

**FACTORS INFLUENCING BEAN PRODUCERS' CHOICE OF MARKETING  
CHANNELS IN ZAMBIA**

**Sunga Chalwe**

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## LIST OF ACRONYMS

ACE	Agricultural Commodity Exchange
AMA	American Marketing Association
CIAT	International Centre for Tropical Agriculture
CSO	Central Statistics Office
DRC	Democratic Republic of Congo
FAO	Food Agriculture Organization
FEWSNET	Famine Early Warning Systems Network
FoDIS	Food Crop Diversification Support Project
FSRP	Food Research Security Programme
HRI	Hotel and Restaurant Institutions
KCE	Kapiri Commodity Exchange
MACO	Ministry of Agriculture and Cooperatives
MNL	Multinomial Logit Model
NGO	Non Governmental Organization
PVCI	Pulse Value Chain Initiative
USDA	United States Department of Agriculture
ZCBC	Zambia Consumer Buying Cooperation
ZNFU	Zambia National Farmers Union
ZPA	Zambia Privatization Agency
ZMK	Zambian Kwacha

## **ABSTRACT**

### **FACTORS INFLUENCING BEAN PRODUCERS' CHOICE OF MARKETING CHANNELS IN ZAMBIA**

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Pulse based foods have potential to help mitigate food and nutrition security problems, which are important issues and of great concern especially in less developed countries such as Zambia. Beans are a good source of vegetable protein that can easily be a substitute for animal protein, which most smallholder farmers cannot afford. It also contains generous amounts of fiber, complex carbohydrates, and other dietary necessities. Beans are increasingly playing a major role in improving farmers' livelihoods in Zambia in that, in addition to their contribution to food and nutritional security, they are one of the major sources of income for the small scale farmers especially women. Marketing of agricultural products in Zambia has experienced major swings from use of marketing boards to a liberalized and much more diversified market system. The latter has given the producer a wider choice of marketing channels. Thus, understanding the producers' market participation requires, among other things, understanding the decision processes through which they select their marketing channels. Currently, there is very little empirical evidence regarding these decision processes and the factors that influence bean producers selection of marketing channels.

This study aims at understanding Zambian smallholder bean producers and the factors that influence their choice of marketing channels. It uses a probit model and data from the 2008 supplemental survey to the 1999/2000 post-harvest survey, conducted by the Central Statistical Office (CSO) with financial and technical support from the Food Security Research Project (FSRP).

Results from the probit model indicate that the choice of marketing channel is directly influenced by the price of beans, scale of operation (as measured by the quantity of beans harvested, and quantity sold), distance to the market, farming mechanization used and livestock ownership. Implying that except distance which is negatively related to private trade channel selection, a positive change in the variables above increase the probability of farmers selling to private traders. Under long distance to the market, beans farmers prefer selling to other households than to private traders. On the other hand probit results for decision to sell indicated that price, mechanization and farmers age significantly affect farmers decision to sell. Meaning that price is very important in stimulating both selling decisions and channel selection hence it is vital to make price information available to farmer. It can also be recommended that markets for beans should be developed within shorter distances from farms, this will motivate more participation in



beans marketing. Policy makers should also focus more on small scale farmers especially in low beans producing areas if production of beans in Zambia is to enhance.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background

Pulses are one of the oldest crops known to man (Mbene, 2005). As food they are a cheap but important source of high-quality proteins, and are consumed all year round because of their good storage properties. They are, thus, one of the best means of mitigating food nutrition problems experienced in most developing countries like Zambia. In particular, the common dry bean or *Phaseolus vulgaris L.*, is the most important food legume for direct consumption in the world (Jones, 2007). Nutritionists characterize it as a nearly perfect food because of its high protein content and generous amounts of fiber, complex carbohydrates, and other dietary necessities and hence view new varieties as powerful means of combating malnutrition. It is grown worldwide for its edible bean, popular as dry, fresh and green beans and can remain in storage for 3–4 years if stored in a cool, dry place, although with time, their nutritive value and flavour degrades and cooking times lengthen as they desiccate and harden (Ferris and Kaganzi, 2008). In eastern and southern Africa, beans is recognized as the second most important source of human dietary protein and third most important source of calories (Pachico, 1993). While in Kenya Tanzania, Malawi, Uganda, and Zambia particularly among other counties, it is a major source of dietary protein (Crawford, 1997)

According to Ferris and Kaganzi (2008), Global beans Production is expanding slowly, based on population growth, with highest usage in poor (developing) countries, where beans provide an alternative to meat as a source of low-cost protein. In Zambia, beans is widely consumed countrywide among most households especially the low income ones (FoDIS 2009). It ranks second to groundnuts in terms of land area allocated to food legumes and the number of households growing the crop. It is a major source of protein in human diets in most communities and increasingly play a major role in improving farmers livelihoods by providing a source of income especially for small holder women farmers in addition to its contribution to food and nutritional security (Muimui, 2010).

Production of Beans in Zambia is a country wide activity but mainly done in the medium and high rainfall regions of the country by small scale farmers (Greenberg et al. 1987 as contained in Mukobe, 1998). However, although the CSO/FSRP (2004) survey indicates that beans are grown in all Zambian provinces, the top four producing provinces account for about 83 percent of total output for the crop (PVCI, 2010) The bulk of beans are produced in the Northern Province, accounting for 62% percent of the total production mostly under rain fed conditions the other four provinces include Northwestern (8 percent); Central (11 percent); and Luapula (6 percent) (PVCI, 2010). At national level, current production statistics indicates an Increasing pattern in the amounts of beans produced annually, in that National production in 2004 was estimated to be 600,000 tons per annum (ZNFU, 2004) while that of 2006/07 agricultural season stood at 24,000 metric tons (MT) (FEWSNET 2007). And therefore there is need to focus on other components of beans subsector necessary to make it more beneficial to producers in order to attain improved well being of farmers through increased income.

In terms of demand CIAT (2001) noted that as Africa's cities are expanding, market demand for beans is also rising rapidly, creating opportunities for farmers to increase their incomes by producing both grain and high-quality seed. It further predicts that the observed bean market growth is likely to directly benefit smallholder women farmers, who are arguably a major bean-producing category of farmers in Africa (CIAT, 2001). Indeed there is a growing potential market for beans both in international and local markets. In Sub-Saharan Africa, Muimui (2010) reports that demand for beans is at 20,000 metric tons per year and is projected to grow in excess of 40,000 metric tons over the next 10 years. Locally, an increased demand for beans has been observed over the years, according to ZNFU (2004) demand for beans in Zambia was 500,000 tons per annum in 2004 however Muimui (2010) also reported that local demand for navy beans was in excess of 5,000 metric tons per year which required 2,500 hectares planted to meet the demand. Besides individual consumers, beans also have very high institutional demand, including schools, prisons and hospitals. The observed trends in demand, presents an opportunity for Zambian farmers to exploit the market by increasing production of beans, as well as participating in its supply chain for income generation. However, agricultural markets have seen a lot of changes over the past two decades, which need to be understood in order to fully appreciate the extent of the markets for beans.

Generally Agricultural products in many developing countries are often lost after production due to spoilage and inability to access markets. This can be attributed to several influencing factors in marketing that tend to reduce and discourage farmer participation in formal markets. Ever since the evolution of economic (agricultural) reforms that led to the abolition of commodity boards, introduction of free market pricing policy and encouraging private sector participation, there has been an increase in the number of buyers and marketers of agricultural produce such as beans. This has resulted in wider alternatives in terms of marketing channels available for selling beans unlike before privatization when specific markets or channels existed (marketing boards).

Mathews, (2009) noted that the growing demand for local foods is presenting new opportunities for small-scale agricultural producers, but understanding the relative costs and benefits of different local food channels is important to maximize farm performance. In literature several channels through which agricultural produce can be sold have been revealed (Mbene, 2005, David, 1997, Jari, 2009) .Criford (1997) argues that the use of intermediaries in the market chain increase efficiency while Wallace suggests that selling at farmers market can help one increase their profit for example a famer can set his/her price. Beans farmers in Zambia have alternative to sell all, a proportion, or none of their produce (beans) through any one of the channels. The choice therefore of the marketing channel to use by the producer at any time is dependent on several factors. The study therefore endeavors to identify the factors that influence bean producers participation in the market and particularly choice of the marketing channel to use.

## 1.2 Problem Statement

Despite the great potential of beans in mitigating nutrition related problems, providing a source of income to farmers and hence improve their livelihood, Auko (2006) observed that the crop has received little attention in terms of policy thrust and research compared to crops such as maize, which is believed to be the single most important crop in the small and medium scale sectors in terms of gross value of production and gross value of crop, hence receives a lot of attention from agricultural policy makers in Zambia (Zulu *et al.*, 2007). Even the little attention given to beans in terms of research has shown that, most of it has focused on yield enhancement through breeding, disease tolerance, soil management and other agronomic properties (Tenywa 1999). They have mainly centered on improving production practices and efficiency. However other factors concerning beans such as market participation are important as they influence the benefit derived from production.

Furthermore despite notable increase in local demand for beans Muimui (2010) pointed out in adequate linkages among supply chain actors especially between smallholder farmers and canning industries as a major challenge experiencing bean producers in Zambia. With the background of little attention given to the crop in terms of research, Queries on stakeholder market participation especially the actual producers therefore arise. There is lacking information on the bean producer's market participation and the factors affecting downstream participation into available marketing channel. Particularly, characteristics of beans farmers that influence their participation in any channels they adopt for bean marketing are unknown and there is little information about their desirability to sell to the market through the various existing channels and the factors influencing channel selection.

Although a number of studies have been done on marketing channel choice decisions worldwide, market participation has not been fully exploited even in international research studies in particular the factors determining beans producers choice of marketing channels. A bulky of studies were observed to be done in choice of marketing channels relating milk marketing (Mburu *et.al.*, 2007, Nsoso *et.al.*, 2004, Tsourgiannis *et.al.*, 2002), despite the importance of these studies in highlighting factor influencing market participation and choice of marketing channel, the commodity involved in marketing is different in characteristics compared to beans in that milk is highly perishable and need quite agent attention hence time factor becoming a

greater issue in its marketing while perishability is by far the least problem in beans marketing hence the findings cannot be generalized to beans marketing. A study by Wojciech et.al., (2003) on fresh peach sale also raise the concerns as above. Others chose to study what they perceived to be the most determining factors of channel selection by farmers, for example studies by Gong et.al., (2004) and Arega et.al., (2007) only evaluated transaction costs as a factor influencing channel choice decision, however as much as these studies are important, other factors beyond transaction cost affect famers decision to sell as well as choice of marketing channel hence leaves a knowledge gap of what other factors are. In the same line Jari (2009) only analysed institutional and technical factors that affect channel choice decision and left out other factors such as economical factors. The study therefore is an attempt to fill the identified knowledge gap in the bean sub sector especially locally.

### **1.3 Study Objectives**

#### **Main Objective**

The overall objective of this study was to identify the critical factors that influence bean producer choices of different marketing channels for their product.

#### **Specific Objectives**

Specific objectives of the study are to:

- i) Describe the characteristics of bean producers in Zambia
- ii) Determine the distribution of producers by type of marketing channel they use in selling their produce
- iii) To identify the factors that affects bean producers' market participation and channel choice decisions.

## **1.4 Rationale**

Choice of a marketing channel is one of the key ingredients to successful marketing of both agricultural and non-agricultural products. This is so because different channels are characterized by different benefits (profitability) and costs. According to Tsourgiannisa (2008), marketing channel used when selling the product has a bearing on the profit farmers may make. Therefore, Studies on marketing channel choice decisions are very important especially in a liberalised market economy like Zambia, where there are many alternative market channels and therefore open to the sellers' choice. In addition, such studies are even more vital in pulses because pulse sub-sector has high potential to help diversify the economy and alleviate poverty in rural communities. According to Barker (1981), marketing management should be of paramount importance to the individual farmer. If the aim is to make a profit from transactions then marketing considerations should be in all decision-making processes, from short-term storage versus immediate sale considerations through to long-term planning of the structure of farming enterprises (Barker, 1981)

Most of the beans produced in Zambia is produced by smallholder farmers, who are argued to be among the poorest and most vulnerable of all groups (Rasmus et.al., 2001). This identifies the need to go beyond production technology enhancement and towards transitioning these farmers into the exchange economy (Kitinoja and Kader 2002); and participation in the bean market offers one of those opportunities. According to Jari (2007), smallholder farmers need to know more about packaging, storage, handling and analyzing market indicators, in addition to being encouraged to grow high-yielding varieties.

It is therefore necessary to undertake this study in order to establish bean producers level of participation in the marketing channels as well as the critical factors discouraging and encouraging them to participate in the marketing channels available. The results of this study are essential in contributing to the existing pulse body of knowledge especially the marketing aspect which is scanty locally. According to Van dar laan (1999), information on pulse marketing and trade is lacking in Africa, and data on its production economics scattered. Zambia unfortunately is not an exception of this, in that more research and information is available on other crops like maize than beans, besides the little information available on beans is mainly agronomical in

nature. Therefore understanding the marketing side of the pulse subsector, beans in particular is vital for wider creation and adoption of beans production (especially in low production areas) and increased participation in its marketing which possibly may lead to increased farmer income, reduced malnutrition problems and ultimately reduced poverty.

Information from this study will be vital to extension officers in advising farmers on the proper channel selection in beans marketing as they encourage them to increase their production and profitably participate in bean supply chain. Policy makers would also use this information to create or amend existing policies in an effort to develop the bean production and markets as well as motivate producers to access high value markets. Farmers can also use this information when deciding on which channel to sell their beans for profitable marketing.

### **1.5 Outline of the Study**

The report is comprised of five chapters. It begins with chapter one highlighting background information on the subject. Other components discussed under it include the problem statement, objectives and the rationale of the study. The second chapter reveals the literature of smallholder marketing with respect to influencing factors as well as findings of various scholars and researchers related to the study. The third chapter gives an overview of methods and procedures to be used in the study, it also includes conceptual framework. The chapter explains the data collection procedure and the variables considered. It further clarifies on the method of data analysis, pointing out the reasons for choosing such analytical methods. Chapter four presents the results of the study. It firstly highlights on various demographic characteristics including production and marketing characteristics of the sampled households and further discusses the probit regression findings of both the factors influencing farmers' decision to sell and choice of marketing channel. Chapter five concludes the report and gives various recommendations that are necessary in promoting both beans production and its profitable marketing. References are then given.



## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

Although marketing of agricultural produce remain an important tool in increasing farmers income and alleviating poverty, Kherallah and Kirsten ( 2001) explains that farmers experience barriers such as insufficient and inadequate physical infrastructure, lack of basic education and marketing knowledge, lack of organizational support and institutional barriers in marketing. This further has an implication on the choice of marketing channels that farmers who sell use in marketing their produce. This chapter reviews literature relating to marketing of agricultural produce that helps in identifying and understanding the factors affecting channel choice decisions of beans farmers in Zambia. In order to explore these factors, Key words are firstly defined in order to give the actual context in which they are used in this paper. A detailed discussion is letter given highlighting trends in agricultural marketing in Zambia, importance of farmer participation in marketing and factors that affect them to participate in any marketing channel.

#### 2.2 Definition of key Terms

The term marketing has been defined differently by different people. Gregory defines it as the task of finding' developing and profiting from business opportunities by fulfilling customers' needs (Gregory et al., 2002). The American Marketing Association (AMA) offers the following definitions: Marketing is the process of planning production, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational goals (AMA (1995), cited in Kolter, 2003. Agricultural marketing in particular is the performance of all business activities involved in the flow of goods and services from the point of initial agricultural production until they are in the hands of the ultimate consumer (Kohls and Uhl, 1985 as cited in Demeke 2007). On the other hand A Market may be defined as “a particular group of people, an institution, a mechanism for facilitating exchange, (Solomon, 2002; cited in Demeke T, 2007). Markets can be grouped into informal and formal markets. In the agricultural context, Kherallah and Minot (2001) explained that informal markets embrace unofficial transactions

between farmers and from farmers directly to consumers while formal markets have clearly defined grades, quality standards and safety regulations and prices are formally set. Smallholder farmers find it difficult to penetrate the formal markets, due to high transaction costs, high risks, missing markets and lack of collective action (Mangisoni, 2006).

An important integrative part of any marketer's activities is the channel. According to FAO, a channel is an institution through which goods and services are marketed. Channels give place and time utilities to consumers. In order to provide these and other services, channels charge a margin (Crawford, 1997). They further suggest that, the longer the channel the more margins are added. Marketing channels are defined according to Coughlan et al (2002) as “a set of interdependent organizations involved in the process of making available a product or service for use or consumption”. This definition highlights the fact that marketing channels are a set of interdependent organizations. It is not just one organization making its best, but several firms involved in many activities in a certain channel structure. Each marketing channel member depends on others to develop its function efficiently. Therefore, making the product available in an efficient way is the purpose of the “process” highlighted by Coughlan.

Supply chain on the other hand refer to the system of organizations and individuals involved with moving products, services and information from producers to consumers and vice versa. Kietzman also defines a supply chain as a network of retailers, distributors, transporters, storage facilities, and suppliers that participate in the production, delivery, and sale of a product to the consumer (Kietzman, 2010). Decision on which channel to use involves all decisions related to how the product moves from the producer to the consumer a farmer can sell his/her product through intermediaries who may be retailers, processors and wholesalers or directly to the consumers.

Direct marketing systems are used where distance between producers and consumers is short. Ayinde defines wholesalers as traders who sell in bulk (usually in bags and sell to other market operators like the retailers and some consumers who buy in bulk) these may be hotels, hospitals, schools, prisons e.t.c. While Retailers are operators who break bulk; that is, sell in smaller measures mostly directly to consumers (Ayinde, 2005).

## **2.3 Overview of Agricultural Produce Marketing Trends in Zambia**

Up until 1991, Zambia's economic policies were restrictive and constraining (Mwanaumo, 1994) and entailed high levels of government control and interference, suppressing private sector initiatives (Mwanaumo, 1999). The system was characterized by official price controls and determination, centralized delivery of support services, concentration and public sector dominance of agribusiness industries, frequent policy and institutional changes, and extensive subsidies. In agriculture, the controls involved output and input prices, high level of parastatal activity in both markets, and maize and fertilizer subsidies (Katepa, 1984; Muntanga, 1984 as cited in Mwanaumo, 1999). During this period agricultural marketing boards were set to control all agricultural marketing activities in the country.

Barret explained that generally in developing countries Marketing boards were both state-owned and state-funded, based on centralized decision making systems. They possessed the sole legal authority to purchase commodities from farmers and to engage in trade. Through the boards, governments typically fixed official producer prices for all controlled commodities, often in a pan seasonal and pan-territorial manner whereby a single price was set for the whole marketing season and for all regions of the country. Marketing boards provided a guaranteed market for the farmers, absorbing all marketed surplus at the official producer prices, and maintaining extensive buying networks and storage facilities throughout the production regions. Unlike marketing boards in developed countries, producer sales into the network were rarely rationed, because the marketing boards' objective was normally to increase supply and lower prices for consumers, as opposed to controlling supply for the benefit of producers (Barret et.al., 2005). Emongor further explains that, prior to the privatisation process government agencies and parastatals were operating a number of retail (chain) stores. These included the Zambia Consumer Buying Corporation (ZCBC), National home stores, Mwaiseni and ZAMHORT (marketing horticultural produce). These stores were scattered in all provinces of Zambia. The government withdrew from the retailing sector by selling its loss making retail chains to Shoprite – a South African retail group (Emongor et.al., 2004). This marked a turning point in the way agricultural marketing was to be done in the country.

However, like most African countries, since the 1990s, Zambia has undergone immense changes in the agricultural sector. These include changes in the marketing of agricultural produce. Mwanaumo (1999) noted that as part of the market reforms government facilitated the privatization of agricultural parastatals under the Privatization Act No. 21 of 1992 by the Zambia Privatization Agency (ZPA) among them were Parastatal Farms, Lukanga Investment and Development, ZADL, Nchanga Farms, Memaco Farms, Zambia Cashew Company which operated as general agricultural boards. Furthermore with the introduction of market liberalization and market reforms in the early 1990s, government was required to withdraw from direct involvement in agricultural marketing and input supply, freeing prices, removing subsidies, privatizing agro-parastatals, renting out and selling public storage facilities to the private sector and overall removal of constraints and distortions to international trade in farm products (Mwanaumo, 1999). This posed a challenge to agriculture market participants especially farmers more also that Globalisation and liberalisation amongst other factors resulted in changing agrifood systems in Zambia (Emongor et al., 2004). In addition marketing boards' role in marketing reduced, Jari explains that, when Marketing Boards withdrew from the markets, private traders moved in to fill the vacuum created by the withdrawal of the Marketing Boards. These private traders had to choose from whom to purchase agricultural produce (Jari, 2009). This became a new set up and a challenge for the farmers who needed to attract these private buyers if their produce were to be sold.

Faced with thin markets, some smallholder farmers, especially those located in the remote rural areas, could not trade their produce (Makhura, 2001). However despite the challenge some small scale farmers kept producing for sale, according to Makhura (2001) the coming in of private traders led to a lot of price exploitations to farmers. In order to cushion the impact of privatization, Mwanaumo explains that, government established agricultural commodity exchanges as part of the private sector response to agricultural market reforms. The Agricultural Commodity Exchange (ACE) was set up in Lusaka in 1996 and the Kapiri Commodity Exchange (KCE) was set up in Kapiri in 1997 (Mwanaumo, 1999). Their role was to provide centralised trading facilities for buyers and sellers of agricultural commodities and inputs, and regular price information of traded commodities.

## **2.4 Importance of Farmer Participation in Markets**

Like most developing countries Zambia's farming sector is highly dominated by smallholder farmers who cultivate less than 20 hectares (Chomba, 2004) and are among the poorest people with very limited access to capital assets (Jari, 2005). On the other hand the Zambian agricultural market is comprised of many small-scale traders and producers, both of whom do not have adequate capacity to participate effectively in the market.

Literature reveals that farmer participation in formal markets is very important in that humans derive benefits such as income and rural employment from farming (Ngqangweni, 2000), in other words farming in rural areas act as a form of employment for the rural people and help in income generation. However beyond production activities, producer participation in marketing allows for the transition from subsistence farming to commercial farming (Makhura, 2001). Implying that farmers that participate more in selling their produce are more likely to advance from lower scale e.g small scale producers to larger scale producers, This commercializing environment is essential for providing an incentive for increased production and thus, for improved welfare of emerging and smallholder farmers. In addition marketing activities such as processing, transportation and selling can provide employment for those willing to exit the farming sector.

At national level, Lyster (1990) noted that farmer market participation is important both for sustainable economic growth and for the alleviation of poverty and inequality. In summary, marketing plays a critical role in meeting the overall goals of food security, poverty alleviation and sustainable agriculture, particularly among smallholder farmers in developing countries (Altshul, 1998; Lyster, 1990 as cited in Jari, 2009).

## **2.5 Factors Affecting Farmer Participation in Formal Markets in Zambia**

According to MACO 2004 report, a number of factors affect farmer participation in markets in Zambia. These constraints can be grouped into three broad categories: institutional and agricultural market, policy and legal environment; as well as access to finance, investment, and infrastructure services. Under institutional and market constraints the following specific

constraints exist, there is a serious lack of sufficient and timely market information on the prices of agricultural products (especially in the pulse industry), and on the supply and demand thereof. Without necessary market information at the time it is needed for decision-making, it is impossible for the key market participants to make informed decisions. Also with the exception of maize, there is a general lack of an official set of grades and standards for many other commodities. Besides Zambia does not have a self-regulating association of grain traders. This poses a problem for the individual traders, who often are very small and lack the ability to fully understand the market, let alone representing their interests to decision makers. An association that brings all the traders together has the potential to provide the competent voice of traders.

Under finance, investment and infrastructure constraints roads are either very poor or virtually non-existent. The poor road and rail networks make the cost of moving commodities between markets very expensive and directly hinders the development of rural markets. Telecommunication facilities are not widely distributed in the rural areas. Limited access to electricity and water constrains productivity and marketable surpluses. The report also reviews that under legal constraints, there is a lack of a comprehensive agricultural marketing legal framework to guide the functions of the agricultural sector. These are some of the challenges faced by any farmer intending to or participates in marketing their product and beans farmers are not an exceptional.

## **2.6 Possible Marketing Channels (Market actors and Relationships)**

A study “investigation of key aspects for the successful marketing of cowpeas in Senegal” by Mbene in 2005 as her PHD thesis proved that cowpea Producers have many alternatives when selling their produce. She explained that their possible channels are directly or indirectly to exporters, collectors, wholesalers, processors, retailers and to consumers. Producers can receive a cash advance from wholesalers or collectors prior to the harvest period. In such cases, there is no negotiation on price, since the buyers set it. The practice of providing cash advances is common between relatives or close friends. Producers also bring their cowpeas to the market where collectors sell the product for them. Collectors and producers agreed on a selling price and producers get their money and unsold cowpea at the end of the market day.

On channel preference a study by Kasozi and others entitled “An investigation of alternative bean seed marketing channels in Uganda” in 1997 in which the appropriateness of bean seed distribution through four non-conventional channels: rural shops, a rural health clinic, women's groups and an NGO was tested. It showed that male farmers preferred buying their seed from the shops and extensions selling in market while female farmers bought most of the improved seed through world vision (NGO) and health institutions. This clearly suggests that different farmers have different preferences for the channels available and so important to investigate how they choose to use one instead of the other.

Jari also suggested the common marketing channels that are usually followed by smallholder farmers. She explains that produce from smallholder farmers is sold to consumers and traders at the farm gate, usually through Local Traders who letter sell to urban consumers, or to Middlemen/brokers who sell to and finally International Traders Foreign consumers Rural consumers urban consumers (Jari,2009).

## **2.7 Factors Affecting Choice Decision of Marketing Channel**

A number of studies have been done that have revealed both institutional and technical factors influencing marketing channel choice decisions. Key studies that relates to the current study are reviewed below.

A survey study by Tsourgiannis, Errington and Eddison in 2002 entitled “Marketing Strategies of Agricultural Producers in Objective One Greek Regions: The Factors Affecting the Selection of Marketing Channels of Sheep and Goat Producers” was conducted in the spring of 2002 with a sample size of 343 sheep and goat farmers in the Region of EMTh in Greece had an effective response rate of 92%. The study reviewed that many factors and farm/farmer characteristics were found to be associated with the selection of a particular livestock and milk marketing channel. Factors such as price, loyalty, speed of payment, personal relationships and volume of production, degree of isolation, farm area, size of flock, farmer’s age and debt level were found to influence the sheep and goat farmers in the Region of EMTh in Greece to select a livestock and milk marketing channel. The capability of a buyer to purchase large quantities of livestock

influenced these with different marketing channels and the isolation of the farm affected farmers only in their selection of a milk marketing channel.

In Examining the profile of each livestock marketing channel, the study reviewed interesting findings in which age and type of the farmer influenced decision in that farmers who preferred the direct sales to retailers were small scale livestock and medium scale milk producers, their flock was medium, allocated between their financial performance was below average. Farmers who preferred the direct sales to wholesalers were large scale livestock and milk producers, their flock was big, and their financial performance was above average. On the other hand, farmers who preferred private use of their produce were small scale livestock and milk producers, their flock was small, and their financial performance was low. Finally, those who preferred the sales to more than one marketing channel (multi-channel) were large scale milk producers the financial performance of their farm was above average. Regarding the profile of each milk marketing channel, it was found that farmers who prefer to sell to local processing plants were medium scale livestock and milk producers, middle aged farmers, had medium size flock, and had incurred a debt between 10-29% of their income and earned average financial rewards. Farmers who used the cooperative processing plants as an outlet were medium scale livestock and milk producers, young farmers, had a large flock and had incurred substantial debt whilst their financial performance was average. On the other hand, farmers that preferred to market their milk produce to big dairies were large scale milk and livestock producers, middle aged farmers, had a large flock, had a high debt and above-average financial performance. Finally, farmers who self-consumed their milk produce were small scale milk and livestock producers, were old in age, had a small flock, allocated none of their land to the sheep and goat enterprise and had a debt of less than 10% of their income.

The study was based outside Zambia, not specific to the pulse subsector in that the dairy industry has several influencing factors since it deals with highly perishables compared to beans that does not necessarily need urgent marketing decisions to avoid loss.

A similar study was done by Mburu, Wakhung and Gitu in 2007 in Kenya under the titled “Determinants of smallholder dairy farmers' adoption of various milk marketing channels in



Kenya highlands” it was found that the Logit models of milk marketing channels through itinerant traders (hawkers, neighbors and hotels) were non-significant ( $P > 0.05$ ) but dairy cooperative was significant ( $P < 0.05$ ). Eleven explanatory variables were significant ( $P < 0.05$ ) in explaining farmers' adoption of milk marketing through the dairy cooperative channel. Leases land, average milk price [Kenya shillings (KES) /kg], total number of cow milked and farm acreage negatively influenced farmers' adoption of milk marketing through the dairy cooperative channel. Upper midlands, lower highlands, hired permanent labor, household head worked off-farm, average milk production per cow (kg / day), dairy cooperative as a source of animal production information, and availability of credit services had positive influence.

Ogunleye and Oladeji in their study “Choice of Cocoa Market Channels among Cocoa Farmers in ILA Local Government Area of Osun State, Nigeria” in 2007 found that the cocoa farmers in the study area made their choice of market channels for their produce based on time of payment, mode of payment, price of product, distance from farm, transportation cost and grading of product. Majority of the farmers involved in the study patronized itinerant buyers, cocoa merchant, other farmers and cooperative society store in that decreasing order. They conclude that the delay between when produce are sold and when payment are made is an important negotiation cost that influences the choice of an outlet for cocoa farmers. Delay in payment discouraged farmers from the choice of an outlet. Transportation cost increases with increased distance from farm and also related to the condition of road. Bad road tends to increase the transportation cost and so farmers will prefer a very low transportation cost if they cannot completely avoid it. Uncertainties are attached to grading of produce because farmers stand the chance of their produce being rejected or the price being brought down and so farmers will tend to prefer a situation of not facing either of the two consequences attached to grading of produce.

Another study by Jari entitled “Institutional and technical factors influencing agricultural marketing channel choices amongst smallholder and emerging farmers in the Kat river valley” in 2009 in south Africa, show that the statistically significant variables at 5% level were access to market information, expertise on grades and standards, availability of contractual agreements, existence of extensive social capital, availability of good market infrastructure, group participation and reliance on tradition. These findings suggest that an adjustment in each one of

the significant variables can significantly influence the probability of participation in either formal or informal marketing channels.

A study by Wojciech, Timothy and Abdalbaki in 2003 “Marketing Portfolio Choices by Independent Peach Growers: An Application of the Polychotomous Selection Model” showed that In selecting a marketing channel for fresh peach sales, Georgia commercial peach growers choose the channel after accounting for buyers’ preferences for quality attributes. Using the polychotomous selection model and survey data it was identified that both external and internal quality attributes were essential factors influencing the choice of a marketing channel and the share of the crop marketed. Other factors influencing the choice and the volume sold through each marketing channel included orchard characteristics and the variety-determined fruit maturity.

Careful examination of these studies show that, none of the studies is Zambian nor pulse based. Besides most of the studies revealed analyzed more perishable crops like milk and fresh peach whose marketing plans involve time as a very important component to avoid loses. This is different from beans that can be kept over a year and still be sold at a good price. Besides the study intends to be broad in its investigation rather than selecting what is perceived to be the most important factors an approach taken by a number of revealed studies above. The current study therefore is an attempt to fill the knowledge gap identified especially locally.

## **CHAPTER THREE**

### **METHODS AND PROCEDURES**

#### **3.1 Introduction**

This chapter outlines the methods and procedures to be used to achieve the stated objectives. It presents the types and sources of data, and the analytical methods that will be used. The first section (methodology) briefly discusses the model to be used in the analysis of the factors that influence beans producers' choice of a particular marketing channel. Thereafter it describes the data section, the study area, sample size used, and analysis

#### **3.2 Methodology**

Economic literature reveals various methods used in analyzing adoption studies (participation or not). These are normally econometric in nature in which probit and logit models are commonly used. These methods generally model decisions which involve two complete mutually exclusive alternatives such that when one is adopted the other is completely left out. Logit and probit models are quite similar as cumulative logistic and cumulative normal distributions are very close to each other except at their tails. The tails of a logistic model are flatter than the probit models (Gujarati, 2007). As a result, the findings obtained can actually be similar provided the samples are very large and many observations fall near the tails. It is important to note that unlike in the probit model, in the logit model, the dependent variable is the log of the odds ratio which is a linear function of the regressors and follows the logistic distribution (Gujarati, 2007).

Sometimes choice decisions are not bound between two alternatives. Channel selection experience such a real case in which simple models as those above may not be so helpful in analysis. In such cases advanced models called multinomial logit or probit are used. According to Wikipedia (December 2010), an extension of the binary Logit model to cases where the dependent variable has more than 2 categories is called multinomial Logit model. It is an appropriate technique especially when the dependent variable categories are not ordered Joseph (2010) further explains that Multinomial Logit (MNL) model is similar to the Binary Logit model, except that the dependent variable in this case will have multiple discrete outcomes,

instead of just 2. The estimation technique is very similar to the Binary Logit model, except that instead of predicting the odds of 1 vs. 0, it predicts the odds of the different outcomes vs. a baseline outcome. For example a model with 3 outcomes A, B, C, it estimates odds of B vs. A and C vs. A. Multinomial Logit models are used in applications in marketing that have several distinct outcomes. In other words it is used to model relationships between a polytomous response variable and a set of regressor variables. These polytomous response models can be classified into two distinct types, depending on whether the response variable has an ordered or unordered structure (Ying S, Warren F.K). In addition the technique of MNL can be used to study nominal categories in which the regressands are unordered or unranked unlike the ordinal Logit models that models only ordered response categorical variables (Gujarati, 2007)

However, though in reality more than two channels for marketing products exist and a number of studies carried out on channel choice decisions have commonly adopted the multinomial logit model (MNL) as a more appropriate method for analyzing factors affecting choice of marketing channel, the current study endeavors to analyze such factors on only two channel choices which are sell to private traders or to other household. The simple probit model therefore has been adopted for analysis.

### **3.2.1 The probit model**

The term probit and its probability unit were coined by Chester Bliss in the 1930s.. It is an estimating model that emerges from the normal cumulative distributive function (CDF) (Gujarati, 2008) also known as a normit model. This model is an appropriate estimation method developed for the investigation of the effects of explanatory variables on dichotomous dependent variables (Amemiya, 1981). It avoids negative dependent variables and assumes non-linear effects of the explanatory variables. Therefore, the model discriminates better near median potency (i.e. probability of response) and is more appropriate when the binary dependent variable is assumed to represent a normal distribution. In addition it assumes OLS which further implies that the rate of change of the probability per unit change in the value of the explanatory variable is constant (Jari, 2009). The model is a popular specification of a generalized linear model, using the probit link function and generally specified as:

$$Pr(Y = 1|X = x) = \Phi(x'\beta) \dots\dots\dots (1)$$

where  $\beta$  is a parameter to be estimated, and  $\Phi$  is the standard normal cumulative distribution function (cdf). The probabilities of probit models lie between 0 and 1 and they compel the disturbance terms to be homoscedastic (Silwana and Lucas, 2001). The underlying model is

$$Y_i^* = \alpha + \beta_1 X_1 + \varepsilon_i \dots\dots\dots (2)$$

Where

$\varepsilon$  is the error term, with  $N(0, \sigma^2)$ ,

$\alpha$  and  $\beta$  are parameters to be estimated.

With a realization that

$$Y_i = 1 (Y_i^* > 0) = \begin{cases} 1 & \text{if } Y_i^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

$Y_i = 0$  if  $Y_i^* \leq 0$ , and  $Y_i = 1$  if  $Y_i^* > 0$ . It follows that  $Prob(Y_i = 1) = P(Y_i^* > 0) = P(\alpha + \beta_1 X_i + e_i > 0)$ .

The probit model, which models only two qualitative outcomes/alternatives (binary choice), is based on the normal cumulative distributive function (CDF), which displays a sigmoid relationship  $F(Y^*)$ . Via the CDF,  $Y^*$  is merely being mapped on the appropriate scale, such that the values it may take are between 0 and 1, therefore arriving at the probability of event occurring. Marginal effects which are dependent on the value of each explanatory variable and further depend on the value of the probability density function.

### 3.2.2 Model Specification

The probit model was used to analyze both the factors influencing bean producers decision to sell as well as factors influencing them to participate in either private trade marketing channel or sell to other households. The decision to participate in markets is modeled as a binary decision (Makhura, 2001; Key et al., 2000; Goetz, 1999) such that a household either sells or does not sell beans. As such, the dependent variable is a discrete dummy variable (sold = 1; did not sale = 0)

in one model and (sell to private traders = 1; sell to other households = 0),  $\beta$  is the set of parameters to be estimated, which reflect the impact of changes in  $x$  on the probability of selling or not and channel choice decision and  $\varepsilon$  is the independently distributed error term assumed to be normal with zero mean and constant variance.

Based on the theoretical framework and on past empirical work on market participation, a number of relevant and appropriate independent variables likely to affect decision to sell as well as the choice of marketing channel, were identified and used in the probit analysis. They included production, marketing and household characteristics. These explanatory variables are production technology (mechanization), transport and livestock ownership, volume of production, age, gender, Marital status, education level, household size, bean price, market, amount stored and sold, distance to the market and off farm employment. In summary, the model was specified as follows:

$$Y_i = X_1 + X_2 \text{price zmk} + X_3 \text{price barter} + X_4 \text{edu level} + X_5 \text{dkgsold} + X_6 \text{dha} \\ + X_7 \text{dkgstored} + X_8 \text{Age} + X_9 \text{ddistance} + X_{10} \text{dtrans} + X_{11} \text{dmech} \\ + X_{12} \text{dlivstok} + X_{13} \text{gender} + X_{14} \text{marital status} + X_{15} \text{market} \\ + X_{16} \text{off femployment}$$

Where

$Y_i$  = probability of market participation (decision to sell variable (dsold) in one model and channel selection in another)

Price Zmk and price barter = beans price in kwacha and on barter basis

edu level = highest level attained by the household head

dkgsold = variable for the amount of beans sold by each farmer

dha = amount of beans harvested

dkgstored= amount of beans stored from the previous year

age = age of the household head

ddistance = distance to the market

dtrans = dummy for transport ownership

dmech = dummy for ownership of any form of farming mechanization

dlivstock= dummy for livestock ownership

gender= sex of the household age

marital status = marital status of the household head

market = where the transaction took place

off femploment = other sources of income

Pricing is an important marketing decision because it greatly affects the revenue generated by the firm. Channel decision made based on price is important as price influences Revenue and affect the quantity sold through its effect on the demand relationships for the product. However the two price effects works in opposite directions and hence present a challenge to the one making the price decisions. Lower prices produce less revenue per unit, but usually generate an increase in quantity sold and vice versa. According to Arega many farmers sell some of their produce right after harvest to satisfy their cash needs, commodity price does not influence market participation decisions but marketed supply increases with commodity price, once participation decisions are made (Arega et.al., 2007) from such a background it is expected that bean producers are likely to participate more in channels with better prices (higher). A positive relationship is expected on both price modes in influencing decision to sell as well as choice of marketing channel. Farmers that sell to other households are likely to barter than those selling to private sectors.

The Gender of the household head is expected to affect the type of marketing channel used in that female producers are expected to use direct marketing channels (sell to other households) compared to male producers. To the extent that female farmers have differential levels of wealth, ownership of bicycles, knowledge of trader networks, and access to market information we can expect differences in the extent and nature of their transactions in output markets (Hills, et.al., 2009). The variable for household head's gender is a dummy which takes a value of 1 if the household head is a male and 0 if otherwise. Female headed households are also expected to participate relatively less in markets.

Age variable represents the age of the household head in years. Age of the household head has been shown to be synonymous with farming experience in some studies (Matungul *et al.*, 2001). And it is mostly associated with farming experience of the household. The age variable, measured in number of years in this study, is hypothesized to be negatively related to market participation implying that, older Farmers are expected to have a lower probability of market

participation than younger farmers. However majority of older farmers that participate in bean marketing are expected to sell to other households this expectation is based on Angulas results that showed that older household heads had a greater propensity to sell their coffee to the main exporter (Kawakom) rather than to middlemen (angula, 2010).

Education variable represents the level of educational attainment of the household head in years. Formal education enhances managerial competence and successful implementation of improved production, processing and marketing practices (Marenya and Barret, 2006 as cited in angula 2010), it also has an implication on ability to understand and interpret extension information thus, education levels affect market information interpretation and hence, market participation level of farmers (Jari, 2009). Therefore education is expected to increase the propensity to participate in marketing and more also in the sustainable marketing channel. The more educated a farmer is the more they are likely to spend less time doing marketing activities hence would rather sell in bulk so that they may concentrate on other planning activities. The expectation therefore is that more educated farmers will participate more in marketing beans to private traders than to other households.

Marital status defines the social status of the household head in terms of whether they are married or not and the type of marriage involved in. Producer that are married are likely to produce more and hence likely to use private traders than other households. Married households are likely to participate more in the supply chain and further to private traders than single, or widowed. Females do a lot of farming in married households than men more if polygamy is involved a particular household is likely to harvest larger amounts even for sell (Hill et.al., 2009) it also enables division of labour hence more chances of participating in market and further sell to private traders.

Literature also suggests that Mechanization used in farming has an influence on market participation. Productive assets are central to stimulating smallholder market participation and escape from semi-subsistence poverty traps (Barret, 2007). Farmers that use more of family labor in beans production are likely to sell to other households because production is predicted to be low while those that source other production technologies e.g. animal draft power, hired labour



e.t.c are more likely to use private traders because of high levels of production. Livestock ownership reflects availability of animal draft power (Arega et.al., 2007).

Amount of beans harvested is another variable predicted to have an influence on bean producers market participation. Farmers producing small quantities have little opportunity to sell, for their primary concern may be to cater for on farm consumption, leaving little or no quantities to sell. They are also likely to sell to other household and within village than to private traders.

According to Hill, higher quantities sold reflect ability to pay for public transport to the near markets (Hill et.al., 2009) hence farmers with larger quantities of beans to sell are likely to sell to private traders who relatively buy in larger quantities compared to other households. In addition the more beans a farmer has in stock from previous farming season the more likely they are to sell to private traders than other households.

Another variable hypothesized to affect market participation is transport ownership. According to Makhura (2001) despite the location of the household, availability of own or hired transport is positively related to market participation. Transport owned on the farm may determine whether the farmer will produce to supply to the market, or merely for consumption. If on-farm transport is available, the farmer avoids hiring costs that culminate from hiring delivery vehicles to move the produce from the farm to the market place. Also the producer is better able to access market information, which enhances supply chain participation. A study on market access by Key *et al.* (2000) shows that ownership of some means of transport such as ox-carts and vans is positively related to market participation. Therefore, availability of on-farm means of transportation (e.g bicycles, motorbikes) is expected to increase probability of market participation and more also to private traders. The transport variable is a dummy (dtrans) which takes a value of one if the household owns any means of transport and zero if otherwise.

Distance to the market was also identified to be an important variable in analyzing market participation channel choice decisions. Road infrastructure and transport availability have an influence on smallholder market participation, especially if they are located a distant from the consumption centers (Gabre-Madhin, 2001, as cited in Jari, 2009). According to Bachmann and Earles (2000), one of the most important constraints facing agricultural markets throughout sub-Saharan Africa is transport infrastructure and the need to reduce transport. The majority of

villages in rural areas are served by an inadequate and poorly maintained road network (Montshwe, 2006). In a study on infrastructure and market access in Madagascar, Minot (1999) showed that the choice between traders is negatively related to the distance to market sites. Thus, the author concluded, that because a great deal of the trade in agricultural products happens in regular market sites while only a minority happens in the village itself. Thus the closer the village is to a market site, the higher the probability that farmers will have choice between traders. Hence, the expectation is that distance will negatively affect decision to sell and that the longer the distance the more farmers sell locally to other households.

Off farm employment reflects off farm income. Income from other sources other than the farm may enable the farmer to purchase necessary inputs to meet quality requirements of the sustainable bean marketing channel (Marenya et. al., 2006; Kydd, 2001 cited in angula, 2010). It is expected that off farm employment will have an impact on amount harvested and hence an impact on market participation. Off farm employed farmers are expected to sell beans to private traders to accommodate more bulky sells that accords them a chance for other activities.

### **3.3 Data and Data Sources**

The study used the 2008 third supplementary survey to the 1999/2000 post harvest survey of small and medium farmers obtained from CSO. The survey was part of a team effort at the Central Statistical Office aimed at studying options to improve crop production, marketing, and food consumption among small holder farmers and was conducted at national level. The survey was carried out at national level capturing all provinces regardless of their crop (beans) production levels and was conducted by the Central Statistical Office (CSO) with financial and technical support from the Food Security Research Project (FSRP). It is however important to note that the survey only captured small and medium scale farmers and the data analyzed for this study was at household level with household head as unit of study.

A Sample size of 1044 bean producer households drawn from the total of over 8000 farmers in the survey was used in the study analysis. The sample size is in line with Leedys recommendation who argues that if a population sample is larger than five thousand, the sample

size become almost irrelevant (leedy, 1997 cited in Mbene, 2005) and therefore a sample size of 1044 is adequate for generalizing findings.

### **3.4 Data Analysis**

Data was analyzed in Stata (version 11.0) and Microsoft excel 2007. This was based on only the data relating to bean producing households. Descriptive statistics and econometric model results were obtained from Stata while generation of graphs, charts and tables was done in excel. The main descriptive indicators employed were frequencies, percentages and mean values. These are useful in analyzing household characteristics as well as analyzing the relationship between variables. Probit was used to model the factors that influence beans farmers participation in the market which covered decision to sell in one model and choice of marketing channel in another. A number of model specification tests were done to ensure the model was correctly specified this involved among others checking for multicollinearity and Heteroscedasticity.

Variables expected to have an influence on decision to sell and choice of marketing channel were categorized into Demographics, production and market characteristics. Demographic characteristics included farmer characteristics such as age, gender, education level and marital status. Production characteristic variables included amount of beans harvested ( used as a proxy for scale of production), ownership of any form of mechanization used as a dummy variable of whether the farmer owned any mechanization or not and off farm employment (proxy for off farm income) while price both in kwacha and barter, amount of beans stored from previous farming season, amount sold, distance to the market, ownership of any form of transport and availability of market were included in model analysis as market characteristics.

### **3.5 Study Limitations**

The survey data used only captured small and medium scale farmers and most of the data were focused on major crops. The sampling strategy did not explicitly take into account localized crops such as beans; as a result very few bean producers were captured. The survey also did not collect data on some of the variables purported by literature to influence sales decisions, such as contractual agreements and market information. Due to the fact that a small number of farmers were captured in the channels involving institutions and schools, the study employed Probit model to analyze factors that influence choice of marketing channel on only two channels which are sell to private traders or other households, instead of the most widely literature recommended multinomial logit model or conjoint model which analyses channels independently. This may limit the extent to which the probit results may be generalized in channel selection as it did not analyze other possibly identified channels.

## CHAPTER 4

### STUDY FINDINGS AND DISCUSSION

#### 4.1 Introduction

This chapter presents the study findings and gives a detailed discussion on the findings. It begins by discussing findings on demographic characteristics such as gender, education level, marital status and age distribution of bean producer, it further discusses findings of both production and marketing characteristics likely to influence market participation as well as channel selection. In addition probit model results for decision to sell as well as the results for choice of marketing channel are also presented and discussed.

#### 4.2 Demographic Characteristics of the Sampled Households

The section below gives an overview of the household demographics. Under this section gender, Age, Educational background and marital status of the sampled farmers were analyzed and discussed in relation to their influence on the topic at hand. These aspects are important because the main household activities are coordinated by the household head and the head's decisions are more likely to be influenced by such demographic aspects (Makhura, 2001 as cited in Jari, 2005). Distribution of the farmers by sex is indicated in Table 1, table 2 shows their age distribution, table 3 indicate the highest level of education attained by the farmers and finally table 4 gives an highlight on their marital status.

##### 4.2.1.1 Gender distribution among household heads

Sex of the household head is important to be known in that it helps in determining the household capabilities in production and marketing. Gender was analyzed by checking the number of male and female headed households. The table below shows the gender distribution in the sample.

**Table 1: Distribution of Farmers by Sex**

Gender	Number	Percent
Male	835	79.98
Female	209	20.02
Total	1044	100

**Source: Own analysis**

The data shows that more male headed households produced beans than female headed household accounting for (79.98%) of the total sample as opposed to 20.02% of females. The gender statistics however only shows farmers who produced beans in the sample with no regard to whether they sold or not. This is contrary to CIAT (2001) literature which suggested that the crop is grown mainly by small women farmers and they reap most of the benefits. The finding could be because male headed households have recently started realizing the importance of beans both as food and cash crop.

Age as a categorical variable was observed and farmers fell in one of the four categories given below. The table below gives details of the sampled farmers' age

**Table 2: Distribution of Household heads by Age**

Household head age	freq.	Percent	Cum
1 to 20	2	0.19	0.19
21 to 40	364	34.87	35.06
41 to 60	447	42.82	77.87
above 60	231	22.13	100
Total	1044	100	

**Source: own analysis (2011)**

As shown above, the age of bean producers in the sample ranged from 20 years to 94years with an average age of 48.7 years. The majority of beans producers were those in the age group of 41 to 60 years representing 42.82% of the total producers, while minorities were in the age group of 1 to 20 years. 22.13% of the farmers were above 60 years old.

#### 4.2.1.3 Distribution of Household Heads by their Education Level

Education level of the farmers was examined by getting the highest education a farmer attained in their life. This was categorized into 4 including category of farmers that had never been to school those that went up to primary (equivalent), secondary (and equivalent) and tertiary). The table below gives the findings.

**Table 3: Distribution of Beans Producers by Education attained**

Education level	Freq.	Percent	cum.
never been	98	9.4	9.4
Primary	668	64.05	73.44
Secondary	253	24.26	97.7
Tertiary	24	2.3	100
Total	1043	100	

**Source: own analysis (2011)**

Beans producers captured in the survey reviewed that most of them had low formal educational background in that 64.05% of the producers attained primary level education, 24.26% ended up at secondary with 9.4% and 2.3% farmers who had never been to school and tertiary level respectively. The findings suggest a low formal educational background of Zambian bean producers; this is in line with Chomba's findings that most farmers in Zambia have low education backgrounds (Chomba, 2004). The lower educational levels among the sampled households imply that written market information is of minimal benefit to most beans farmers in the country (Jari, 2009)

#### 4.2.1.4 Marital Status Distribution

Marital status is important to be examined because it has an influence on agricultural production and marketing. The table below highlights on the marital status distribution of the sampled farmers

**Table 4: Distribution by Marital Status of bean producers**

Marital status	freq.	Percent
Never married	4	0.38
Monogamously married	758	72.61
Polygamously married	75	7.18
Divorced	35	3.35
Widowed	154	14.75
Separated	18	1.72
Total	1044	100

**Source: own analysis (2011)**

As shown in the table above, majority of farmers engaged in beans production were monogamously married which accounted for 72.61%. Polygamously married producers accounted for 7.18%, widowed farmers accounted for 14.75%, divorced farmers were 3.35% while 1.72% were separated and the least were the single accounting for 0.38%. In general about 80% of beans producers were married. Jari associates married household to stability in the household and farming (Jari, 2005).

#### **4.2.2 Production Characteristics**

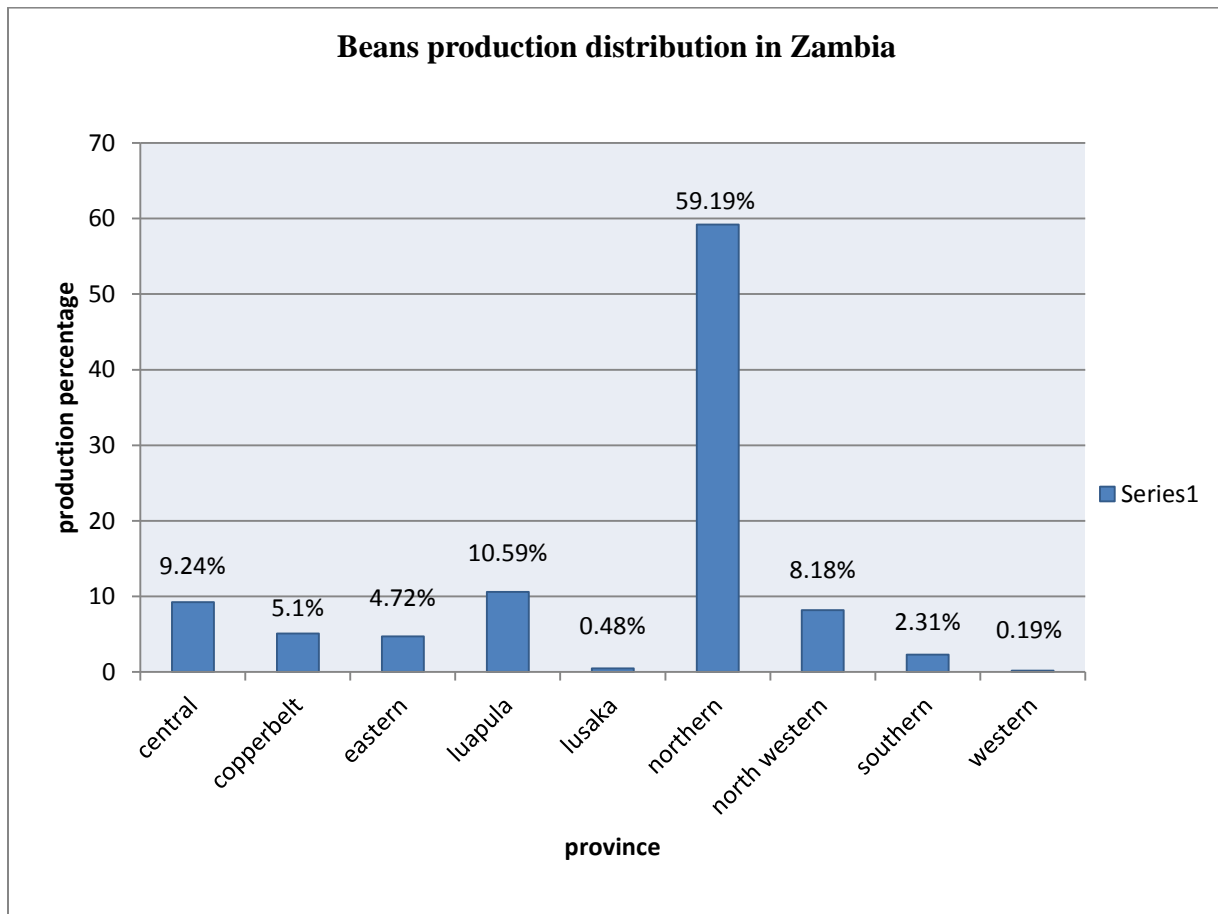
Production characteristics are important in analysing market participation in that they have an influence on the area farmed, amount harvested and alternatively amount available for marketing. Production characteristics differ from farmer to farmer and between female and male headed households, according to Hills et.al, A rich literature reports that regardless of how access to land is gained, female-headed households tend to have smaller landholdings than households headed by men (Morrison et al., 2007; Doss, 2001 as cited in Hill et.al., 2009). Most small scale farmers are poor in terms of production resources. Hills further revealed that even if both male and female headed households were poor in resource acquisition, women rarely have similar access to assets and markets as men and this has a non-trivial impact on production and marketing of cash crops (Hill et.al., 2009).

The following information gives an overview of beans production characteristics in Zambia. Figure 1, gives the production distribution of beans in Zambia, provincial distribution based on the amount of beans produced per province was used and table 5 summarises other production



characteristics of the beans farmers, including area cultivated, ownership of production mechanization and the scale of beans producers.

**Bar graph 1: Provincial Distribution of Beans Production**



**Source: Own analysis**

From the bar chart above it can be seen that beans production in Zambia is done throughout the country with major production areas being in region 3 and 2 of the countries ecological region classification. Production is highest in Northern Province representing 59.19% of the total production. This is followed by Luapula province with 10.59%, central (9.24%), North western (8.18%), copper belt with 5.1% and the minimum amount from western province producing only 0.19% of the total production. This is in line with literature (PVCi work plan, 2010) which suggests Northern province as the largest producer of beans in the country and other literature

suggesting that It is grown mainly in the medium and high rainfall regions of the country (Greenberg et.al, 1987 as cited in Mukobe 1998, Fewsnets, 2007) and that mixed beans is predominantly produced in Northern Province while for all other provinces contribution to national production is very low (Fewsnets, 2005).

**Table 5: Distribution by Farmer scale, Area Cultivated and mechanization ownership**

<b>Category of producers</b>	<b>Freq</b>	<b>Percent.</b>
Small scale holdings	852	81.61
Medium scale holdings	192	18.39
Total	1044	100
<b>Hectares of beans cultivated</b>		
Less than 0.5ha	851	81.51
Between 0.5 & 1ha	133	12.74
More than 1ha	60	5.75
Total	1044	100
<b>mechanization ownership</b>		
No	958	91.76
Total	1044	100

**Source: own analysis**

As shown in the table above, 81.61% of beans producers in the sample were small scale farmers and only 18.39% were medium scale farmers. Majority of these farmers produced beans on less than 1 hectare. In addition 92% of the beans farmers lack production mechanization. The observed pattern is in agreement with literature which suggests that most beans is grown mainly in the medium and high rainfall regions of the country by small scale farmers (Greenberg, et.al, 1987 as cited by Mukobe 1998) and by nature Most Smallholder farmers are poor people and they lack capital assets needed to assure their livelihoods and due to lack of machinery, most of them rely on labor for production (Jari, 2005)

#### **4.2.3 Market Characteristics**

A number of market characteristics were observed in the data. This section presents various characteristics related to beans marketing, The table below shows characteristics including inventory holding, livestock and transport ownership measured as dummy variable taking a value of 1 if household kept any amount of beans from previous season, owned some livestock or some

form of transport and zero if not. The results presented for these variables are those taking a value of 1.

**Table 6: Market Characteristics**

<b>Variable</b>	<b>Freq.</b>	<b>Percent</b>
<b>Beans inventory</b>		
Yes	219	21.3
<b>Sold</b>		
Yes	620	60.31
<b>Livestock ownership</b>		
Yes	812	77.78
<b>own transportation</b>		
Yes	748	71.65
<b>Distance to the market</b>		
less than 1km	893	85.5
more than 1km	151	14.5
<b>kg sold</b>		
1 to 50 kg	207	33.5
51 to 100kg	116	18.77
above 100 kg	295	47.73
<b>To whom did you sell (channel)</b>		
Other households	912	87.36
private traders/ marketer	127	12.16
Schools	2	0.19
Institutions	1	0.1
not specified	2	0.19
<b>where transaction took place</b>		
at homestead	816	78.16
within village	111	10.63
within district (rural)	32	3.07
within district (urban)	48	4.6
other district (rural)	3	0.29
other district (urban)	32	3.07
another country	2	0.19

**Source: Authors own analysis**

The table above indicates that of the farmers who grew beans only 60.31% sold and further that of those that sold 47.73% sold above 100kgs while 18.77% and 33.5% sold amounts of 51 to

100kgs and less than 50kgs respectively. 72% of the producers owned some means of transport and 77.78% had livestock according to Demeke Livestock are farmers' important sources of income, food and drought power for crop cultivation and transportation (Demeke, 2007). This suggests that on average a good number of beans farmers sell their beans. Furthermore a number of markets for beans were observed in the sample. Farmers had alternatives to sell at their homestead, within the village, within and other districts as well as outside the country. As shown in the table, majority of them sold at their home stead (78.16%) while 10.63% sold within the village, 3.07% and 4.6% of the farmers sold within the rural and urban districts.

Various channels through which farmers were able to finally sell their produce existed as shown above, 87.36% of the farmers preferred selling to other households while 12.16% preferred private traders implying that farmers prefer selling within their homestead. The findings are in agreement with literature which suggests many roots or channels available in liberalised market economies (Mwanaumo, (1999); Mbene, 2005)

### **4.3 Results and Interpretation of the Estimated Probit Model**

Probit results were obtained from two models modelling decision to sell and choice of marketing channel. This section therefore presents the results of the probit regression models and discusses the results of the significant variables that determine firstly the decision to sell and then market participation choices among beans producers. Variables discussed in the previous section were considered for the models and tested for their significance. The table shows the estimated coefficients (values), marginal effects and standard errors of independent variables in the model. The coefficient values measure the expected change in the probit for a unit change in each independent variable, all other independent variables kept constant (Gujarati, 1992). The sign of the coefficient further shows the direction of influence of the variable on the probit. Meaning a positive value indicates an increase in the likelihood that a household will participate in the channel used as independent variable as opposed to the alternative. On the other hand, a negative value indicates that it is less likely that a household will consider the alternative (Gujarati, 1992; Pundo and Fraser, 2006). Therefore, in this study, a positive value implies an increase in the likelihood of a farmer selling their beans and market to private traders.

The significance values (also known as p-values) show whether a change in the independent variable significantly influences the probit at a given level (Gujarati, 2007) while the standard error measures the standard deviation of the error in the value of a given variable (Hill *et al*, 2001; Gujarati, 1992).

**Table 7: Econometric Analysis of Factors affecting Farmers Decision to Sell**

Variable name	Coefficient (std.err)	Marginal effects (std.err)
price	164.615*** (21.529)	56.926
Price barter	1.134*** (0.187)	0.392
dkgstored	-0.008 (0.016)	-0.002
dmech2	-1.490** (1.124)	-0.314
dtrans2	-0.191 (0.253)	-0.067
dlvstock2	0.029 (0.264)	0.010
off_femplo~2	-0.010 (0.233)	-0.003
edu_level	-0.329 (0.212)	-0.114
age_group	-0.290* (0.166)	-0.100
inventory2	-0.094 (0.414)	-0.033
gender1	0.464 (0.434)	0.149
marital_st~2	-0.485 (0.474)	-0.173
marital_st~3	0.704 (0.481)	0.268
marital_st~4	0.503 (0.469)	0.189
observations	557	
Pseudo R2	0.7754	
log likelihood	-72.863727	
Prob > chi2	0.0000	
LR chi2(14)	503.25	

**Source: Authors own analysis**

\* Statistically significant at 10% significance level

\*\*Statistically significant at 5% significance level

\*\*\* Statistically significant at 1% significance level

#### **4.3.1 Model Results for Factors Affecting Bean Producers Decision to Sell**

This is given in table 7 above. Of the 11 variables included only 4 variables were observed to significantly affect the decision to sell. These included price in zmk, price barter (at 0.01 significant levels), mechanization (at 0.05 significant levels) and farmers age (significant at 0.1).

A positive and significant relationship was observed between price in Zmk ( $p = 0.000$ ) and farmers decision to sell beans. This means that with a unit increase in price in Zmk, producers were 0.05% likely to sell their beans. This is as expected because economic theory suggests that higher prices are an incentive to product selling as they determine profitability of the business.

Another significant variable observed to statistically influence decision to sell is the price barter. The positive sign on its marginal effect implies that the higher the price the more farmers were likely to sell beans, in other words farmers were 39.23% likely to sell beans at higher barter prices. A possible explanation to the large difference in the marginal effects of this variable and price Zmk, can be that the bean market is quite informal and so producers respond more to increases in the barter price than price in Zmk.

A Negative but significant relationship was seen between age group and decision to sell. Meaning older farmers were 11.4% less likely to sell beans compared to younger farmers. This is as expected because younger farmers are expected to be more receptive to new ideas and are less risk averse (Barret et.al., quoted in Angula, 2010) and are keen to making money than older farmers, who may only want to farm to meet domestic consumption needs. Younger farmers are also energetic and are more capable to move beans to the market. According to Arega and others, Market participation declines with age, indicating that such characteristics of older farmers as risk aversion and reluctance to adopt technology and hence inability to produce for the market, dominate the expected greater market contacts and trust that would allow them to trade at lower costs (Arega et.al, 2007)

Mechanization ( $p$  value = 0.005) was found to negatively but significantly affecting decision to sell in that the mechanized farmers did not sell. This contradicts with Barret's finding that a household's production technology choices fundamentally affect its market participation choices by affecting its productivity and that those with production technologies participate more in the

market (Barret, 2007). A possible explanation to this would be that the more a farmer became mechanized the more they ventured into other crop production such as maize than producing beans for sell and probably produced beans at a small scale.

#### **4.3.2 Model Results for Factors Affecting Channel Choice Decision**

Given the above factors a further analysis was then made in order to understand fully what influences these farmers to further participate in the downstream of the supply chain. This is given in the table below showing the probit results of the factors that influence farmers' choice of marketing channel. Of the 15 variables included in the model, 5 variables were found to significantly affect channel selection decision these included amount sold (significant at 0.001), price barter, ownership of livestock, amount harvested, mechanization and distance (significant at 0.05 significant level) and price in kwacha (at 0.1 significant level).



**Table 8: Econometric Analysis of Factors Affecting Bean Producers Decision To Sell and their Choice of Marketing Channels (Probit Regression)**

variable name	Coefficients (Std. error).	Marginal effects (std. error)
Price	2.101** (1.057)	0.300
Pricebarter	0.043** (0.0203)	0.006
edu_level	-0.161 (0.103)	-0.023
dkgsold1	1.440*** (0.159)	0.347
dkgsold2	1.100*** (0.186)	0.264
dha	0.292** (0.126)	0.041
dkgstored1	-0.021 (0.160)	-0.003
ddistance2	-0.705** (0.345)	-0.071
dtrans1	0.012 (0.144)	0.001
dmech1	-0.381)** (-0.207)	-0.067
dlvstock1	-0.411** (0.156)	-0.050
gender1	-0.015 (0.288)	0.002
marital_status2	-0.116 (0.298)	-0.017
marital_status3	0.179 (0.330)	0.028
marital_status4	0.321 (0.339)	0.056
off_femployment1	-0.082 (0.125)	-0.0118
market1	0.459 (0.395)	0.054
market2	0.396 (0.362)	0.070
age_group	-0.022 (0.082)	-0.0032
observations	991	
Pseudo R2	0.2324	
log likelihood	-292.90735	
Prob > chi2	0.0000	
LR chi2(19)	177.37	

**Source: Authors own analysis**

\* Statistically significant at 10% significance level

\*\*Statistically significant at 5% significance level

\*\*\* Statistically significant at 1% significance level

Price barter was statistically significant in determining the factors that influence channel choice decision with a p value of 0.038. A positive sign on its coefficient indicates that an increase in the barter price of beans increase farmer participation in selling their produce to private traders. This may be due to the fact that beans market is quite informal and sell on barter is common especially if private traders offer a better barter price compared to other households. Choice of private channel will increase by 0.0062% upon a unit increase in the barter price. The sign is consistent with a priori expectation that when price of product increase in a channel an increase in participating in that particular channel occur. However another expectation would be that Farmers who may wish to barter are likely to sell to other households than to private traders. This is contrary to the findings and may be justified by the reason above that private traders who barter, sell at a better barter price than that of other household. According to Arega, marketed supply increases with commodity price, once participation decisions are made (Arege et.al., 2007)

Price in zmk was also significant at 10% confidence level and positively affecting private channel selection. This means that with a unit increase in the variable farmers were 0.00029% likely to sell to private traders. the justification for this is as above, in that the higher the price the more profit is made and hence the more it provides an incentive to use a particular channel compared to the other. In comparison with barter price farmers are more responsive to sell to private traders when barter prices increase than kwacha prices. This reflects the high informal nature of beans market in Zambia.

A positive and significant (p value = 0.000) relationship was found between private channel selection preference and amount of beans sold (dkgsold). This implies that the more the amount of beans sold the more a farmer was likely to sell to private traders rather than other households. The positive coefficient further implies that households tend to increase in private market participation with the increase in amount sold. This may be because Farmers producing small quantities have little opportunity to sell, for their primary concern may be to cater for on farm

consumption, leaving little or no quantities to sell. They are also likely to sell to other household and within village than to private traders. This is in line with the findings of Tsourgiannis et.al., (2002) suggesting that farmers that preferred to market their milk produce to big dairies were large scale milk and livestock producers,

A positive and significant ( $p$  value = 0.021) relationship was found between private channel selection preference and amount of beans harvested (dha). It was found that farmers were 42.3% likely to sell to private traders when they harvested larger quantities of beans as opposed to other households. This could be because private traders are more likely to buy in bulk compared to other household and so for farmers that wish to sell a lot of beans sell faster through private traders in addition larger producer are more likely to have resources e.g for transportation and so would cover longer distances in meeting private traders. It is also in line with findings of Tsourgiannis and others that volume of milk produced was highly significant in determining channel choice and that farmers who marketed their milk to big national / regional dairy firms were large scale farmers in terms of cultivated land, size of flock, volume of livestock and milk production (Tsourgiannis et.al, 2002)

Distance was also another variable found to influence the decision of the channel to use. Distance significant at 0.041 was negatively related to channel choice decision. Ddistance2 dummy variable represented distance to the market of more than 1km, the negative relationship therefore implies that the longer the distance to the point of sale the less farmers preferred selling their beans to private traders. In other words beans producers preferred selling to other households when long distances to the market existed (7.3% less likely to sell to private traders than to other households). This can be justified by the fact that most beans farmers are poor in resource endowment and lack transport resources, transportation costs associated with moving the produce to the market therefore discourage farmers to participate in markets far from their premises. This is as expected because the larger the distance, the higher the transportation cost and the higher the cost of marketing which farmers always like to bring down to enhance their profit (Ogunleye et.al, 2007).

Livestock variable was also found to be significant ( $p$  value = 0.002) in influencing channel selection and was negatively affecting choice. dlivstock1 dummy variable represented farmers

without livestock meaning that beans producers were 5.16% less likely to sell to private traders under conditions that they owned no livestock, while those with livestock preferred private traders. The negative coefficient is as expected because Livestock are farmers' important sources of income, food and drought power for crop cultivation and transportation (Demeke, 2007). Therefore the livestock owned provides an advantage in having a larger farmed area for beans and easy transportation to meet private traders giving an advantage to livestock owned households to prefer private traders to other households.

Mechanization was also significant. Non mechanized farmers preferred selling their beans to other households rather than private traders. This may be because mechanization enables farmers to produce more and hence sell to bulky buying channel (the private traders) becomes convenient for bulky beans selling.

## CHAPTER FIVE

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents the conclusion and recommendations of the study based on the findings and interpretations of the study. These are based on the major insights brought out by the study.

#### 5.2 Conclusion

Although beans' marketing has received little attention in terms of research and policy locally it has proved through this research to be an important component of beans producers in Zambia. This has been shown by the findings that on average more farmers in the sample participated in its marketing. In terms of demographics obtained, majority of beans producers in Zambia are male headed households, aged between 41 and 60 years and monogamously married with primary education as their highest level of formal education attained. As such it was concluded that older and less educated farmers are more engaged in beans production.

From the analysis made another conclusion drawn was that beans is a countrywide grown crop with the majority of it produced in Northern Province. The scale of farmers highly engaged in beans production are small scale by nature representing 82% with the majority producing less than 0.5ha and non mechanized. This implies that resource poor farmers produce beans in Zambia using more human labour in production as opposed to machinery or animal draft power.

Majority of beans farmers participated in its marketing. However, although analysis revealed that a good number of farmers owned some form of transport and livestock, majority sold quantities of above 100 kgs on less than 1km, and that most of the transactions took place at their homestead to other households. Meaning that on average a good number of beans producers participate in markets near to their homesteads and few cover long distances in selling beans.

Production characteristics included in the probit model analysis revealed that farmers without farming mechanization had a higher probability of selling beans. In terms of channel selection producers with larger amounts of harvested beans preferred selling to private traders than to

other households. On the other hand mechanization though significant in affecting channel selection revealed a negative effect on private channel selection. This implies that among production factors included mechanization is very important in influencing market participation of beans producers because it affects both decision to sell and the choice of the marketing channel while the amount of beans harvested and livestock ownership only influenced channel selection.

Among the market factors the two price modes (price in kwacha and barter price) were the only factors influencing both decision to sell and choice of marketing channel. However in addition to these, other market variables including amount of beans sold, amount of beans stored from previous farming season, distance to the market, farming mechanization and livestock possession were only significant in influencing channel selection. Implying that price as a market factor is very important in determining bean producers market participation as it influences both decision to sell and the choice of marketing channel. Farmers with livestock preferred selling to private traders. Those who harvested a larger amount of beans sold to private traders than other households and sold on longer distances

In summary the probit model results show that the factors found to significantly affect producers decision to sell beans were price, mechanization and farmers age. Except the price variables the later variables negatively affected decision to sell. Meaning that price variable is very important in stimulating selling decisions and that it is very important to make it available to farmers. Of the factors included in the probit model analysis of factors influencing channel choice decisions, the study has shown that beans farmers in the study area make their choice of market channels for their produce based on price of the product, distance from farm to the market, amount of beans harvested, amount sold, farming mechanization and farmer ownership of livestock.

### **5.3 Recommendations**

Decision making on market participation and further into the choice of marketing channel is an important task that is influenced by many factors. Based on the empirical results, policy recommendations can be suggested. This section gives a series of options that can be considered, in an effort to help beans producers to reach their full potential.

Much of beans production is done in Northern Province, to an extent that it even produces more than half of the total country production. Fewsnat attributed the reduction in beans production in 2007 to reduced yields in parts of Northern Province due to excessive rainfall. There is need to promote beans production by government countrywide both as a source of food and income especially that the bean production requirements can be met anywhere in the country.

Policy makers should focus more on small scale farmers if production of beans in Zambia is to enhance, this can also be proved from the provincial production amounts which vary significantly and the knowledge that small scale farmers are found in all provinces leading to countrywide malnutrition eradication, increased income among households and eventually national development. Further focus on this should be made on younger farmers who were found to actively participate more in the supply chain and may help in pulse market development.

Price variable is an important factor observed to influence both decision to sell as well as choice of marketing channel. Implying that with knowledge on prices farmers are more likely to participate in beans marketing and choose wisely on the appropriate channel. Beans price information therefore, should be made available to the farmers possibly at all times, this can be done based on the researched best means by which beans farmers can easily access market information. Farmers getting prices right help in market based development (Barret, 2007)

Distance from the farm to the market significantly affect channel choice decision, government should ensure developing markets for beans within reach this will motivate a lot of farmers to participate in beans supply chain their by increase their income and subsequently their livelihood.

Policy makers should also put deliberate policies on livestock production. This will promote both production and marketing of beans depending on the animal reared. This is drawn from the finding that producers with livestock preferred private traders who are likely to buy in larger quantities than other households and so promotion of livestock will promote choice of private trade sell implying high level of beans production.

Similar studies in the supply chain of beans must be carried out that will include variables identified in literature that influence channel choice decision such as, market information, group marketing, contract farming, value addition, channel mode of payment as well as delay in

payment. It should also analyse all possible channels as well as determine the value accruing to each channel. In addition, research should be done in market information delivery to beans farmers focussing on how best producers can access market information especially price.



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