (IFAD 2013) between 60 to 70 percent of people in rural areas still rely on agriculture for their livelihood directly or indirectly. This means that any poverty reduction strategies that focus on agriculture are likely to have a positive impact in the rural areas as it is their major source of income (Moono 2015). Zambia, located in Southern Africa with an HDI rate of 0.591 (UNDP 2019) still faces the problem of high poverty in the rural areas (76.7 percent as of 2015 (World Bank 2018)) where more than 80 % of the population lives (MACO 2012), and it has been working towards poverty alleviation through agriculture. Agricultural contribution to GDP of 2.57 percent (FAOSTAT 2019) has been declining over the years though it still employs the largest percentage of people in the economy at 28 percent (MLSS 2019). The country has 58 percent of its total land mass (752 614 km²) available for agriculture activities but only 14 percent is being utilised. Lakes and rivers are largely underutilised and only 11.8 percent of the irrigation potential is being used (MFL & MOA 2016).

Rice is the staple food of more than half of the world's population and is recognized by the United Nations as important in providing food security and poverty alleviation (Norman & Kebe 2006). It is also an important staple food to most urban and rural populations of the world and is mainly produced in Asian countries who are currently in the top ten of rice-producing nations with China and India holding the first two positions (FAOSTAT 2019). In Zambia, rice production also provides an opportunity for income generation and eventually poverty alleviation especially in the areas where it is the only viable crop e.g. Mongu District in the Western Province. The local consumers generally prefer the local rice varieties like Mongu, Chama, and Nakonde due to their good aroma and quality but they are often more expensive than the imported rice varieties from Asia, Tanzania, and South Africa (MFL & MOA 2016).

The Zambian Ministry of Agriculture and Livestock increased focus on rice by making it one of the strategic food crops adding it to a list including maize (staple crop), cassava, sorghum, millet, sweet and Irish potato, and wheat (Styger 2014). The majority of the farming community is made up of 70% small-scale farmers who are mainly in the rural areas and they are mainly into maize farming. The government formulated policy and strategy documents including the National Rice Development Strategies that ran from 2011-2014 and 2014-2018, the National Agriculture Policy (2004-2015), the Second National Agriculture Policy (2012-2030), the Sixth National Development Plan (2008), and the Zambia National Agriculture Investment Plan (NAIP, 2014-2018) respectively which aimed at increasing the production of rice, commercialization of the rice sector and improving the market participation of smallholder rice farmers in the country. In Zambia, around 64,500 rice farmers each produce on average less than 1 MT of rice/year (MFL & MOA 2016). Rice production has increased yearly since early 2000 from about 17,000 MT/year to an estimated 47,000 and 54,000 MT/year in 2010 and 2013. The consumption of rice per capita increased from 1.49Kg in 2002 to 4.9Kg in 2013 (MFL & MOA 2016). Rice is mainly grown in the Northern, Eastern, and Western regions (around Mongu District) where there are rainfed lowland systems and floodplains (Styger 2014). However, these rice-growing regions are quite isolated from the major urban markets and it is also a challenge to profitably produce and market rice in Zambia due to cheaper rice imports from South East Asian countries (Sitko et al. 2011).

The smallholder farmers in the Zambian rice sector have been facing many challenges that include, limited market access, poor infrastructure, fragmented markets, lack of organization of farmers, poor extension services, lack of pricing information, poor quality seeds, lack of processing and storage facilities, presence of unscrupulous players in the market chain, lack of finance in the market chain and low yields among others (Manda & Mandebwu 2010; MFL & MOA 2016). Access to markets has been identified as one of the most important factors that affect smallholder farmers especially in developing countries (Barrett 2008). Smallholder farmers' marketing is constrained by many factors like distance from the market, lack of own transportation, poor road infrastructure, and inadequate market information (Masuku et al. 2001). Lack of bargaining power due to selling as individuals along with various credit-bound

relationships with the buyers has led to farmers being exploited during the transaction where most of the farmers become price takers. The majority of farmers are smallholders and hence are unable to obtain a fair price for their produce due to different limitations and as a result, they are not able to sustain their livelihoods (Xaba & Masuku 2012). Bienabe et al (2011) identified six factors that were constraints in smallholder farmers marketing/marketing strategies, and these are barriers to entry, lack of economies of scale and high production risks, high marketing risks, lack of bargaining power, high transaction costs, and lack of human and social capital. According to (Fafchamps & Hill 2005a), there is a difference in the prices that farmers receive in each marketing outlet and this has an impact on their welfare and decision-making process. Marketing channel choice is one of the crucial ingredients to successful marketing by rural rice producers as different channels are characterized by different costs and profitability. Selling to brokers or collectors at the farm gate is often less remunerative, but this may be the only option for farmers who cannot carry their crops to the rice mills in nearby towns or who may be time-constrained and thus prefer to conduct a single transaction at the farm gate, instead of several transactions to the nearest town or the highest paying market (Fafchamps & Hill 2005a).

The rice farmers in Mongu district mainly operate through farming cooperatives and each farmer is somehow linked to a cooperative. Cooperatives can assist smallholder farmers in accessing markets and improving their economic welfare. Farming cooperatives enable farmers to bargain collectively with input suppliers in a bid to get a reduced price for a bulk amount of inputs, they also help reduce transaction costs through economies of scale and they also assist farmers in negotiating good prices for their produce (Anteneh et al. 2011; Bijman & Iliopoulos 2014). Cooperatives also assist in the smooth and efficient flow of information between the farmer and the market and this helps farmers in meeting the market requirements in terms of quality (Wollni & Zeller 2006).

Little is known about factors affecting the market outlet choices of rice cooperative members in Mongu and Limulunga Districts of Western Province Zambia. It

is not known which of the currently available market outlets offers a better price for the farmers' output. The expectation is a profit-maximizing farmer will choose the outlet that maximizes their profits and at the same time improves their welfare. A better understanding of how rice cooperative farmers choose a market to sell their products will help stakeholders involved in formulating policies and pricing mechanisms that contribute to income maximization by the farmers (Anteneh et al. 2011). This research will attempt to empirically investigate the factors affecting market outlet choices by rice cooperative farmers and this will help bridge the current knowledge gap through the provision of empirical evidence.

The study is organized as follows; Chapter 1 has the introduction and description of the relevant literature of this study, Chapter 2 describes the research aim, Chapter 3 describes data collection and methodology used, chapter 4 is about the estimation of the results of the study, chapter 5 is about the discussion and proposed recommendations from the study, chapter 6 is about the conclusion and chapter 7 references.

1.2. Literature Review

Previous research on cooperatives in agriculture has mainly focussed on two issues. The emphasis has been on issues to do with the relationship between the cooperative members and the cooperative itself, for example, what determines cooperative membership (La Ferrara 2002; Fischer & Qaim 2012), what is the relationship between the cooperative functions and the preference of the farmers (Kalogeras et al. n.d.; Cechin et al. 2013), and how joining cooperatives affects market participation of farmers (Barrett n.d.; Hellin et al. 2009). Other areas that previous studies have focused on are cooperatives' impact on production in agriculture, adoption of technology in agriculture, and the welfare of farmers (Abebaw & Haile 2013; Chagwiza et al. 2016).

There is a limited empirical study on factors affecting market outlet choices by cooperative rice farmers in Zambia as a whole. There is research about factors

influencing market participation by smallholder rice farmers in Western Zambia (Moono 2015) but it does not look at their participation from the cooperative perspective and reasons why they select their marketing outlets. There is literature on determinants of market outlet choices and market participation of crops like coffee in Ethiopia, mangoes, rice in Asia, sorghum in Zimbabwe, maize in Malawi, and other countries but there is not much of that in Zambia especially for rice (Anteneh et al. 2011; Cazzuffi et al. 2012; Chagwiza et al. 2016; Musara et al. 2018)

1.2.1. Marketing and Market channel/Outlet Definitions

According to (AMA, 2017) marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large. (Kotler et al. 2012) defines marketing as a societal process by which individuals and groups obtain what they need and want through creating, offering, and freely exchanging products and services and value with others. Marketing channels are defined as a set of interdependent organizations participating in the process of making a product or service available for final use or consumption (Kotler et al. 2012). Most farmers do not sell their produce directly to the final consumer but require a set of intermediaries performing a variety of functions and these intermediaries constitute a marketing channel or outlet (Kotler et al. 2012).

1.2.2. Factors affecting market outlet choice

There are limited empirical studies on factors that affect farmers' market outlet choice especially by smallholder rice cooperative farmers in Zambia. Previous studies in other crops like coffee, teff, mangoes found that factors related to price, scale and size of production, characteristics of farm household, behavioural aspects such as trust, risk, and experience, distance, and purchase condition affect the market outlet choice of a producer (Agarwal & Ramaswami 1991; Brewer 2001; Williamson 2002). According to

Zúñiga-Arias & Ruben (2007), factors such as price attributes, production system, farm household characteristics, and market context could also affect the market outlet decision of farmers in the mango supply chain in Costa Rica. Further studies by Hobbs (1997) discovered that age, on-farm profit, education, and transaction cost are part of the factors that influence farmers' channel choice decisions in livestock marketing. In the same study, Hobbs (1997) noticed that the form of payment (cash or credit), longstanding relationship with the buyer (some form of trust), and the price received as the most important reasons for selling to a particular buyer in the livestock sector.

According to Chirwa (2009), the choice of marketing channels among smallholder farmers, therefore, can be understood within the framework of transaction costs, contracts, and enforcement of contracts. In their study, Fafchamps & Hill (2005) of selling at the farmgate or travelling to the market by Ugandan Coffee farmers, they found out that poor farmers would walk to the coffee market when public transport is not available and the wealthier farmers would sell at the farm gate especially when the quantity sold or distance to market is large because their opportunity cost of time being higher. The result was found to be reversed when the cash constraints and public transport are introduced in their model as they could afford to pay for transport. Wealthier farmers were more likely to sell at the market when they had large quantities of produce and they were also more likely to travel to the market. Nyaupane & Gillespie (2011) also studied the producers' marketing decision in the Louisiana Crawfish Industry and found that most of the producers selected wholesale markets compared to direct marketing to consumers and retailers as this channel was the most convenient and also offered the highest returns. They found out that market outlet choice was affected by market and demographic characteristics. According to Jari & Fraser (2009), institutional factors such as transaction costs, access to market information, the use of grades and standards could reduce the transaction costs in produce marketing. In their study of cocoa farmers, Ogunleye & Oladeji (2007) found that the choice of market channels was influenced by time and mode of payment, price, and grading of products, and distance from farm and transportation cost. Farmers were discouraged to choose an outlet if it had a record of payment delays, or if the condition of the road to that outlet was bad, and also if there was an increase in transportation costs. Factors like access to credit,

cooperatives, government policy-related interventions, and membership to an agricultural farmers group were the determinants of smallholder dairy farmers' adoption of different marketing channels in Kenya (Mburu et al. 2007). The availability of marketing information to small-scale farmers allows them to know market prices and periods of supply and demand (Jari & Fraser 2009).

1.2.3. Theoretical Framework

The study will be based on a framework of the theories of utility, transaction cost, economies of scale, the utility maximization theory, value chain theory, and theory of Planned Behavior (Porter 1985; Norris & Batie 1987; Ajzen 1991; Fishbein & Ajzen 2011; Pryanishnikov & Zigova 2016)

1.2.3.1. Value Chain Theory

The value chain is defined as an economic system made up of distribution and supply itineraries used by all producers who intend to sell the same goods and compete on the same market (Chapota 2013). 0Kaplinsky & Morris (2001) defined value chains as the full range of activities that are required from the conception of a product or service, through the different phases involved in the production, delivery to final consumers, and disposal of that product after final use. The United States Agency for International Development defined value chains as the full range of activities required to bring a product or service from its conception to its end use, including all the marketing channels available to all firms (Fourcadet & Attaie 2003). An agricultural value chain is defined as the individuals and activities that bring about a product like maize or rice or coffee from getting inputs and actual production in the field till final delivery to the consumer, through stages such as processing, packaging, and distribution. Smallholder farmers are involved in value chains as they are connected to markets and sell their produce to traders through different marketing channels (Chapota 2013).

Porter (1985) developed the Value Chain System which suggested that every value chain in a firm is composed of two types of activities i.e. Primary activities (value-creating) and Support activities (firm-wide activities/functions that support primary activities). The major purpose of these activities is to generate a margin for the firm. Primary activities are further divided into five categories i.e. Operations, Inbound logistics, Outbound Logistics, Marketing & Sales, and Services.

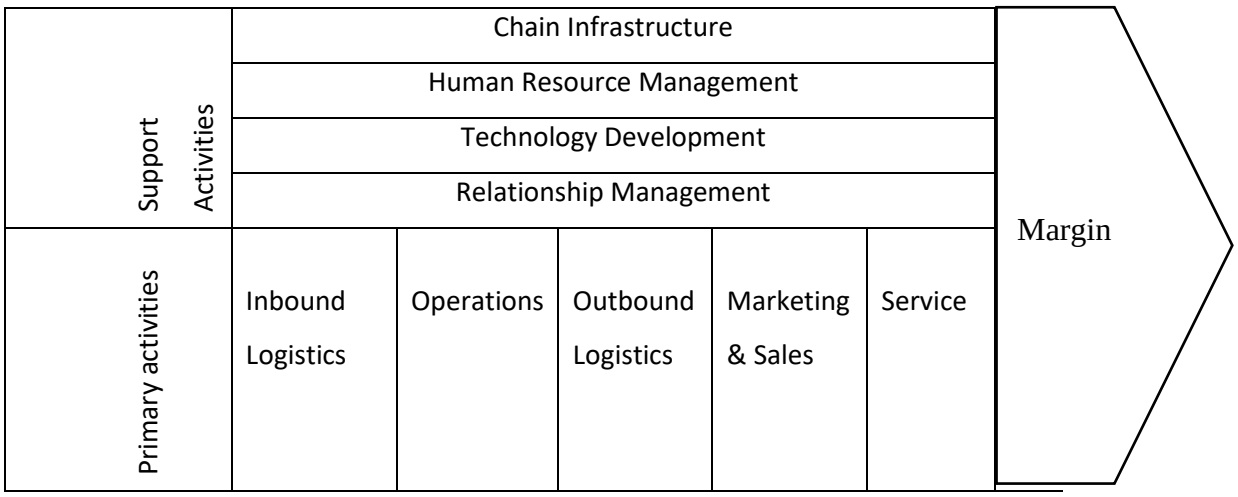

Figure 1.1 Porter's Value Chain Model

Source : (Porter 1985)

Operations- activities related to the conversion of inputs into final products. In agriculture this includes all farming activities such as planting, cultivating, harvesting, packing e.t.c.

Inbound Logistics- All activities involved regarding logistics inside the business of one chain actor, e.g. material handling, inventory control, etc. Outbound Logistics-all activities involved in logistics between different actors in the value chain. For example, the distribution of produce from farmers to buyers.

Marketing & Sales-All activities needed to provide buyers with the means to purchase products. Marketing and sales should be considered at each step in transactions between value chain actors (e.g. from agricultural producers to processors and from those to distributors). The last stage deals with selling the product of the chain to the final consumers. Marketing & Sales covers the following activities for all levels of chain actors: advertising, pricing, promotions, channel selection, positioning, etc (Porter 1985; Fourcadet & Attaie 2003; Chapota 2013).

Services- Activities to enhance or maintain the product after the sale. This is however not applicable to the agri-food sector.

Chain infrastructure- activities management, planning, financing, quality management, and regulations that would be more applicable to cooperatives and large farming operations.

Human Resource Management-these are activities involved in recruiting, hiring, training, and compensation. Relative to an agriculture value chain this would be sharing of personnel between groups or cooperatives and training of members about farming methods or quality requirements.

Technology & Development- all types of technologies and innovations required for primary and support activities at each level in the value chain.

Relationship management- activities involved in the interactions between different players in the value chain e.g. contracts between buyers and sellers and how to maintain or improve such relations (Porter 1985; Fourcadet & Attaie 2003).

1.2.3.2. Transaction cost theory

This theory is based on a fundamental study by Coase who gave a distinction on the firm and the market (Coase 1937, 1960). According to the theory, smallholder farmers would not be motivated to participate in markets if transaction costs are not kept at a bare minimum level. Transaction costs can also be called 'hidden costs' which can either be observable or non-observable costs linked with the exchange of goods and services (Kemisola et al. 2013). Transaction costs arise due to attributes of the transaction as well as characteristics of the human actors involved in the transaction. According to (Williamson 2005), transaction costs are caused by bounded rationality and opportunism of human behaviours and attributes of a transaction, especially uncertainty, frequency, and asset specificity (Williamson 2019). In their debate (Key et al. 2000), transactions that occur between farmers and buyers are closely related to the farmer's assets for production and the location of those assets. For instance, as a result of small farm size, economies of scales cannot be realized by smallholder farmers; the farmers then face higher external transaction costs in obtaining inputs and financial services (Hao et al. 2018).

Production-specific assets are assets that are both physical and human investments which are specialized and unique to a certain product. Physical asset specificity consists of machinery, buildings, land and is closely related to the farm's specialization. According to (Williamson 2007), human asset specificity emanates from "learning by doing. Attaining skill needs energy, finances, and time. Job-specific skills are not easy to transfer across different jobs and in that sense, human asset specificity is a sunk cost that leads to a high probability of being locked in (Hao et al. 2018).

Information and search costs- there are costs incurred in obtaining information about buyers and market-related information about price changes and these are costs that need to be minimized if smallholder farmers are to realize profits (Williamson 2007). There is also opportunism by most of the buyers who always look to take advantage of the farmers by not providing full information about contracts. Due to the uncertainty surrounding the exchange between a farmer and a buyer, there is an increase in transaction costs as more effort is spent on collecting information to minimize the risk

involved. A farmer might choose to sell their products through a middleman but he/she needs to know if the broker is trustworthy and if at all he/she is getting a good deal. This will involve additional costs on the part of the farmer(Mabuza et al. 2014).

Cost of finding the buyers-these are costs that include those incurred in negotiating with potential buyers, the cost of finding new buyers, and the possible transport costs that smallholder farmers incur when travelling to the market. There are costs also involved in monitoring the contracts with the buyers. Smallholder farmers are generally price takers and the level of transaction costs usually increase as they need to travel to their favoured point of sale (Mabuza et al. 2014).

Geographical factors can limit the size and distribution of farms. Small-sized farms normally have high transaction costs because the economies of scale in transacting are not realized. Smallholder farmers experience higher unit costs of acquiring inputs, access to credit and other financial services, access to extension services, and market information (Wiggins et al. 2010). In most cases, bad geographical conditions usually go with poor roads and infrastructure leading to high transaction costs.

Transaction uncertainties include both behavioural and environmental uncertainty. Behavioural results from the opportunistic tendencies of the parties involved in the transaction (John & Weitz 1988), while environmental uncertainty results from failure to specify the terms of the futures exchange. Transaction costs are usually a result of uncertainties. Direct ex-ante transaction costs derive from behavioural uncertainty whilst information asymmetry includes the costs of screening and selecting partners. Direct ex-post transaction costs are related to the processes put in place to measure a partner's performance (Standifird & Marshall 2000)

1.2.3.3. Economies of Scale

Economies of scale from an agricultural perspective refer to the ability of a farm or farmers to reduce the costs of production by increasing their production levels (Duffy & Duffy 2009). The economics of scale concept means that the average cost per unit of production decreases as the size of the farm increases. It is a theory of the relationship

between the scale of optimum combination of productive resources and the rate of output of the enterprise (Stigler et al. 2007). There are two types of economies of scale that can be considered which are internal and external. Economies of Scale that are internal to the firm are an important ingredient for modelling monopolistic competition. Economies of scale that are external to the firm are important for the explanation of cumulative phenomena, multiple equilibria, and path dependencies (Junius 1997). According to Wossen et al. (2017) and Grashuis & Su (2019), the motivation for farmers' collective action is to take advantage of bargaining power which improves farm gate prices in the event of input and market output failures.

1.2.3.4. Utility maximization theory

The decision on the proportion of output to sell and the proportion to retain depends on the expected level of satisfaction derived from selling the output. This decision can be influenced by the socio-economic characteristics of the producer. In the case of rice, it is also influenced by the rapid changes in eating habits, where most Zambians are turning to rice as a major staple. Those who use rice as a staple crop and have large household sizes may opt to sell less in the market and retain more for home consumption. Those who borrowed credit for farming may be forced to participate more to pay back. Those who participate in the market have to utilize marketing outlets that maximize their profits or expected utility such as convenience and relations.

1.2.3.5. Theory of Planned Behavior

Even though human behaviour is difficult to understand or predict, social attitude and personality traits play an important role in explaining human behaviour and the decision-making process in general (Ajzen 1991). The theory of Planned Behavior aims to explain human behaviour in terms of intention by looking at three key components i.e. attitude, subjective norm, and perceived behavioural control (Ajzen 1991). The theory assumes that people behave rationally and following the beliefs that they have and that a person’s behaviour is a function of the information that he or she possesses.

These beliefs may be based on fact, hearsay, experience of fallacious (Beedell & Rehman 1999).

According to the Theory of Planned Behaviour, a farmer will weigh up all the influences on him from family, friends, peers, advisory services, peers, the media, and based on all these influences and the information available forms his beliefs. According to (Ajzen 1991) the three components and salient beliefs of the Theory of Planned Behaviour are defined as follows. Attitude can be defined as behavioural or human beliefs about something. This will create a negative or positive, good or bad, pleasant or unpleasant attitude towards a behaviour. Attitude can estimate the set of salient beliefs with behavioural beliefs and outcome evaluations.

The next component suggested by (Ajzen 1991)is the subjective norm which is defined as perceived social pressure by an individual or group (friends, family, doctor, partner) to perform or not to perform a behaviour. In this case, a farmer will consider what his friends or family are saying about participating in the market or about using a certain marketing outlet. The third component is perceived behavioural control which refers to perceived human capability to perform the behaviour; this can substitute for actual behavioural control. Control, and power to control salient beliefs, refer to any capacity and autonomy aspects that facilitate/ease or impede/prevent performance of the behaviour. These salient control beliefs reflect perceived behavioural control (Ajzen 1991).

Recently (Fishbein & Ajzen 2011), developed the latest behaviour prediction approach which they called the Reason Action Approach which looks at the background factors that affect the three components of the Theory of Planned Behaviour. The factors include age, gender, education, ethnicity, race, culture, religion, personality, mood, emotion, values, perceived risk, media, skills, and past behaviour. However, (Fishbein & Ajzen 2011)have also argued that it is not necessary to connect these background factors to the salient beliefs and they say relevant factors should be related to the context of the study.

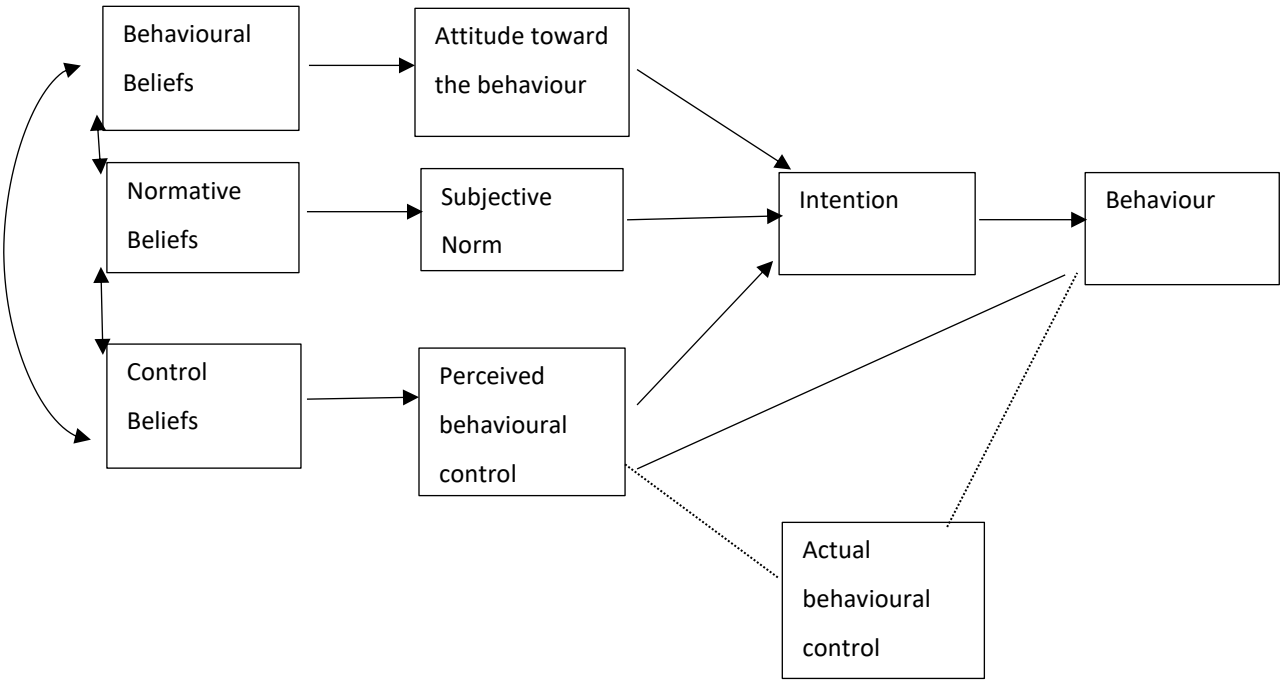

Figure 1.2 Theory of Planned Behavior

Source: Theory of Planned Behaviour (Ajzen 1991)

There are not many studies on marketing channel selection by farmers using the theory of planned behavior and there is no current research on marketing outlet choice of rice farmers in Zambia. Previous studies have been done in Australia (Jackson et al. 2010), Romania (Möllers et al. 2018), and Thailand (Thamthanakoon 2018) and they all confirmed the positive effects of the key components of the Theory of Planned Behavior on farmer's intention or behaviour. They also found that farmer's decision-making can be affected by other factors such as relationship dynamics (including trust,

social cohesion, and networks), transaction-specific factors such as price and services provided by the channel.

1.2.4. Model Literature Review

Previous studies have used a variety of methods to analyze market outlet choices by farmers and these include multinomial logit models, multivariate probit/logit models, Tobit model, endogenous switch regression models depending on what the authors sought to achieve. The Multinomial Logistic Model (MNL) was used by Abera Negeri (2017) to examine the determinants of market outlet choices of Coffee farmers in Lalo Assabi District of West Wollega Zone, Ethiopia. In the model, it was shown that the choice of end consumer outlet is significantly affected by access to transportation facilities, access to information on price, and access to credit compared to private trader outlet. Whereas access to extension services and the quantity of coffee sold negatively affected the choice of the end consumer outlet. Marketing through a cooperative was significantly affected by distance to the market, access to price information, and access to training in comparison to the private trader outlet.

In another study, Hailu & Fana (2017) used the MNL to study the determinants of market outlet choice for major vegetable crops in Ambo and Toke-Kutaye Districts, West Shewa, Ethiopia. The study found out that access to market and family size negatively affected the choice of retailer outlet. In the same breadth, dummy model farmer, level of education, access to credit decreased the likelihood of choosing the retailer outlet whilst having an opposite effect on the wholesaler outlet choice. Access to market and livestock in TLU decreased the chances of selecting the wholesaler outlet.

Diro et al. (2017) also used the MNL in their study of Share of Coffee Market Outlets among Smallholder Farmers in Western Ethiopia. In their study consumers, brokers, cooperatives, urban and rural traders were found to be the main coffee market outlets in the area. They found out that gender had a positive and significant impact on the choice of the cooperative outlet as male farmers preferred it more than female farmers. They assumed that this was because male farmers had more resources for

transportation and time to sell their coffee even when the outlet was far from their place of residence.

The MNL has been used by several scholars in market outlet choice related studies (Jari & Fraser 2009; Panda & Sreekumar 2012; Kuma et al. 2013; Musara et al. 2018; Nxumalo et al. 2019)

Sori et al. (2017) used the Multivariate Probit Model (MVP) in their study of Factors Affecting Market Outlet Choice of Groundnut Producers in Digga District of Oromia State, Ethiopia. The results of the model showed that variables like distance to market, educational level, access to extension services, size of land allocated to crop, quantity of groundnuts, buyers trust, transportation facilities access to off-farm income affected the choice of market outlets by producers.

In another study on the determinants of tomato smallholder farmers' market outlet choices in West Shewa Ethiopia, Tura & Hamo (2018) also used the MVP model. Their results showed that distance to the nearest market, access to credit, age of household head, family size, level of education, farming experience, and quantity of produce significantly influenced the choice of marketing channels. Age of household head, level of education, and distance to nearest market negatively affected the retailer market outlet but access to credit had a positive effect. They also found out that the wholesaler market outlet was negatively affected by the quantity of produce, access to credit, and size of the family.

Degaga & Alamerie (2020) in their study of determinants of coffee producer market outlet choice in Gololcha district of Oromia region, Ethiopia: A Multivariate Probit regression analysis discovered that gender of the household head, level of education, ownership of transport, and access to information had a positive influence on the choice of wholesaler outlet and negatively influenced the agent middlemen outlet. The same variables also had a positive influence on the cooperatives' channel choice.

The MVP has also been used by several scholars in market outlet choice related studies e.g. Arinloye et al. (2015); Tarekegn et al. (2017), Honja et al. (2017)

1.3.

1.3. Context of Zambian Agriculture and Cooperative Development

1.3.1. Agricultural Cooperatives in Zambia

The first cooperative was established in 1914 in the then Northern Rhodesia (now Zambia) and after that followed a few other cooperatives in rural credit (1947), a consumer credit, and a labor recruitment cooperative. In 1948, the Cooperatives Ordinance was enacted which allowed multiple registrations of cooperatives and from that time up to around 1964, a couple of other cooperatives were formed from the parent cooperative societies, and these included marketing cooperatives. There was a review of the Cooperative Ordinance in 1969 (following the collapse of some cooperatives) after research on the viability of the existing cooperatives was done and in 1972 the Cooperatives Act was put in place. This was then followed by the formation of the Zambian Cooperative Federation in 1973 which was to be the mother body of cooperatives at that time.

After the formation of the federation, there were now four levels of cooperatives and these were the Zambian Cooperative Federation (ZCF), Provincial Cooperative Unions (PCUs), the District Cooperative Unions (DCUs), and Primary Cooperatives (PCs). Between 1993 and 1999 there was a massive decline in cooperatives as a result of the liberalization of the market by the Zambian government. The competitive power of cooperatives was now weaker than that of private traders. However, in 1998, another Cooperative Act was enacted, and this resulted in a cooperative reawakening campaign pushed by the government which saw a lot of cooperatives being opened.

1.3.2. Agricultural Marketing in Zambia

The Movement for Multiparty Democracy liberalized the agricultural market when they were voted into power in the early 1990s and this was for both the input and output sectors. Before market liberalization, the National Marketing Board (Namboard), a government parastatal was

responsible for agricultural marketing of inputs and outputs throughout Zambia. However, by 1999 especially after an amendment to the Cooperative Act, the government had withdrawn from the agricultural market to an extent though they were still active through the Food Reserve Agency (FRA) who were buying maize for strategic reserves. The FRA was now buying rice from 2007 in a bid to improve market access for rice farmers (Moono 2015) though it was initially meant for maize only. The FRA was brought about in 1995 through an act of parliament is still in existence and its mandate was recently amended by the Government of Zambia in October 2020 (Government of Zambia 2020). The functions of FRA include but are not limited to: administering strategic food reserves, engage in market facilitation especially for small scale farmers as well as develop and manage national storage facilities.

According to (MACO 2012), agricultural marketing is hampered by a couple of factors such as institutional, policy and legal framework, investment, finance and other services. There is a lack of capacity for small scale farmers and private traders to form effective linkages and there is also a lack of a comprehensive legal framework to guide the operations of the agriculture sector (Moono 2015)

2. Research problem

The opportunity to sell products is important for smallholder farmers though they face a lot of challenges in marketing their crops. Based on the literature review and the background research from Zambia, the main research problem is to analyse the factors affecting the market outlet choice of rice cooperative farmers in Limulunga and Mongu districts of Western province Zambia. Different outlets offer different benefits to farmers and farmers select a market based on a variety of factors. This study will try to look what are the motivational factors behind the marketing decisions of rice cooperative farmers. A lot of research has been done on market participation and outlet choices by farmers of other crops like beans, coffee, maize and cocoa in other countries. According to the best of our knowledge, there is no research on the market outlet choices of rice cooperative farmers in Zambia and this research seeks to close this knowledge gap.

The results of this research will assist extension officers, cooperative leaders, and responsible policymakers in understanding rice farmers' marketing behavior of farmers and the reasons behind it. The policymakers will then be able to formulate policies that assist farmers in

accessing potential markets, access improved extension services, access to market information relating to price and access to input subsidies.

2.1. Objectives

The general objective of this study is to analyse the determinants that influence the market outlet choices of smallholder rice farmers in the Western Province of Zambia. This will be done by looking at the socioeconomic, institutional and market factors affecting farmers,

Specific objectives

1. The author will use descriptive statistics (mean, standard deviation, percentages) to describe the marketing channels and value chains available for Zambian rice farmers

2. The Multinomial Logit Model will be used to determine the factors that influence smallholder rice farmers' market outlet choice in Mongu & Limulunga District, Western Province, Zambia

2.1.1. Hypotheses

Hypothesis 1

The study hypothesized that there was a difference between the selling prices offered by the different market outlet choices in the Western Province of Zambia (Muthini 2015)

Hypothesis 2

Previous studies have looked at the effect of socioeconomic, institutional and market factors on farmers market participation or selection of outlet choice in other countries and on crops like coffee, maize, cattle, crawfish and vegetables (Nyaupane & Gillespie 2011; Zivenge

2012; Abebaw & Haile 2013; Arinloye et al. 2015; Harrizon et al. 2016; Abera Negeri 2017b; Tarekegn et al. 2017). With inspiration from previous studies, this study looks at the Zambian perspective and hypothesizes market factors had an influence on farmers' market outlet choice in the rice market in the Western Province of Zambia.

The specific **market factors** that were hypothesized are distance to the nearest market, time of payment, advance payment, the selling price of rice, and access to market information

3. Methodology

3.1. The Study Area

The study was done in Mongu and Limulunga districts of Western Province, Zambia. Western Province is the largest administrative province in Zambia, and it shares its boundaries with Central, North-Western, and Southern provinces respectively. There are 16 districts in the province with Mongu being the capital. Mongu and Limulunga Districts are approximately 600 km due West of Lusaka, the Zambian capital. Limulunga used to be a part of Mongu district but became an independent district in 2012. Mongu and Limulunga are located near the Zambezi River and in the catchment area of the 30km wide Barotse Flood plain. It is the home of the Lozi people. The districts are located in Agroecological Region 2b with the following types of soils; Arenosols, Histosols, Podzols, and Gleysols (Baidu-Forson et al. 2014; Stalin 2015). There is a tropical savanna wet type of climate in Limulunga and Mongu. The area has an average rainfall of 945mm, and the season starts from October to April. Flooding starts around January, peaking in April, and recedes at the back end of June. There are three main farming system classifications in Western Province and these are; crop-based commercial agriculture, wetland agricultural systems mainly around the Barotse flood plain, and traditional subsistence farming (Baidu-Forson et al. 2014). Western Province was purposively selected because it has the highest number of rice producers per capita (mostly concentrated in Mongu and Limulunga district) in Zambia and it is the second-largest producer of rice after the Northern Province (Moono 2015). Mongu is also known for the best Mangoes and tiger fish in Zambia (Styger 2014).

There are approximately 1500 registered cooperatives in the Western province in different sectors of the economy ranging from agricultural, fisheries, livestock, multipurpose, youth, local development, dairy, credit, and saving cooperatives. The agricultural and multipurpose cooperatives specialise in legumes, cereals, livestock and vegetable production (Paos 2018).

3.2. Target group and sample size

The target group for this study was rice cooperatives in Limulunga and Mongu districts. The sample size was 123 members. The approximate population size of cooperative farmers in Western Province is 1000 according to Mr Paos Munzele the provincial cooperative chief officer. The sample size was calculated using the Yamane formula which is used for a finite population (Yamane 1967). The formula is shown below:

$n=\frac{N}{1+N(e^2)}$ where n is the sample size, N is the size of the population and e is the sampling error. Therefore:

$n=\frac{1000}{1+1000(0.07^2)}$ = 169.49 rounded off to 170.

However, due to Covid-19 lockdown restrictions, the sample size became 123 which was still representative enough.

3.2.1. Sampling technique

The study used a non-random sampling technique specifically the purposive and snowballing technique as there was a need to select farmers in a rice cooperative and who were also selling through an outlet. The level of activity of a cooperative member was based on the number of meetings attended. Most of the members do not live close to the cooperative centre this meant that the respective leaders assisted in bringing the members together for data collection. There was also assistance from the

Caritas Czech Republic in the organization of meetings with cooperative members for data collection.

3.2.2. Type and source of data

Data collection was based on social-economic (age of respondent, education level of respondent, gender of respondent, farm size allocated to rice, Ownership of transport), Institutional (access to extension, access to credit, access to training and access to input subsidies, years in cooperative, position in cooperative) and market factors **(**distance to the nearest market, time of payment, advance payment, selling price of rice and access to market information) factors that influence a farmer's market outlet choice decision (Jari & Fraser 2009; Anteneh et al. 2011; Xaba & Masuku 2012; Abera Negeri 2017b).

Primary data was collected through the use of a face-to-face interview with farmers with the aid of a structured questionnaire considering both open and close-ended questions. The data was collected by a member of the CZU Cooperative Research group Ing. Ebenezer Donkor who was also carrying out data collection for his PhD research in the same area. Enumerators who were already working for the Czech Caritas Group in Western Province were trained and assisted in data collection. Qualitative data was also collected from the farmers and cooperative leaders about the different value chains in the study sample.

3.3. Data Analysis

SPSS version 27.0, Stata version 13.0 and Microsoft Excel 2016 were used for data analysis.

Analysis of data for Objective one was done using descriptive statistics such as means, graphs, frequencies, standard deviation and percentages.

Qualitative data was also used to describe the market outlet channels and value chains available.

For objective two an econometric analysis using the Multinomial logit Model was used to analyse the factors affecting rice market outlet choices. Inspiration for use of the MNL model was taken from (Jari & Fraser 2009; Muthini 2015; Chirwa 2016; Abera Negeri 2017b)

3.3.1. Conceptual Framework

The choice of marketing channel is a fundamental and important decision for the farmers where many factors and conditions must be considered as a basis for precise decision. The conceptualization of this study is given in Figure 3.1 below. It identifies factors that influence farmer's choice of marketing outlets.

Conceptual Framework of the study

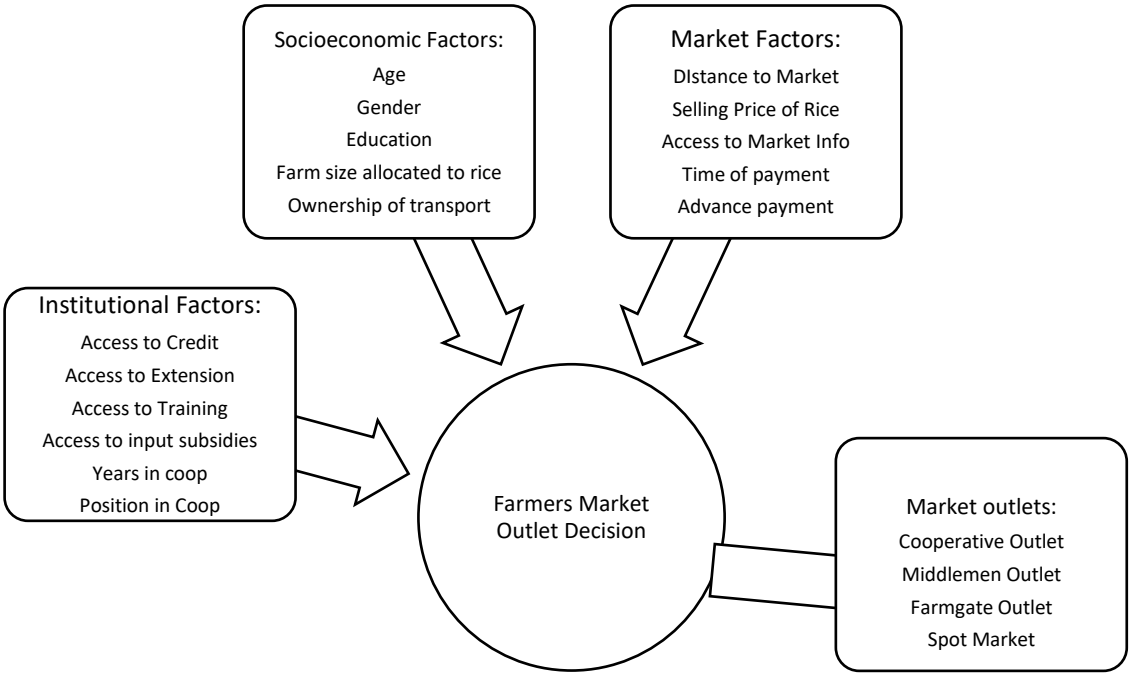

Figure 3.1 Conceptual Framework

Due to the lack of reliable data and difficulty of measuring some of the variables identified in the literature review were not included in this study. The components of the conceptual framework are translated into operational explanatory variables including their descriptions in

Table 3.4.1.

3.3.2. Model Specification

Multinomial models are appropriate when farmers can choose one outlet or have the option of a single outcome from a set of mutually exclusive, collectively exhaustive alternatives. When farmers use simultaneous marketing channels the multivariate probit model is usually used. As such, based on previous empirical studies reviewed the Multinomial logit model was adopted for this study to analyse the factors affecting rice cooperative farmers market outlet choices because in this study we were only considering the major outlet used by the farmer. The MNL is a multi-equation model where a response variable with K categories generates K-1 equations. Every one of the K-1 equations will be a binary logistic regression comparing each category (Market Outlet) with the baseline or reference category. The MNL is similar to logistic regression but the only difference is that the probability distribution of the response is multinomial (categorical) not binomial (binary) hence we have K-1 equations instead of a single equation.

The specification of the model is as follows; suppose the utility for a farmer to an alternative j is U_{ij} where j= 0,1,…J. From the farmer's view, the best alternative is the one that maximizes net private benefit at the margin. That is, a farmer will only choose marketing outlet j if and only if $U_{ij} > V_{ik}$, $\forall j \neq k$. According to (McFadden 2015), a farmer's utility function for using alternative j can then be expressed as follows:

U (choice of alternative j for I farmer) =

$U_{ij} = V_{ij} + \varepsilon_{ij}$

U_{ij} is the overall utility, V_{ij} is an indirect utility function and ε_{ij} is the random error term.

The probability that farmer *i* can select alternative *j* can be specified as follows:

$P_{ij} = Pr(Vij + \varepsilon_{ij} > V_{ik} + \varepsilon_{ik})$

$P_{ij} = Pr(\varepsilon_{ik} < \varepsilon_{ij} + V_{ij} - V_{ik})$ *for* $\forall j \neq k$

If the error terms are identically and independently distributed, the probability that farmer *I* chooses alternative *j* was explained by the multinomial logistic model (Greene 2002)

$$P(Y_i = j / X_i) = P_{ij} = \frac{e^{Xi.\beta j}}{\sum_{j=0}^{j} e^{Xi.\beta j}} \quad , i = 1,2,....N$$

Where P_{ij} is the probability of the i^{th} farmer choice of category j; X_i are probability predictors;

e = natural base of logarithms; n is samples and β_j are parameters to be estimated using the maximum likelihood estimate.

Following the generalised equation above, the MNL regression fitting to the study is adapted as;

$$P(Y_i = j / X_i) = P_{ij} = \frac{e^{Xi.\beta j}}{\sum_{j=0}^{j} e^{Xi.\beta j}} \quad , i = 1,2,....123\ j = 1,2,3,4$$

Where P_{ij} is the probability representing the i^{th} farmer outlet choice j. That is *j = 1* for Cooperative Outlet choice, *j=2* for Middlemen outlet choice, *j=3* for Farmgate outlet choice and *j=4* is for the Spot market outlet choice. Following this, P_{i1} is the probability representing the i^{th} farmer selection of cooperative outlet, P_{i2} is the probability representing the i^{th} farmer selection of middlemen outlet, P_{i3} is the probability for i^{th} farmer selection of farmgate outlet, P_{i4} is the probability for i^{th} farmer selection of spot market outlet. X_i are predictors (independent variables). *e*= natural base of logarithms; and β_j are parameters to be estimated by maximum likelihood estimate with the first category (Cooperative Outlet) as a base (reference) category (Hausman & Mcfadden 1984). An appropriate normalisation that removes an indeterminacy in the model is to assume that $\beta_1\{\beta_0, \beta_1, \beta_2...., \beta_n\}= 0$ (coefficients of explanatory variables on the base category) so that $e^{\beta 1.Xi}=1$. Here the probability that a base category was chosen can be expressed as:

$$Pr(Y_i=1/X_i) = P_{i1}= \frac{1}{1+e^{\beta 0.Xi}+e^{\beta 2.Xi}}$$

Where $\beta_0\{\beta_0, \beta_1, \beta_2...., \beta_n\}$ are coefficients of explanatory variables on the cooperative outlet and $\beta_2\{\beta_0, \beta_1, \beta_2...., \beta_n\}$ are coefficients of explanatory variables on the middlemen outlet. Utilising the fact that all P_{ij} must sum to one ($\sum_{i=0}^{2} Pij = 1$), the separate probabilities that cooperative outlet and middlemen outlets were chosen can be expressed by the equation below.

$Pr(Y_i=1/X_i) = P_{i1} = \frac{e^{\beta 0.Xi}}{1+e^{\beta 0.Xi}+e^{\beta 2.Xi}}$

$Pr(Y_i=2/X_i) = P_{i2} = \frac{e^{\beta 2.Xi}}{1+e^{\beta 0.Xi}+e^{\beta 2.Xi}}$

The parameter estimates of the MNL model only provide the direction of the effect of predictors on the dependent variables. That is, the estimates represent neither the actual magnitude of change nor probabilities. Instead, the marginal effects are used to measure the expected change in the probability of a certain technique being selected with respect to a unit change in an independent variable from the mean. The marginal effects of the characteristics on the probabilities are specified as:

$$\delta_{ij} = \frac{\partial P_{ij}}{\partial X_{ij}} = \ddot{u}_{ij}\left[\beta_j - \sum_{j=0}^{J} ij\beta j\right] = ij\left[\beta_j - \beta\right]$$

Where $\bar{\beta} = \sum_{j=0}^{J} P_{ij}\beta_j$ is a probability-weighted of the β_j (Hausman & Mcfadden 1984; Freese Jeremy & Long 2000)

3.3.2.1. Assumptions of the Multinomial Logistic Regression Model

When using the MNL model there are a number of assumptions that are made and these are as follows (Hausman & Mcfadden 1984; Freese Jeremy & Long 2000; Gujarati 2004):

- The Dependent variable is Categorical in nature (Nominal level)
- The Dependent Variable does not need to be normally distributed
- There should be no multicollinearity in the independent variables
- The error term is independent and there is no assumption of Normality.
- There should be no outliers
- There is no assumption of linearity between the dependent and independent variables but a linear relationship between the log of the response and exploratory variables.

3.3.3. Diagnostic Tests

3.3.3.1. Test of significance of coefficients

Individual regression coefficients are tested with the reported z-statistics and the corresponding p-values as usual. The Likelihood ratio test, to test the significance of the overall model involves three steps:

1)Estimate the full model including all of the variables and obtain the Likelihood ratio statistic LR_f^2

2) Estimate the restricted model that excludes some explanatory variables, X_k and obtain LR_r^2 and ;

3) Calculate the difference, $LR^2 = LR_f^2 - LR_r^2$ which is distributed as chi-square with j-1 degrees of freedom (Freese Jeremy & Long 2000).

3.3.3.1.1 Wald test

While the LR test is generally considered to be better, if the model is complicated or the sample is big, the cost of computing the LR test can be restrictive. Optionally, K Wald tests can be calculated without estimating additional models. The Wald test is defined as follows; Let $\hat{\beta}_k$ be the J-1 coefficients associated with x_k,

Let $\widehat{Var}(\widehat{\beta_k})$ be the estimated covariance matric. The Wald statistic for the hypothesis that all of the coefficients associated with x_k are simultaneously zero is calculated as:

$W_k = \hat{\beta}_k{}^1 \widehat{Var}(\widehat{\beta_k})^{-1} \hat{\beta}_k$

If the null hypothesis is correct then W_k is distributed as chi-square with J-1 degrees of freedom (Freese Jeremy & Long 2000).

3.3.3.2. Multicollinearity tests

Multicollinearity is when predictor/independent variables in a logistic regression model are highly correlated. This can cause unstable estimates and inaccurate variances which affects the confidence intervals and hypothesis tests. Existence of collinearity inflates the variances of parameter estimates and a result incorrect inferences about the

relationships between independent and dependent variables (Midi et al. 2010). The Variance Inflation Factor (VIF) will be used to check for multicollinearity in this study.

3.3.3.2.1 Variance Inflation Factor (VIF)

Variance Inflation Factor (VIF) shows how the variance of an estimator is inflated by the presence of multicollinearity. The higher the value of VIF_j, the more troublesome or collinear the variable X_j. The general rule of thumb is, if VIF exceeds 10 then there is high multicollinearity (Gujarati 2004). VIF is calculated as $\frac{1}{(1-r^2)}$ where r^2 = the artificial regression with the i^{th} dependent variable. A VIF figure of less than 5 indicates absence of multicollinearity (Alauddin & Nghiemb 2010). Ideally, VIF should be less than 3

3.4. Hypothesised Variables

3.4.1. Dependent Variables

Market outlet choice: Categorical dependent variable which represents the outlet preferences of the rice farmers. Four main rice outlets (1=Cooperative, 2=Middlemen, 3=Farmgate and 4=Spot Market) were selected in the study area. Farmers realistically use simultaneous outlets at the same time but for the purpose of this study, the major outlet used by the farmer was used.

3.4.2. Independent Variables

The independent variables that influence a farmer's market outlet choice decision also need to be explained. Therefore, the explanatory variables expected to influence the dependent variable are summarized in

Table 3.4.1 below:

Table 3.4.1 Independent Variables in MNL Model

Variable Code	Full identity	Type of Variable	Mean (SD)
	Socio-Economic Factors		
Age	Age of respondent in years	Continuous	48.96 (14.94)
Gender	Gender of respondent	Dummy, 1 if male, 0 if female	
Farm size rice	Farm size under rice in hectares	Continuous	1.69 (1.75)
Education	Level of education in years	Continuous	9.22 (2.77)
Ownership of transport	Ownership of Transport	Dummy, 1 if yes, 0 if no	
	Institutional Factors		
Position in coop	Cooperative Position	Dummy. 1 if leader, 0 if a member	
Years in cooperative	Years in a cooperative	Continuous	4.81 (3.77)
Access to credit	Credit access	Dummy, 1 if yes, 0 if no	
Access to Extension	Extension services	Dummy, 1 if yes, 0 if no	
Access to training	Access to Training	Dummy, 1 if yes, 0 if no	
Access to subsidies	Access to input subsidies	Dummy, 1 if yes, 0 if no	
	Market Factors		

Payment Time	Payment Time	Dummy, 1 if yes, 0 if no	
Distance to market	Distance to the market (km)	Continuous	15.47 (16.96)
Advance Payment	Advance Payment	Dummy, 1 if yes, 0 if no	
Selling price of rice	Selling Price of Rice (ZMK)	Continuous	224.48 (145.47)
Access to Market Information	Access to Market information	Dummy, 1 if yes, 0 if no	

Table 3.4.2 Distribution of Farmers

Market Outlet Choice	Number	Percentage
Cooperative	36	29.3%
Middlemen	23	18.7%
Farmgate	27	22.0%
Spot Market	37	30.1%
Total	123	100

The study sample (Mongu and Limulunga) had a total of 123 farmers split up as 76 (61.79%) female and 47 (38.21%) males. The average selling price of the whole sample was ZMW224.48/50kg which was generally high. The sample study results showed that the average farm size allocated to rice was 1.69ha and the average distance to market was 15.47 km. The results also showed that the average number of years in the cooperative by the farmers was 4.81 years. Table 3.4.2 shows the distribution of farmers in the study sample.

3.5. Limitations to the study

Whilst the study was a success in general, some limitations were faced during the research period. Firstly, the study was undertaken during the Covid-19 pandemic in November 2020 and the sample size was affected as people in the study area were not allowed to gather in large numbers due to lockdown restrictions. This meant that we were not able to interview as many cooperative farmers as we would have wanted.

The data about the farmer's economic performance cannot be confirmed to be 100% accurate as the respondents did not record their selling prices from the previous period and in some cases, the respondents estimated quantity of rice produced, quantity sold and the selling price received. This affects the reliability of the data and could lead to over/underestimation of the economic performance of the farmers.

There was also a language barrier between the respondents and the main data collector (Ing E Donkor) so there is a chance some information could have been lost in translation. Some of the data was also collected by local administrators without supervision and this could influence the reliability of the data.

The author of the thesis did not visit the study area due to Covid-19 restrictions and relied on a member of the research group which limited the amount of data that could have come out of the study.

4. Results

This section presents the descriptive and econometric results of the study. The first section has descriptive statistics that relate to the first objective; to describe the market channels and value chains available for rice farmers in Western Province, Zambia. Hypothesis one (there is a difference in the selling prices of the different outlets) will also be tested in the first section.

The second section addressed the second objective; to determine factors affecting the market outlet choice of rice cooperative farmers in Zambia. The second hypothesis that market factors that had an influence on farmers' market outlet choice in the rice market in the Western Province of Zambia was also tested.

4.1. Description of the Market Outlet Choices and Value Chains

The map of the value chain of rice in the study area is shown in Figure 4.1 shown below.

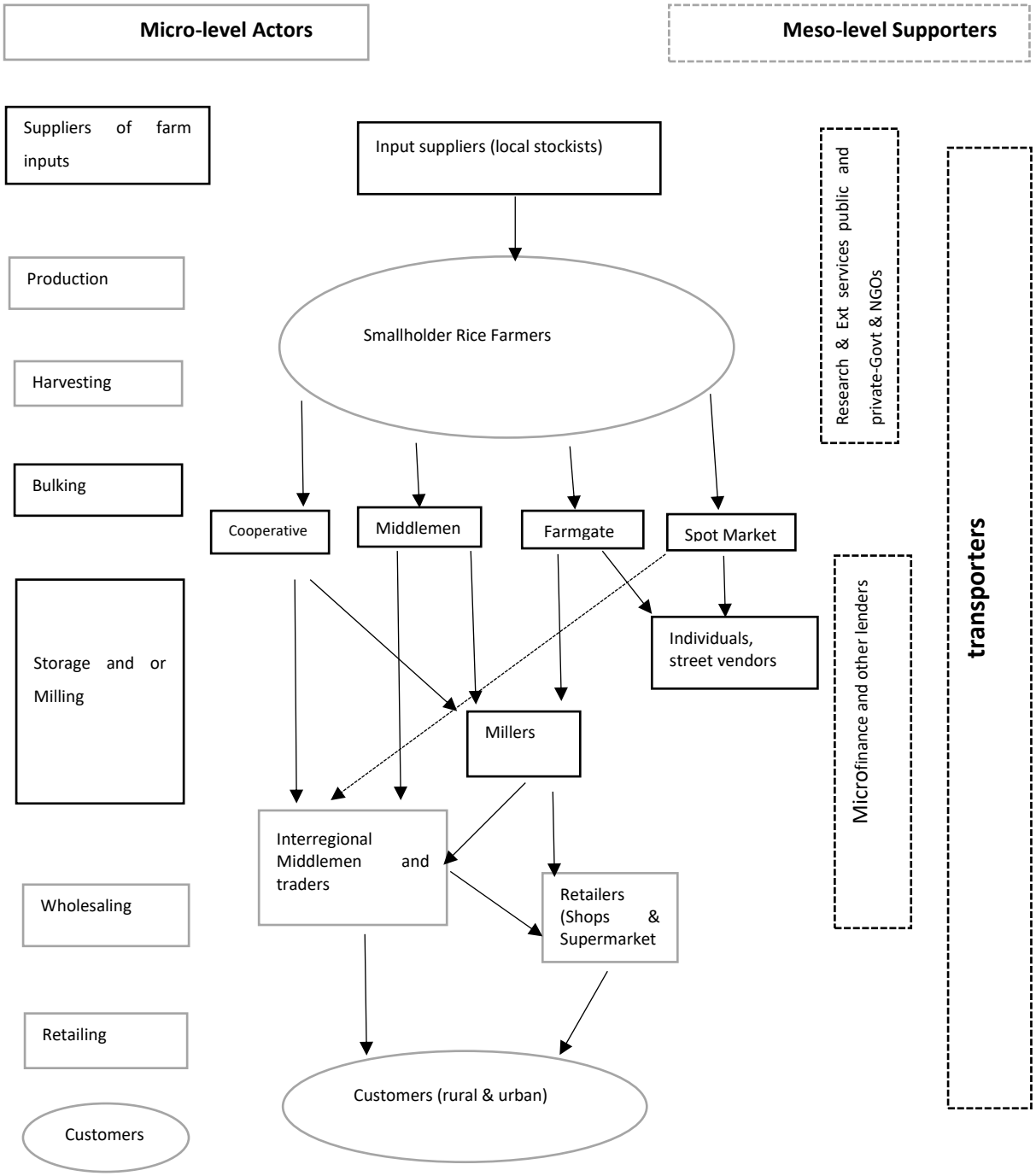

Figure 4.1 Value Chain Mapping

There are key rice value chain micro-, meso- and macro-levels as shown in the rice value chain map above. At the micro-level there are input suppliers as the key actors, and they supply inputs like fertilizers, herbicides, seeds and farming equipment (ploughs, cultivators and hoes). Producers (smallholder farmers), the four outlet channels (cooperative, middlemen, farmgate and spot market), (transporters, traders and wholesalers), retailers and consumers are all part of the micro-level in the Zambian rice value chain. Besides the key actors, there is generally a lack of support from the farmer groups, lending institutions, extension services and other players at the meso-level of the value chain. They are however crucial in supporting, training, promoting, facilitating, technology development and financial services. Most micro and meso-level actors are operating in isolation and far from each other with limited linkage systems, limited business skills and low social capital between them.

Government authorities, central government and providers of other functionalities like roads, storage facilities and electricity are supporting the Rice Value chain at the macro-level. Ideally, the value chain is supposed to benefit from these institutions through the provision of framework conditions (macroeconomic policy, economic infrastructure and administration) but on the ground, the reality is more assistance is still needed to get a robust and strong competitive rice value chain.

4.1.1. Description of the value chains

In our study sample of 123 rice farmers from the study area, there are four available marketing channels that a farmer could market his/her produce through. The available channels are cooperative, middlemen, farmgate and spot market. Whilst the reality on the ground might be that farmers use simultaneous outlets at the same time, in this study the farmer’s major outlet choice is used as farmers only gave information about where they sold most of their produce. The farmers' continuous variables ANOVA differences are presented in Table 4.1.1 shown below.

Table 4.1.1 Continuous Variables

Variable	Cooperative Outlet		Middlemen Outlet		Farmgate Outlet		Spot Market Outlet		Mean
	Mean	Std Deviation	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	
Age of Respondent	47.08	12.262	54.74	16.399	51.33	13.781	45.46	16.338	**48.96***
Education	10.72	2.275	8.52	3.146	7.81	2.418	9.22	2.583	**9.22*****
Selling price of rice	288.61	139.57	223.04	154.73	172.63	116.43	200.81	147.45	**224.48*****
Farm Size allocated to Rice	2.58	2.77	1.42	0.997	1.18	0.60	1.38	0.94	**1.69*****
Distance to Market	14.47	20.55	17.65	15.59	16.28	14.69	14.50	15.93	15.47
Years_Coop	5.64	3.15	5.30	5.24	4.33	2.75	4.05	3.84	4.81

***,* represent 1% and 10% significance level respectively

Cooperative Outlet

The cooperative buys rice from both cooperative members and non-members. The rice is then taken to the millers where it is polished and packaged into marketable sizes ranging from 90kg bags to 1kg packets depending on the target market. Most of the cooperatives have storage facilities where rice is kept in bulk and then sold later when prices would have risen. In some cases, the cooperative will sell to the local supermarket i.e., Shoprite after agreeing on prices and quantities to be supplied. Some of the rice will be sold to larger middlemen who take the rice for marketing to other regions like Lusaka where it is sold at the Baseko produce market or to supermarkets.

The cooperative outlet was used by 36 (29.3%) of the 123 sample farmers and was the second-highest in the study sample. The outlet had a mean education of household head years of 10.72 which was the highest for the four outlets. The mean

selling price of the cooperative outlet was ZMW288.61/50kg bag and this was the highest in the sample. The total farmland allocated to rice had a mean of 2.58ha which was also the highest among the four outlets and above the sample mean of 1.75ha. Farmers in the cooperative outlet were travelling an average of 14.47km to get to the cooperative selling point which was the lowest amongst the four outlets. The study results also showed that farmers who used the cooperative as an outlet had an average of 5.64 years in the cooperative which was also the highest in the study sample.

Middlemen outlet

The farmers usually have a selling arrangement with middlemen who sell rice on their behalf in some cases or they simply buy the rice from the farmer and then offload it to other markets. The middlemen buy unprocessed rice and then take it to millers where it is processed and then repackaged according to the targeted market. This outlet usually relies on trust between the buyer and the farmer and is the least used outlet in the study sample.

The study results showed that 23 (18.7%) of the 123 sample farmers used middlemen to sell their rice which was the lowest of the four available outlet choices. The mean age of the farmers that used the middlemen as an outlet was 54.74 years and the highest amongst the four outlets. On average a farmer had to travel 17.65 km if he/she was to use the middlemen as an outlet which was the highest in the sample.

Farmgate Outlet

Farmers who use the farmgate as a marketing outlet wait for prospective buyers to come to their homestead to buy unprocessed rice. The buyers include traders (brokers from other places outside Mongu and Limulunga who buy different quantities for reselling elsewhere), local people and large-scale farmers. The farmgate outlet is characterised by low producer prices as there are no transaction costs involved and in most cases, farmers who use this cannot afford transport costs, have a low quantity of produce and are generally poorer than those that go to the spot market. The buyers at

the farm gate outlet usually use volume measures or scales that are tampered with to cheat the farmers and they also effectively pay prices lower than the market prices which drastically reduces the profit margins of the small-scale farmers

The results of the study sample show that 27 (22 %) of the 123 farmers used the farmgate as a marketing outlet. The average number of years spent in education was 7.81 years which was the lowest of the total sample. The mean selling price of the farmgate outlet was ZMW172.63/50kg bag of rice and the lowest of all the outlets. The results also showed that the mean for the total farm size allocated to rice was 1.18 ha and the lowest of all the outlets.

Spot Market outlet

The farmers who sell at the spot market use a common produce marketing area or the local market where agricultural produce is sold. There are mostly cash transactions at the spot market and farmers negotiate directly with potential buyers. The buyers include individual consumers, street vendors and even traders from other areas who will be looking for bulk purchases of rice visit the farmers at their marketing stands. The farmers can sell the rice milled or unmilled, packaged or in bulk. The spot market is popular with farmers as they have control of the pricing and this gives them cash to cover their immediate household needs. The spot market generally has a faster payment time as transactions are done in cash and on the spot. However, there are transaction costs involved in transporting and handling products from the farm to the marketing area.

The study results showed that 37 (30.0%) of 123 sample farmers used the spot market as an outlet which was the highest amongst the four outlets. The mean age of the farmers in this outlet was 45.46 years and was the youngest of the four outlets. The farmers in the spot market outlet had an average of 4.05 years in the cooperative and this was the lowest in the study sample.

4.1.2. Testing for Market Outlet Price Differences (ANOVA)

Table 4.1.2 Market Outlet Prices

Variable	Cooperative Outlet		Middlemen Outlet		Farmgate Outlet		Spot Market Outlet		Mean
	Mean	Std Deviation	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	
Selling price of rice	288.61	139.57	223.04	154.73	172.63	116.43	200.81	147.45	**224.48*** **

The above Table 4.1.2 shows the average prices of the four outlet channels. To test if there were any differences in the selling prices of the different market outlets a One-way ANOVA was carried out on the selling prices collected from the farmers during the interviews. The results of the analysis are presented in Table 4.1.3 below.

Table 4.1.3 ANOVA Selling Price

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	241425.215	3	80475.072	4.086	.008
Within Groups	2343667.484	119	19694.685		
Total	2585092.699	122			

Since p value=0.008 <0.005 the test confirms the rejection of the null hypothesis that there is no difference in prices between the different marketing channels.

4.1.2.1. Tukey post hoc test

Since ANOVA only shows that there is a difference in prices in the marketing channels a Tukey post hoc test was carried out to check which exact groups had the differences in prices and the results are shown in

Table 4.1.4 Tukey post-hoc results below.

Table 4.1.4 Tukey post-hoc results

I^{th} Market Outlet	**J^{th} Market Outlet Choice**	**Mean Differences (I-J)**	**Sig**
Cooperative	Middlemen	65.56763	0.303
	Farmgate	115.98148	0.008***
	Spot Market	87.80030	0.042**

***,** represent significance at the 1% and 5% level respectively

The test results showed that there was a significant difference between the selling price of the Cooperative outlet and the Farmgate outlet (0.008) and another significant difference in pricing between the Cooperative outlet and the Spot Market (0.042).

4.2. Results of the Multinomial Logit model

Before carrying out the Multinomial Logit Regression, multicollinearity test and goodness of fit test were done, and the results confirmed that the model is of sufficient quality. The results are shown in Appendices 1 and 2 respectively.

4.2.1. Multinomial Logit Model Results

The results (Coefficients and Marginal Effects) from the MNL regression are presented in **Error! Reference source not found.** and Table 4.2.2 below. The parameter estimates (coefficients) represent the direction in relation to a reference category (Cooperative Outlet) not the magnitude of change. If the coefficient sign is positive, it means a unit increase in the variable will make the farmer choose the current outlet and a negative sign means that the farmer will go for the reference category (in this case the cooperative outlet was used as the base category as we want to know how other outlets perform in relation to the cooperative outlet since our sample is made up of cooperative members only). Marginal effects were used to determine the actual effect of a unit change of the independent variable on the farmer's outlet choice and they are more preferred when using the MNL model (Gujarati 2004; Panda & Sreekumar 2012; Muthini 2015).

Table 4.2.1 MNL Model Coefficients

	Middlemen Outlet			Farmgate Outlet			Spot Market Outlet		
Variable	**Coeff**	**Std Error**	**P>|z|**	**Coeff**	**Std Error**	**P>|z|**	**Coeff**	**Std Error**	**P>|z|**
Gender	-0.368	0.795	0.643	0.058	0.731	0.937	0.128	0.734	0.861
Age	0.583	0.340	**0.086***	0.034	0.029	0.233	0.004	0.026	0.884
Education	-0.373	0.164	**0.023****	-0.435	0.142	**0.002*****	-0.153	0.117	0.191
Selling price of rice	-0.010	0.003	0.765	-0.005	0.003	**0.051***	-0.003	0.002	0.190
Farm Size Rice	-0.339	0.359	0.343	-0.866	0.371	**0.020****	-0.408	0.238	**0.086***
Transport Ownership	-0.402	0.868	0.643	0.094	0.847	0.911	-0.550	0.764	0.472
Distance to market	0.022	0.018	0.229	-0.014	0.029	0.636	-0.010	0.196	0.614
Years in coop	-0.034	0.096	0.726	-0.015	0.099	0.881	-0.021	0.107	0.846
Access to extension	-0.317	0.696	0.649	1.555	0.735	**0.034****	-0.434	0.780	0.578
Access to credit	0.162	0.451	0.719	0.012	0.411	0.977	-0.028	0.465	0.952
Advance Payment	-0.285	0.461	0.537	-0.574	0.439	0.191	-1.110	0.654	**0.090***
Payment time	-0.245	0.232	0.292	0.317	0.242	0.190	0.428	0.206	**0.037****
Access to training	-0.667	0.442	0.131	-0.473	0.595	0.427	-1.298	0.556	**0.020****
Access to input subsidy	0.822	0.758	0.278	-1.564	0.785	**0.046****	-1.255	0.635	**0.048****
Position in coop	-1.418	0.777	**0.068***	-0.754	0.754	0.318	-0.269	0.646	0.677
Access to market info	-1.077	1.943	0.579	-5.280	2.015	**0.009*****	-2.143	2.317	0.355
Constant	9.772	4.060	**0.016****	7.760	4.695	0.098	10.903	4.042	**0.007*****

**reference category: Cooperative Outlet*

N =123, Wald Chi^2 (48)=110.91 , Prob >Chi^2 =0.000, Pseudo R^2= 0.3023, Log pseudolikelihood= -117.344

***,**,* significance level at 1 %, 5% and 10 % respectively

Table 4.2.2 MNL Marginal Effects

	Cooperative Outlet			Middlemen Outlet			Farmgate Outlet			Spot Market Outlet		
Variable	**Dydx**	**Std Error**	**P>|z|**	**dydx**	**Std Error**	**P>|z|**	**dydx**	**Std Error**	**P>|z|**	**dydx**	**Std Error**	**P>|z|**
Gender	0.006	0.078	0.936	-0.051	0.071	0.470	0.013	0.065	0.842	0.032	0.085	0.708
Age	-0.003	0.003	0.245	0.005	0.003	**0.094***	0.002	0.003	0.487	-0.004	0.003	0.210
Education	0.034	0.012	**0.005*****	-0.022	0.014	0.126	-0.032	0.012	**0.01****	0.019	0.014	0.157
Selling price of rice	0.003	0.003	0.194	0.000	0.000	0.517	0.000	0.000	**0.080***	0.000	0.000	0.675
Farm Size Rice	0.057	0.026	**0.027****	0.009	0.039	0.814	-0.071	0.041	**0.087***	0.005	0.040	0.900
Transport Ownership	0.044	0.082	0.589	-0.029	0.080	0.719	0.064	0.074	0.390	-0.079	0.086	0.359
Distance to market	0.000	0.002	0.996	0.003	0.002	**0.064***	-0.002	0.003	0.514	-0.002	0.002	0.548
Years in coop	0.003	0.010	0.771	-0.002	0.010	0.797	0.000	0.011	0.944	-0.001	0.015	0.945
Access to extension	-0.049	0.079	0.533	-0.114	0.054	**0.036****	0.183	0.055	**0.001*****	-0.020	0.083	0.813
Access to credit	-0.005	0.046	0.909	0.019	0.043	0.643	-0.002	0.037	0.940	-0.012	0.055	0.829
Advance Payment	0.087	0.054	0.112	0.033	0.046	0.470	0.010	0.049	0.832	-0.130	0.084	0.120
Payment time	-0.022	0.022	0.312	-0.058	0.022	**0.008*****	0.022	0.024	0.362	0.058	0.024	**0.017****
Access to training	0.109	0.049	**0.025****	-0.008	0.036	0.813	0.050	0.059	0.392	-0.152	0.064	**0.019****
Access to input subsidy	0.140	0.062	**0.024****	0.013	0.075	0.864	-0.086	0.083	0.298	-0.066	0.087	0.444
Position in coop	0.089	0.069	0.192	-0.129	0.069	**0.061***	-0.025	0.074	0.735	0.064	0.081	0.421
Access to market info	0.289	0.229	0.208	0.160	0.159	0.313	-0.494	0.145	**0.001*****	0.046	0.247	0.854

*dydx is the marginal effect, ***,**,* represents 1 %, 5% and 10 % level of significance respectively

In this study, we are more interested in finding out the variables that are significant in affecting the selection of a marketing outlet by a farmer. The results for each marketing outlet are presented in the following paragraphs.

Cooperative Outlet

The empirical results of the study in Table 4.2.2 show that education of the household head is statistically significant at the 1% level. A unit increase in the number of years in education results in a 3.4% increase in the chances of a farmer choosing the cooperative outlet. Farm size allocated to rice is also statistically significant at 5% as a unit increase in farm size results in a 5.7% increase in chances of farmers choosing the cooperative choice. The results also show that access to training and access to input subsidy were both statistically significant at the 5 % level and a unit increase in both variables resulted in a 10.9% and 14.0% increase in chances of a farmer choosing the cooperative outlet.

Middlemen Outlet

The study results in Table 4.2.2 show that age of household, distance to market, and position in cooperative are statistically significant at the 10 % level. A unit increase in age results in an increase of 0.5% in the probability of a farmer choosing the middlemen outlet and a unit increase in distance to market result in an increase of 0.2% in chances of the farmer using the middlemen as an outlet. However, a unit increase in the position of member reduces the chances of using the middlemen as an outlet by 6.9%. Access to extension services and time of payment is significant at 5% and 1% respectively. A unit increase in access to extension decreases the chances of using the middlemen as an outlet by 11.4% whilst a unit increase in time of payment decreases the chances of using the middlemen by 5.8%.

Farmgate Outlet

The results of the study show that the selling price of rice and farm size allocated to rice are statistically significant at the 10% level. A unit increase in selling price has no significant effect on the choice of the farmer however a unit increase in farm size allocated to rice results in a 7.1% decrease in chances of farmer using the farmgate as an outlet. The results also show that education of the household head is statistically

significant at the 5% level whilst access to extension and access to market information are statistically significant at the 1% level. A unit increase in the number of years in education reduces the chances of using the farmgate as an outlet by 3.2% whilst a unit increase in access to extension increases the chances of using the farmgate by 18.3%. A unit increase in access to market information reduces the chances of a farmer using the farmgate by 49.4%.

Spot Market outlet

The empirical results of the study in Table 4.2.2 show that time of payment and access to training are statistically significant at the 5% level. A unit increase in the amount of time to receive payment for sold produce increases the chances of a farmer using the spot market as an outlet by 5.8% whilst a unit increase in access to training reduces the chances of using the spot market as an outlet by 15.2%.

The study results also show that the gender of respondent, access to credit, and advance payment are not statistically significant in any of the outlet choices.

5. Discussion

The study analyses determinants influencing market outlet choices made by smallholder rice cooperative farmers in Mongu and Limulunga districts of Western Province, Zambia. The study first describes the available marketing channels and value chains through the use of descriptive statistics (mean, standard deviation, and percentages), and then the MNL model is used to determine the factors influencing the smallholder rice farmers' market outlet choices. The study also hypothesizes that there are differences in selling prices between the market outlets and that market factors influence smallholder farmers' market outlet choices.

There are four marketing channels available in the study area and these are cooperative middlemen, farmgate, and spot market.

The empirical results of the study show that the cooperative outlet was the second most used outlet in the study sample. The cooperative was the main focus of the study since we were dealing with cooperative members and the expectation was that this will be the most used outlet. The results of the MNL model show that education of respondent, farm size allocated to rice, access to training, and access to input subsidies are statistically positively significant for the cooperative outlet. As the educational level of respondents increases, they gain the ability to interpret and understand market information (improve predictive power) and the ability to adapt to new farming methods. Farmers with a better level of education also understand the benefits of economies of scale found through marketing in a cooperative and are therefore more patient and willing to wait for the right buyer (Jari & Fraser 2009; Chalwe 2011; Abera Negeri 2017b). This is consistent with a study done by (Nkhori 2004) who discovered that an increase in the educational level of the household head meant a reduction in information search costs and improved the negotiation skills of farmers. However, the study results are different from those of Anteneh et al (2011) who discovered that farmers with the most education preferred to sell through multiple channels than through cooperatives only. The difference can be attributed to the fact that in this study

we considered only the major outlet used by the farmer. Admittedly this might be the case in the study area but we cannot confirm this since we focused on the major outlet used by the respondents which could have limited the study. The farm size allocated to rice was positively significant with the cooperative outlet as the assumption is there will be more produce from an increase in land size. With an increase in quantity farmers use the cooperative outlet where they can get a higher price from bulking their crop and selling to the highest bidder. The results are similar to those of a study by Diro et al. (2017) who discovered that farmers with more land allocated to coffee preferred to sell via cooperatives instead of traders because that outlet had a higher price. However, this was not the case in the study done by Anteneh et al (2011) who found out that farmers with more land allocated to coffee opted to sell through multiple channels instead of cooperatives. The difference can be explained by the assumption that if the farmer has more land, he/she might have a higher yield and is more willing to try marketing in different outlets to fulfil different financial needs. Fafchamps & Hill (2005b) also discovered that wealthier farmers could afford to sell through cooperatives as they did not have immediate cash needs and could therefore afford to wait longer and rely on other sources of income. Access to training was also positively significant with respondents choosing the cooperative outlets as with more training, farmers realized the benefits of using the cooperative as a marketing outlet. This is also a product of the respondents being educated and therefore easy to train. Farming cooperatives provide trainings for farmers through field visits, field days, training workshops and other related activities. Access to training also positively affected the cooperative outlet in a study of marketing choices of coffee farmers on Ethiopia done by Anteneh et al (2011) and there were similar results in other studies done by Mujawamariya et al. (2013) and Abera Negeri (2017b). As per a priori expectations, access to input subsidies positively affected the respondents in choosing the cooperative outlet since farmers used the outlet in anticipation of getting inputs at a lower price from the cooperative. Economies of scale in the cooperative help farmers negotiate for reduced prices of inputs from suppliers and sometimes governments release input programs through cooperatives. The results are consistent with previous studies done by Fischer & Qaim (2012), Anteneh et al (2011), Diro et al. (2017) who all discovered that access to input subsidies positively

influenced the use of the cooperative as a market outlet. However, Mujawamariya et al. (2013) discovered that most farmers who had accessed input subsidies because of cooperative membership did not necessarily sell their produce through the cooperative in a bid to avoid deduction of input costs from their income. Access to credit and advance payment were not significant for the cooperative outlet since no farmers received any sort of credit in the study sample. Previous researches by Anteneh et al. (2011) and Abera Negeri (2017b) showed that access to credit positively influenced the use of the cooperative as an outlet which is not the case in our study. Access to market information, years in cooperative and extension services were also surprisingly not significant for the cooperative outlet although the assumption is extension services have more contacts with cooperatives and through that, there will be an increase in access to information. It is also assumed that those with more years in the cooperative would use the outlet but in our regression model, this was not significant. These findings are contrary to a priori expectations as previous studies by (Anteneh et al. 2011; Cazzuffi et al. 2012; Mmbando et al. 2015; Asefa 2016; Diro et al. 2017) and many others found access to extension services and access to market information being positively significant for use of the cooperative outlet by farmers. The difference might be because of the poor quality of extension methods being used in the study area and maybe the farmers are not exposed to correct market information in respect of the cooperative outlet. Whilst the marginal effects for the time of payment was negative the variable was surprisingly insignificant for the cooperative outlet. Previous researches suggest that delays in payment sways a farmers choice against such an outlet (Ogunleye & Oladeji 2007; Anteneh et al. 2011; Mujawamariya et al. 2013) as farmers preferred cash. This shows that whilst time of payment is important, farmers in the study sample do not necessarily consider it as a reason to avoid using the cooperative outlet. Whilst the cooperative offered the highest price amongst the four outlet the selling price was surprisingly not a significant factor in farmers selecting the cooperative as an outlet. This was against the utility maximisation theory and suggested that farmers in the study sample used the cooperative outlet for other reasons like loyalty and trust (as the results showed that the farmers who used this outlet had spent the longest time in the cooperative). In a different study, Kuma et al. (2013) also found that cooperative

members who had a large herd of cows and large grazing area used the cooperative outlet in selling milk to reduce transaction costs through the outlet was offering a low price and was not paying cash. This shows that the price offered is not the only pull factor for using an outlet Position in the cooperative was also surprisingly not significant as the general expectation would be leaders of cooperative sell through the cooperative for the sake of being exemplary.

The majority of the farmers in the study sample sell their produce through the spot market even though the average price at that outlet is lower than that of the cooperative and middlemen. The marketing behaviour of the respondents is against the utility maximization theory which assumes that a rational producer will choose the marketing outlet that provides the highest returns for their produce. It can be assumed that farmers prefer the spot market because of speed/time of payment which is quicker and in cash allowing them to cover debts incurred during the season immediately and to also cover other family and farm-related expenses. The results of the MNL model also confirm the time of payment to be positively significant (as expected) in farmers choosing the spot market. This is also consistent with other studies by (Anteneh et al. 2011; Mujawamariya et al. 2013; Abera Negeri 2017b) which showed that farmers preferred being paid in cash when they are marketing crops. The respondents using the spot market are more concerned about the time value of money and therefore prefer to deal in cash. The spot market also gives farmers independence to negotiate with buyers and the farmers can sell their produce anytime which is not the case when using the cooperative which does not buy all the time. During an interview with a cooperative member who uses the spot market as a major outlet, he said, '*It takes longer for the cooperative to offer payment for their produce so I have to sell at the spot market so that I can take care of my family needs'.* Some of the interviewed farmers also said that '*We avoid using the cooperative because we are only just members so when we bulk our produce for marketing through the cooperative if a buyer comes and takes a few bags the leaders will claim that it was their bags that were bought'.* This implied that there was a lack of transparency on how some cooperatives sold rice in stock and some members did not trust their leaders. The spot market had the lowest mean age of respondents which is consistent with other studies done by Masuku et al. (2001) and

Nkhori (2004) who discovered that younger farmers had more risk-taking behaviour when it came to choosing marketing channels than older farmers. The results show that farmers who were using the spot market had the lowest average of years as cooperative members. This implied that the farmers did not feel obliged to sell to the cooperative or were not loyal to the cooperative values which also explains why they generally did not trust the leaders of the cooperatives. The results of the MNL showed access to training being negatively statistically significant in the selection of the spot market as an outlet. The assumption is farmers in the cooperatives are more trained to use the cooperative as an outlet because they stand to get a higher price for their products and can also pay costs incurred during procurement of inputs. Farmers are also trained to save money for future use, and this is more possible in an outlet where they can get higher prices which leaves them with excess profits to save.

The study also found out that the farmgate is the third most used outlet in the study sample. The results of the MNL model show that education of respondents, farm size allocated to rice, access to market information were negatively significant whilst selling price of rice, and access to extension services were positively significant in farmers selecting the farmgate as an outlet choice. An increase in the literacy level of farmers improves their ability to interpret market information and their predictive power of market behaviour this is why farmers decide to choose other available outlets. Similar results were found by Diro et al. (2017). Whilst the selling price of rice was significant the marginal effects of it were neither positive nor negative. However, from descriptive results, the outlet had the lowest selling price amongst the four outlets which could be another reason why farmers did not use this outlet. This was also found in other researches done by (Fafchamps & Hill 2005b; Buckmaster et al. 2012; Cazzuffi et al. 2012) who discovered that prices at the farmgate were the lowest amongst available outlets. The results also show that an increase in farm size allocated to rice negatively affected the farmers' use of the farm gate as an outlet. The assumption is an increase in output is associated with an increase in farm size and a farmer will put more effort in looking for better prices elsewhere to capitalize on economies of scale and utility if he or she has more produce. An increase in output gives the farmer the ability to cover for transaction costs involved in searching for alternative markets. This is

consistent with the results of a study done by Fafchamps & Hill (2005b) which concluded that selling to the market was more likely when the quantity of coffee produced was high. Anteneh et al. (2011) and Mujawamariya et al. (2013) also found that farmers who had more land preferred to use multiple channels and were more willing to travel long distances in search of markets. As expected, access to market information negatively affected the use of the farmgate as an outlet because when a farmer is empowered with market information, he or she will move to the outlets selling at better prices and this conforms with the utility maximization theory that suggests that a rational producer will always look to sell at the highest price possible. Similar findings were done by Fafchamps & Hill (2005b) and Cazzuffi et al. (2012) who discovered that when farmers have pricing information they opt to use those outlets with better prices which are usually not the farmgate. Most of the farmers interviewed in the study sample said they got market information from friends, relatives, neighbours, extension officers, radio, and other farmers which conforms to the theory of planned behaviour. Access to extension services was surprisingly positively significant in promoting the use of the farmgate as an outlet. This is contrary to a priori expectations and previous researches by (Anteneh et al. 2011; Mujawamariya et al. 2013; Soe et al. 2015; Asefa 2016) who found out that access to extension services negatively affected the chances of a farmer selling at the farmgate as farmers were equipped with market information to search for better prices elsewhere. The assumption is extension services maybe encourage farmers who cannot sell in other outlets to use the farm gate in a bid to reduce costs and to capitalize on the storage facilities they have at the homestead. This can also imply that the farmers that were sampled are located in an accessible area and maybe the extension received was not necessarily marketing extension but input extension.

The middlemen outlet is the least used in the study sample. Although the outlet offered the second-highest price, farmers were not keen on using the outlet which we assume to be caused by a lack of trust of the middlemen by the farmers. Most farmers shun the use of the middlemen outlet as they are generally assumed to be untrustworthy and always looking to benefit at the expense of the farmers as shown by studies done by (Jari & Fraser 2009; Chigusiwa et al. 2013). Although they are generally avoided, middlemen are still crucial as they offer a marketing option to farmers who

cannot access the market and those with poor quality of crop that cannot meet the standards required in other market outlets (van Schalkwyk et al. 2012). The results show that farmers who used this outlet had the highest mean age of 54.74 years which implied that the older farmers respected the contractual relations they had with the middlemen and trusted this outlet which was also consistent with findings by Musara et al. (2018). The age of the respondent was positively significant with the use of the middlemen outlet from the results of the MNL model. This is consistent with previous researches by (Fafchamps & Hill 2005b; Jari & Fraser 2009; Chigusiwa et al. 2013; Soe et al. 2015; Mmbando et al. 2016) which discovered that older farmers preferred to use middlemen as they did not want to travel to distant markets and relied on trust built over past transactions with the middlemen. The middlemen outlet also had the furthest distance to market with an average of 17.65km between the farmer and the middlemen and distance to market was also positively significant with the use of the middlemen outlet. This is consistent with studies done by Masuku et al. (2001), Jari & Fraser (2009), Wiggins et al. (2010) who showed that farmers who are located far from the market and had poor road infrastructure relied more on middlemen for their sales as they could not afford the costs involved in travelling to the market. Access to extension services was negatively significant with the use of the outlet as expected as extension officers discourage farmers to use the middlemen as they generally look to take advantage of the farmers. This is consistent with previous researches by (Fafchamps & Hill 2005b; Chigusiwa et al. 2013; Soe et al. 2015). However, middlemen are important as a source of market information to farmers who are located in marginalized areas, and sometimes they are the only available channel as discovered by Jari & Fraser (2009), Chigusiwa et al. (2013), Fafchamps & Hill (2005b) who also had similar findings in the study of Ugandan coffee farmers where they discovered that geographical location affected who the farmers sold to. The results of the MNL model also show the time of payment of produce to be negatively significant with the middlemen which are logical in the sense that if the payment time increases the farmer will think he or she has been duped by the middlemen. This is consistent with previous studies which suggest that farmers who use the middlemen outlet are looking to be paid on the spot and in cash so any increase in time to pay will result in the farmer rejecting the outlet given that there is a general

preconditioned mistrust of middlemen (Anteneh et al. 2011; Chigusiwa et al. 2013; Abera Negeri 2017b; Musara et al. 2018; Degaga & Alamerie 2020). Position in cooperative was negatively significantly affecting the use of the middlemen outlet as expected as leaders because of their position do not use the middlemen outlet as a show of loyalty to the cooperative and in a bid to show that the cooperative system works. However ordinary members can use the middlemen as an outlet if necessary, given that in some cooperatives they believe leaders put their interests first. This is consistent with other studies done by Mujawamariya et al. (2013) on exploring double selling by coffee cooperative members in Rwanda. In our study access to credit and market information was not significant for the middlemen outlet even though other studies have shown that sometimes middlemen advanced credit to farmers during a season to cover family-related expenses and to secure the farmer's crop. In some cases, middlemen are the only source of market information so the expectation was this should have been significant to a certain extent. These differences might be because in the study sample not many farmers accessed credit from any outlet or source and that there was a low number of farmers using the middlemen as an outlet so there might be a sampling bias.

The study faced some limitations and they are as follows:

- The study was carried out during the covid-19 lockdown restrictions period and this affected the sample size to a greater extent since farmers were not allowed to gather in large groups.
- The economic information about selling price, quantity produced was mainly estimated from the farmers and therefore not very reliable
- Some of the variables that we could have used like the quality of rice could not be measured
- Due to time limitations, the study only focused on the major outlet available to the farmer which might not be the case on the ground.

From these results the following suggestions for future studies were made:

- There is a need to look at factors affecting market outlet choices of non-members so that a balanced view of the marketing situation in Western Province can be deduced.

- A similar study can also be carried out in other provinces especially the Northern Province so that there can be an overview of factors that affect rice marketing in Zambia.
- There is a need to look at other important variables like mode of payment (cash or otherwise), trust (between buyers and sellers), rice farming experience, household size, contracts, quality or grade of rice.
- A study from the buyers perspective can also be done
- Future studies should also consider looking at time-series data of farmers rather than cross-sectional data so that they can get a conclusive statement on the factors that affect farmers

6. Conclusions

The research aim of the study was to analyze factors affecting market outlet choices of rice cooperative farmers in Zambia through a case study of Limulunga and Mongu districts in Western Province. The specific objectives were to describe the marketing channels and value chains available and to analyze the factors that influence smallholder rice cooperative farmers' market outlet choice in Limulunga and Mongu Districts in Western Province Zambia. A sample size of 123 farmers was selected from rice cooperatives in Limulunga and Mongu using purposive sampling and snowballing techniques. A structured questionnaire on nest form application was used to interview farmers to obtain data on social-economic (age of respondent, education level of respondent, gender of respondent, farm size allocated to rice, Ownership of transport), Institutional (access to extension, access to credit, access to training and access to input subsidies, years in cooperative, position in cooperative) and market factors **(**distance to the nearest market, time of payment, advance payment, selling price of rice and access to market information) that were expected to influence market outlet choices.

The first objective was fully met in the results section through the use of descriptive statistics and ANOVA. The results showed that there are four marketing channels in the study area and these are cooperative outlets, middlemen outlets, farmgate outlets and spot markets. The spot market outlet is the most used by rice cooperative members outlet amongst the four outlets in the study area. ANOVA showed that there was a significant difference in the selling price of rice amongst the four outlets with the cooperative having the highest price whilst the farmgate had the lowest selling price. Based on the ANOVA results, the hypothesis that there is a difference between the selling prices offered amongst the rice market outlet choices in the Western Province of Zambia is therefore accepted.

The second objective was fulfilled in the results section through the use of the MNL model. Education of respondent positively influenced the respondent's use of the cooperative outlet whilst it also negatively affected the use of the farm gate outlet as per a priori expectations. The size of the farm allocated to rice positively influenced the use of the cooperative outlet as farmers looked to benefit from economies of scale

whilst the same variable negatively affected the use of the farm gate outlet. Access to extension services negatively influenced the use of the middlemen outlet as farmers were discouraged from using the middlemen by extension officers but it surprisingly positively affected the use of the farm gate outlet. This was attributed to the use of outdated extension methods or maybe the extension services received were not necessarily marketing focused. Time of payment negatively influenced the use of the middlemen outlet as delays in payment would result in farmers thinking they have been cheated on. The same variable positively influenced the use of the spot market outlet as per a priori expectations but was surprisingly not influencing the use of the cooperative outlet. Selling price was also not significantly affecting the cooperative outlet which was against the utility maximisation theory and also showed that other factors were at play in the decision-making process of the farmer. Access to training positively influenced the use of the cooperative outlet as per expectations but negatively influenced the use of the spot market. The assumption was with more training farmers appreciate the economic benefits of using the cooperative. Access to market information negatively influenced the use of the farmgate outlet as per expectations as any information on the prices would result in farmers looking for other available options. This was expected to positively affect the cooperative market but was not significant in the regression model. Based on the results of the MNL model, the hypothesis that market factors influenced rice cooperative farmers' market outlet choice in the Western Province of Zambia is therefore accepted.

Based on the results of the study the following recommendations are made:

- Farmers are concerned about the speed of payment after marketing their crops and cooperatives should work on improving the speed of payment of farmers so that they do not lose members to other channels.
- Cooperatives should be strengthened through improved training of the farmers on the use of market outlet channels so that farmers can benefit from the economies of scale advantages of cooperatives. If farmers are trained on the benefits of marketing

through cooperatives they will also be able to reduce transaction costs during the selling process. There is also a need for access to the latest extension methods so that farmers have the latest trends with regards to rice production and marketing. Selling through cooperatives should be improved and encouraged so that there is economic sense in being a cooperative member. This will also reduce free-riding as all members will be participating in the success of the cooperative.

- There is a need for improvement of road infrastructure so that both buyers and sellers can access the market easily. The data showed that the longer the distance the more the farmer uses the farm gate as an outlet option.
- The government should increase land allocated to farmers as this has a direct impact on the quantity of rice produced. The western province has the highest incident rate of poverty in Zambia and most people rely on agriculture for their livelihood. The size of land positively influenced the use of the cooperative outlet but at the same time reduced the use of the farm gate outlet as the farmer had a marketable surplus and looked for higher prices.
- There is also a need to improve access to market information through the use of radio programs, phone messages, extension officers, and field days. The results showed that access to market information negatively affected the use of the farm gate outlet and was expected to positively influence the use of the cooperative and spot market outlet.

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Appendices

List of the Appendices:

Appendix 1: Multicollinearity Test

The results of the test carried out using the Variance Inflation Factor (VIF) are shown below.

	Collinearity Statistics	
Model	**Tol**	**VIF**
Gender_HH	.802	1.247
Age_HH	.675	1.482
Edu_HH	.780	1.282
SP_Rice	.692	1.444
F_Sz_Rice	.826	1.211
Own_Trans	.698	1.433
Dist_Mkt	.740	1.352
Years_Coop	.610	1.638
Acc_Ext	.770	1.299
Adv_Pymnt	.425	2.352
Acc_Training	.738	1.354
Pymnt_Tm	.678	1.475
Acs_Inpsbsdy	.736	1.358
Pos_Coop	.802	1.248
Acc_Crdt	.474	2.110

VIF is the reciprocal of the tolerance value and it is used to check if multicollinearity exists between independent variables. General rule of thumb is the Tolerance value should be more than 0.2 whilst VIF should ideally be less than 3. A VIF value of more than 5 suggests high chances that there is multicollinearity between our independent variables and a VIF value of more than 10 is evidence that there is multicollinearity in the sample (Greene 2002; Gujarati 2004; Midi et al. 2010).

From the results above there was no independent variable with a VIF value above 2.5 or Tolerance value below 0.2. This means that there is no multicollinearity between the independent variables and our assumption for logistic regression has not been violated.

Appendix 2: Goodness of Fit Results from MNL Model

Log Likelihood	-117.34
Pseudo R^2	0.3023
Prob>Chi^2	0.000
Wald Test (48)	110.91