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ANALYSIS OF MUNG BEAN VALUE CHAIN IN THE CASE OF DELO MENA DISTRICT, BALE ZONE, OROMIA REGION, ETHIOPIA

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Abstract: This study focused on the analysis of mungbean value chain in Delomena district of Bale zone with specific objectives of analyzing the mungbean value chain; identifying the determinants of mungbean supply to the market and market outlet choice of mungbean producers and mungbean value addition at different stages of the marketing chain. Primary data were collected from 90 farmers and 30 mungbean traders using structured questionnaires. Descriptive statistics and Econometrics models were used to analyze the collected data. Results show that the main mungbean value chain actors in the study area are input suppliers, farmers/producers, assemblers, wholesalers, commission agents and cooperatives. The result of 2SLS indicated that size of landholding, livestock ownership, family size and quantity of mungbean produced influences amount of mungbean supplied to market significantly. The multinomial logit model result indicated that the likelihood to choose wholesalers market outlet was significantly influenced by frequency of extension contact, distance from market place, own price of the commodity and membership to cooperative compared to accessing assemblers mungbean market outlet. The likelihood of accessing cooperative mungbean market outlet was significantly influenced by price given to the commodity and distance from market place compared to accessing assembler market outlet. Result of probit model indicated that access to market information, quantity of mungbean produced, distance from market place access to market information, access to extension and credit services significantly affected farmer's decision to be engaged in value addition. Therefore, policies aiming at increasing farmer's awareness of producing value added mungbean produce to enhance value creations are recommended to strengthen chain development.

Key Words: Multinomial Logit, Market Outlet, Value Chain, Value Addition, 2sls

1. INTRODUCTION

1.1. Background of the Study

Agriculture is a core driver of the Ethiopian economy. It accounts for about 45 percent of the Gross Domestic Product (GDP), employs more than 85 percent of the total population that is directly or indirectly engaged in agriculture, generates about 80 percent of the foreign exchange earnings of the country, and provides raw materials for 70% of the industries in the country. About 15-17 percent of the Government of Ethiopia's (GoE) expenditures are committed to the sector (Dawit et al., 2010). The role of agriculture in securing the food needs for the fast growing population is considerable.

Despite having all this importance, agriculture continues to face a number of problems and challenges. The major ones are adverse climatic conditions, lack of appropriate land use system resulting in soil and other natural resources degradation, limited use of improved agricultural technologies, the predominance of subsistence agriculture and lack of and/or absence of business oriented agricultural production system, limited or no access to market facilities resulting in low participation of the smallholder farmers in value chain or value addition of their produces (Bezabih, 2010)

2.2. Statement of the Problem

Development policy of Ethiopia has placed emphasis on increasing agricultural production to serve as a base for rural development. Even though there has been an increase in agricultural production, there were drawbacks with regards to many households limited participation in the markets. The limited market participation of many agricultural households face is considered to be a major constraint to combating poverty (Best et al.2005). This shows that an efficient, integrated and responsive market that is marked with good performance is of crucial importance for optimal allocation of resources and stimulating households to increase output (FAO, 2003).

Supply of agricultural crop in the study area is subjected to seasonal variations where surplus supply at harvest is the main feature. The nature of the product on the one hand and lack of properly functioning marketing system on the other, often resulted in lower producers' price. Several studies that have in the past examined the marketing system of various agricultural commodities and its implications for agricultural and economic development in Ethiopia in general have employed the market value chain approach on different enterprises. However the analysis of mung bean market value chain in Bale lowlands, which is the main source of mungbean for Ethiopia was not conducted yet. In the absence of adequate information on mung bean marketing in Bale lowland designing appropriate mung bean marketing policy in Ethiopia will take place in an information vacuum. So this study is proposed to investigate the value chain analysis of mung bean in Delo mena district of Bale zone

Therefore, this study focuses on identifying the weakest link of the mung bean value chain, in order to narrow the information gap and contribute to an understanding of the challenges and assist in developing improved market development strategies to the benefit of smallholder farmers, traders, and other market participants. Specifically, this research investigated the value chain analysis of mung bean in Delo mena district of Bale.

1.3. Objectives of the Study

The general objective of the study was to analyze the mung bean value chain in Delo mena district of Bale zone.

The specific objectives of the study are:

- To analyze factors affecting mung bean value chain in the study area;
- To analyze the determinants of mung bean supply to the market in the study area;
- To identify marketing channels of mung bean and factors affecting outlet choice decisions of mung bean producers; exporter and salers

- To determine factors affecting mung bean value addition at different stages of the marketing chain.

2. METHODOLOGY

2.1. Description of the Study Area

2.1.1. Overview of Bale zone

Bale zone is one of the 18 administrative zones in Oromia national regional state which is located in south-eastern Ethiopia. It has borderlines with Arsi, Guji, West and East Hararge zones as well as Somali and Southern Nations and Nationalities and Peoples' Regional States. It has 18 districts out of which nine are located in highland agro-ecology whereas the remaining nine are located in mid and lowland respectively. The zone is found in Southeast of Oromia Regional State that extends from 5º 22'S – 8º 08'N latitude and 38º 41'W – 40º 44'E longitudes. Bale zone has four agro-ecological zones namely extreme highlands 0.04%, highland 14.93%, midland 21.5%, and lowland 63.53%. The altitude ranges from below 1000 in the lowlands to 4377m above sea level in the highlands. More than 95% of the rural population is dependent on agriculture and 88% lives in rural areas. Forests and shrubs covered about 34.4% of the zone, while about 4.8% of the zone was degraded and others. Major crops grown in the zone are wheat, barley, maize, teff, sorghum, faba beans, field pea, and linseeds, mung bean, coffee and chat are also grown in the zone.

2.1.2. An overview of Delo Mena district

Delo Mena district is located in the south eastern part of Bale zone. The total area of the district is about 1268 km^2. The district has 20 rural kebeles. The altitude of the district ranges from 750 to 1367 m a.s.l. From the total area of the district about 82% is desert land, 18% is semi desert. The annual average temperature is 29.5ºc where as the minimum and maximum temperature is 19ºc and 38ºc respectively. The annual average rainfall is 1050mm where as the minimum and maximum rainfall is 600 and 1500mm respectively (DMOAD, 2019). Farmers in the district experienced mixed farming system of both crop and livestock. The major crops produced in the district are teff, maize, pulses and oil crops. Rainfall pattern of the district is characterized by bi-modal rain fall distribution. The district has two distinct seasons, i.e. Belg which extends from March to July and Meher which extends from August to January (DMOAD, 2019).

2.2. Methods of Data Collection and Data Sources

2.2.1. Data Sources and Types

The data for this study were collected from primary and secondary sources. Formal and informal sample survey methods were used to collect primary and secondary data. Primary data was collected from producers, wholesalers, assemblers, brokers and trade office. The main data types collected include production, buying and selling, pricing, input delivery and distribution, market supply of mung bean, market outlets, constraints and opportunities characteristics of the actors involved in mug bean crop production and marketing in the study area.

Secondary information was gathered from published and unpublished materials, district agriculture and rural development offices, farmers' organizations, marketing agencies and from different development organizations of the study area.

2.2.2. Methods of Data Collection

Primary data was collected using structured interviews and Rapid Market Appraisal (PRA. Informal survey was conducted using Rapid Market Appraisal (RMA) technique using checklists. Formal survey was undertaken with randomly selected farmers, wholesalers, agricultural office and trade office using a pre-tested structured questionnaire for each group. Secondary data relevant for this study was gathered from published and unpublished materials using questionnaire.

2.3. Sampling Procedure and Sample Size

A multistage purposive random sampling procedure was used to select representative households in the study area. In the first stage, Delo mena district was selected purposely as it has the largest area under Mung bean production in the study zone. In second stage out of 20 PAs of Delo mena district, three Kebeles (Wabaro,Irba and Melka amana) were selected randomly from producers of Mung bean in the district.

2.3.1. Farmers sampling

A list of Mung bean producers along with area allocated under mung bean was prepared by the researcher. Finally appropriate numbers of sample farmers from three kebeles were selected in proportional to population size using Yemane (1967) formula. Accordingly, the required sample size at 95% confidence level with degree of variability of 5% and level of precision equal to 9% are recommended to obtain a sample size required which represent a true population. = () Where, n = sample size, N= Population size and e = level of precision assumed 9%. Using the above formula, totally 90 farm household heads are select from the woreda farmer household heads of and interviewed.

2.3.2. Wholesalers sampling

In addition to farmer households, sample wholesalers were interviewed. The lists of wholesalers were obtained from the district Office of Trade and Industry (OoTI). Based on the number of wholesalers available in the district were selected randomly.

2.4. Methods of Data Analysis

Descriptive statistics, inferential statistics were used to analyze the data collected from producers and traders of marketing mung bean.

2.4.1. Descriptive statistics

Descriptive statistics such as mean, maximum, minimum, standard deviation, frequencies and percentages in the process of examining and describing demographic outputs and marketing functions were applied.

2.5. Econometric models

Econometric models which are useful to analyze factors affecting supply of mungbean to the market, factors determining choices of market outlet and factors influencing value addition are specified below.

2.5.1. Factors affecting market supply

In estimating factors that affect household's levels of market participation, OLS model is applicable if and only if all the households participate in the marketing of the commodity of interest. If participation of all households in marketing of the commodity is not expected, using OLS model by excluding non-participants from the analysis introduces selectivity bias to the model. Tobit, Double Hurdle and Heckman two stage procedures have been suggested to overcome such problems. If only probability of selling is to be analyzed, probit and logit models can adequately address the issue. In Bale lowlands almost all farmers produce

mungbean for selling purpose. Maize and tef are mostly used for household consumption. For studying factors affecting mungbean market supply in the study area, multiple linear regression model was used since all sample farmers interviewed participated in supplying wheat to the market in 2018/19 production year. This model is also selected for its simplicity and practical applicability (Greene, 2000). Econometric model specification of supply function in matrix notation is given as below.

$Y = X'\beta + U$ (6)

Where: Y = quantity of wheat supplied to market

X = a vector of explanatory variables

β = a vector of parameters to be estimated

U=disturbance term

2.5.2. Factors affecting mungbean value addition

Probit model was used to determine the factors affecting the decision to engage in value addition of mungbean. The decision to use probit was based on the fact that the decision to add value is discrete and dichotomous (one either adds value or not), discrete decisions are analyzed using qualitative response models one of which is probit. The other qualitative response models are logit and linear probability model (LPM). Logit models are used to analyze data that has a logistic cumulative distribution function while LPM has a number of shortcomings that make it unsuitable; it is can generate probability values that lie below zero or above one, which would be unrealistic. LPM also leads to questionable values of R2 as a measure of goodness of fit (Gujarati, 2004). This study assumes a normal cumulative distribution function and hence the choice of probit. Empirically the model is presented as follows:

$* = + +$

$= 1\ y * > 0$

$= 0\ y * < 0$ Where,

y * = is a latent (unobservable) variable representing farmers discrete decision whether to add values to wheat or not

β i= a vector of parameters to be estimated

α = Constant

= is normally distributed disturbance with mean (0) and standard deviation of δi and captures all unmeasured variables

Y = is a dependent variable which takes the value of 1 if the farmers add values on wheat and 0 otherwise.

2.6. Definition of Variables and Hypothesis

To identify factors affecting wheat supply to the market, value addition and choice of market outlets that actors involved in the marketing of the crop, the following variables were assumed to affect dependent variables and used for this study.

2.6.1. Dependent variables

Quantity of wheat supplied to the market: It is dependent variable which represents the amount of mungbean actually supplied to the market by household in the year 2018/19 which is measured in quintals. Market outlets: This is a categorical variable that represents mungbean market outlets in the study area. It assumes 1 for wholesalers, 2 for cooperatives, 3 for processors and 4 for assemblers.

Factors affecting value addition: It is dependent variable which represents whether the farmer participates in value addition or not. Value addition considered for these study are time value (storage), place value (transportation) and product value (cleaning). It is dummy variable that takes 1= if the farmers participate in value addition and 0=otherwise.

2.6.2. Independent variables

The independent variables hypothesized to affect the dependent variables are presented as follows. a) Independent variables for factors affecting quantity of mungbean supplied to market and participation in value addition

Access to market information: This is dummy variable assigned 1 if the farmer has access to market information and 0 otherwise. A study by Muhammed (2011) revealed that if mungbean producer gets market information, the amount of mungbean supplied to the market increases. Alemayehu (2012) also found that access to market information positively affected amount of ginger supplied to market. The study by Abraham (2013) indicated that access to market information affected marketed supply of potato and tomato positively and significantly. Therefore it is hypothesized that access to market information positively affects amount of mungbean supplied to market and decision to participate in value addition.

Access to extension service: This is a dummy independent variable taking the value 1 if a household had access to extension services and 0 otherwise. Different studies conducted previously revealed that extension agent visits had direct relationship with market outlet choices (Rehima, 2006). Thus access to mungbean extension service is hypothesized to affect quantity of mungbean supply to market and decision to be engaged in value addition positively.

Size of farmland: It is a continuous variable referring to the total area of farmland a farmer owned, rented in and/or shared in during 2018/19 production year, including shared and rented in, measured in hectare. It is assumed that the larger the total area of the farmland the farmer owns, the larger land is allocated for mungbean and the higher would be the output. Alemayehu (2012), indicated that a unit increase in land allocated for ginger, would give rise to 11.1qt increase in the amount of ginger supplied to market. So it is hypothesized that size of land holding positively influences volume of market supply.

Livestock: This is a continuous variable measured in tropical livestock unit (TLU). Farmers who have many livestock are anticipated to specialize in livestock production so that they allocate large share of their land for pasture. Study by Rehima (2006) on pepper marketing showed that TLU had a negative sign on quantity of pepper sales. On the other hand, it is assumed that household with larger TLU have better economic strength and financial position to purchase sufficient amount of input (Kinde, 2007). For this study livestock ownership is hypothesized to influences volume of mungbean sales positively.

Farming experience: This is a continuous independent variable measured in year's household engaged in farming activities. Abraham (2013) also proved that farmers who have more experience provide more of their potato product to market. Hence it is hypothesized that experience of the farmers on farming activities positively influences both supply of wheat and decision of participation in value addition.

Quantity of mungbean produced: It is the total amount of mungbean produced in quintals in 2018/19 production season in the study area. An increase in volume of production has a significant effect on market

supply and motivates farmers of to increase the supply of commodity to the market. Ayelech (2011) found that the amount of tomato, papaya, avocado and mango produced by farming households has augmented marketable supply of the commodities significantly. Therefore, it is hypothesized that quantity of mungbean produced positively affects the supply of mungbean to market and the decision of participating in value addition.

Lagged price of mungbean per quintal: This is a continuous variable that measured annual average price of mungbean in the reference market. The variable market price of mungbean was measured in Birr per quintal. Tomek and Robinson (1985) argued that product price has direct relations with marketable supply and hence it was expected to affect the household marketable supply of wheat positively in such a way that prices of 2017/18 can stimulate production of wheat, and thus marketable supply for 2018/19. So, it is hypothesized that lagged price positively affects mungbean supply to the market.

Education level of household head: This variable was measured using formal schooling of the household head and hypothesized to affect marketable supply positively. It take dummy values 1 if the household head attended any formal education and 0 otherwise. This is due to the fact that a farmer with good knowledge can adopt better practices than illiterates that would increase marketable supply. Holloway et al. (1999) argued that education had positive significant effect on quantity of milk marketed in Ethiopian highlands. Thus, it is hypothesized that education has positive effect towards quantity supplied to market and decision of participating in value addition.

Age of household head: It is a continuous variable which refers to the age of the household head measured in years. It believed that age can serve as a proxy for experience. Aged household heads are believed to be wise in resource use, and it is expected to have a positive effect on market participation and marketable surplus. Tshiunza et al. (2001) used age as the major farmers' characteristics that significantly affected the proportion of cooking banana planted for market. He found that younger farmers tended to produce and sale more cooking banana for market than older farmers. On the other hand Abraham (2013) also proved that aged farmers provide more of their vegetable product to market. The result suggests that as farmers have high potato production experience the amount of potato supplied to the market increased through its effect on potato production in the first stage. For this study, it is hypothesized that age has positive effect.

Family size: This is a continuous independent variable that is measured in terms of the number of members in a household. Household size increases domestic consumption requirements and may render households more risk averse. Controlling for labor supply, larger households are expected to have lower market participation. Berhanu and Moti (2010) found out negative relationship between household size and market participation of households. In this study the variable is hypothesized to affect volume supplied to market negatively and significantly. But it is hypothesized to affect value addition positively and significantly.

Sex of the household head: In mixed farming system, both men and women take part in crop production and management. Generally, women contribute more labor input in area of land preparation, planting, weeding, harvesting and sale of mungbean. However, obstacles, such as lack of capital, and access to institutional credit, access to extension service, may affect women's participation and efficiency in teff and mungbean production (Tanga et al., 2000). Therefore, it is not possible to tell a prior about the likely sign of the coefficient of sex in sales volume.

2.6.3. Independent variables for factors affecting market outlet choices

Family size: This is a continuous independent variable that is measured in terms of the number of members in a household. Household size increases domestic consumption requirements and may render households more risk averse. Controlling for labor supply, larger households are expected to have lower market participation. Edmeades (2006) found out negative relationship between household size and market participation of households. Therefore, it is hypothesized that it will affect accessing cooperative wheat market outlet choice positively as compared with accessing other wheat market outlets

Access to extension services: This is a dummy independent variable taking the values 1 if the wheat producer farmers have access to extension services and zero otherwise. It is expected that mungbean extension service widens household knowledge with regard to use of improved mungbean technologies. Agricultural extension services are expected to enhance households' skills and knowledge, link households with technology and markets (Lerman, 2004). Birhanu et al (2013) found that access to dairy extension services such as dairy technology information, training, field days, field visits and field tours received by households positively and significantly affected accessing cooperative milk market outlet as compared with accessing individual consumer milk market outlet .Different studies conducted previously revealed that extension agent visits had direct relationship with market outlet choices (Holloway and Ehui, 2002; Rehima, 2006). Thus access to mungbean extension service is hypothesized to affect accessing cooperative wheat market outlet choice positively as compared with accessing other wheat market outlets.

Distance to nearest market: This is a continuous independent variable measured in kilometre. The closer a household to the nearest urban center, the lesser would be transportation costs, loss due to spoilage and better access to market information and facilities. Berhanu and Moti (2010) found out negative relationship between market participation and distance to the nearest urban market center. Therefore, households who are at far away from urban center are hypothesized to affect the likelihood of accessing cooperative mungbean market outlet positively as compared with accessing other wheat market outlets.

Membership to cooperative: This is defined as dummy variable that takes 1 if the household is member of cooperative and 0 otherwise. Farmers who are members of cooperative are supposed to sell to cooperative rather than other market outlets. Abraham (2013) found that membership to cooperative affects negatively and was significant related with retail outlet choice. His result indicated that for those households who were members of cooperatives the probability of choosing collector outlet decreased by 23.4% compared to base category. Hence, membership to cooperative is hypothesized to affect accessing cooperative market outlets positively as compared to accessing other market outlets.

Income from non/off farm activities: This is treated as a dummy variable and measured as 1 if the household obtained income from off/nonfarm activities, and 0 otherwise. Rehima (2006) found that if pepper producer have non-farm income, the amount of pepper supplied to the market decreases. Again, farmers who gain more income from non/off farm income want to supply their vegetable to any nearest market outlet with low price than to go far. Therefore it is hypothesized that off/non-farm income influence market outlet choice decision of mungbean producers positively.

Access to credit: This is a dummy variable that takes 1 if the household takes loan and zero otherwise. Access to credit would enhance the financial capacity of the farmer to purchase inputs, thereby increasing

production and market share size. Therefore, it is hypothesized that access to credit would have positive influence on level of production and sales. Alemnewu (2010) and Muhammed (2011) found that if pepper and teff producer gets credit, the amount of pepper and teff supplied to the market increased. Due to these, it is hypothesized that access to credit will have influence on wholesale market outlet choice decisions.

Ownership of market transport facilities: Specifically vehicles, carts and transport animals would be used to measure the availability of produce transportation facilities by households. In cases where households owned transportation facilities, the variable took the value of one, and zero if the household did not own any form of transport facility. This variable is expected to have influence on the market outlet choice of wheat producers positively. The availability of transportation facilities helps reduce long market distance constraint, offering greater depth in marketing choices (Jagwe, 2007).

Own price of the commodity: It is continuous variable, which is, price given for the commodity with different market outlets per quintal. Each market outlet average price will be asked. According to Birhanu et al (2013) price offered by milk market outlet per liter of milk significantly and negatively affected accessing cooperative milk market outlet as compared with accessing individual consumer milk market outlet. Hence, it is hypothesized that price given by market outlets negatively affects cooperative market outlet choice.

3. RESULTS AND DISCUSSION

This chapter presents the major findings of the study area. Descriptive statistics methods were used to analyze the primary data. Descriptive statistics were employed to describe the demographic characteristics of sample farmers and traders. Also identify factors affecting volume of mung bean supplied to market and market outlet choices in the study area.

3.1. Descriptive Statistics

3.1.1. Demographics and Socioeconomics Characteristics of Households

The variables used to describe demographic characteristics of sample farmers were religion, educational level, sex, marital status, age and family size. The results presented in Table 1 depicts that 57.77% and 42.22% of the respondents were Muslim and Orthodox respectively. The results of the study also indicated that 77.77% of the respondents were male household heads and the remaining 22.22% were female household head which slightly increase in female household due to the area is susceptible to tribe conflict most of male household were passed on conflict as elders' suggestion. The result revealed that 88.88% of them were married and 11.11% were divorced.

Table 1: Demographic and socioeconomic characteristics of respondents

Variables	Frequency N=90		Percent N=90
Religion	Muslim	52	57.77
	Orthodox	38	42.22
Sex	Male	70	77.77
	Female	20	22.22
Education level	Illiterate	42	46.66
	Primary (1-4)	10	11.11
	Junior (5-8)	20	22.22
	Secondary (9-12)	18	20.0
Marital status	Married	80	88.88
	Divorced	10	11.11
Age	Mean		39.5
Family size	Mean		6.3

Source: Own computation

According to table 1 the maximum and minimum age of the respondent was 30 and 70 years respectively with mean age of 39.5 years which is similar finding with (Mohammed Ahmed et al.,2015).Since age is one of the important characteristics of the community. It reflects on the productivity of the population as it has a bearing on the overall health situation within the community. In developing countries, aged members are more prone to diseases and thus are less productive. It has a bearing on the employment pattern, spatial mobility and quality of work done. Age plays a significant role in any kind of business, particularly in agriculture, because the use of child labor on the farms is quite high.

Educational level of the sample household heads in the study area ranges from illiteracy to tertiary levels. The proportion of household heads that were illiterate was 46.66%, those who can read and those who were at primary, junior and secondary educational levels were 11.11%, 22.22% and 20% respectively. This indicates that the educational level of the household head can influence how he or she views the new technologies and new ways of doing business. It can affect technology adoption decision. Education can also contribute to decision-making processes that alter the paths people take in life.

The average family size in the study area was 6.3 with standard deviation of 1.58 which is similar with (Mohammed Ahamed et al., 2015) finding that means their average family size is between 4 and 8.The livelihood of rural farm households mainly relies on agriculture which requires more labor for various activities like land preparation, planting, weeding, cultivation, harvesting, threshing, animal keeping, fetching water and fire wood collection and so on. The family size with age composition is important to carry out different agricultural activities.

3.1.2. Land Use

According to the result indicated in table 2 Land is perhaps the single most important factor of production and measure of wealth in the study area. It is the main source of income and increases the status of people in the community. The average land size of respondents was 2.52 hectare (Table 2).The average shared in land for household was 0.74 hectare .The minimum and maximum size of landholding of the respondent farmers was 0.5 and 6.0 hectares respectively. Out of the total land, the respondents allocated most of their plots for mung bean production, which was an average of 1.27 hectare on average out of total holding, since the area is known as mung bean belt of the country. All of the sample respondents indicated that they are

participating in mung bean production activity. Besides of mung bean cultivation, different crops were grown by farmers. Crops like tef, maize, sorghum, seasam coffee and chat are the major ones.

Table 2.The landholding of respondents

Variables	Minimum	Maximum	Mean	Std. Deviation
Area of owned land	0.5	6	3.25	1.23
Area of rented in land	-	-	-	-
Area of rented out land	-	-	-	-
Area of shared in land	0.5	3	1.5	0.24
Area of shared out land	-	-	-	-
Area allocated for mung bean in 2010/11	0.5	3	1.4	0.21

Source: Own computation from survey data

3.1.3. Access to services

Provision of adequate services for the communities enhances the communities' socioeconomic development in general and the well-being of individuals in particular. It has important contribution in improving production and productivity and thereby increasing marketable surplus and ultimately for increasing the income of smallholder farmers. The most important services that are expected to promote production and marketing of mung bean in the study area include access to credit, access to extension service, and access to market information.

3.1.3.1. Access to market information

Access to agricultural markets and marketing information are essential factors in promoting competitive markets and improving agricultural sector development. A well-organized market intelligence information system helps all the producers and traders freely interact with one another in arriving at prices. Access to reliable market information help farmers sell their surpluses of mung bean and choose modes of transaction, each of which yields a different benefit. It has been postulated that farmers will choose a profitable mode of transaction if they can receive reliable market information on the prevailing market conditions.

Access to price information and source of market information of respondents in Table 3 showed that the major source of market information was 35.55 Traders, 26.66 friends/neighbor farmers, 20.0% Radio and 17.77 Television were used as source of market information in the area. The rest market information was not common in the study area.

Table 3: Sources of market information for respondents

Sources of information	Percent
Traders	35.55
Friends/Neighbour's	26.66
Development agent	-
Market bulletin	-
Radio	20.0
Television	17.77
Others	-

Table 4.Access to credit service

Respondent Kebeles	Number	%
Melka Amana	2	13.33
Wabaro	5	33.33
Irba	7	46.67
Average	14	31.11

3.1.3.2. Access to financial/ credit service

The availability of financial sources for credit is crucial for farmers. Some farmers are using as an important input for agricultural activities. The result from study area shows that 83.6% of respondents have access to credit. However, only 31.11% of the respondents have taken credit from the available sources in the study area. Factors that hinder farmers from taking credit in study area were religion and self sufficiency. The credit source for these farmers was cooperatives, local money lenders and microfinance. In addition, Oromia Credit and Saving Institution provide credit to farmers. However, the credit provision is based on group collateral but farmers are not much interested in this approach in order not to pay for defaulters in their group.

3.1.3.3. Access to extension services

Extension service in agriculture is indispensable and it provides assistance for farmers in improvement of production and productivity, it also enables flow of information and transfer of knowledge and scientific findings to practice. Access to agricultural information services makes farmers to be aware of and get better understanding and ultimately leads to decision to take risk for improved agricultural practices.

Currently in Ethiopia the government has been attempting to fill the required knowledge and achieve food self sufficiency in the country by placing in each Kebele administration three development agents (DAs) and building a farmer training center (FTC). Development agents are assigned as better source of extension services for farmers at kebele level that strengthens intensive method of extension work. However, the result from Table 4 below indicated that each kebeles respondents 48.88%, 40.0% and 64.44 % only get extension service from development agents which influenced them to do better agricultural production.

Table 4: Access to agricultural extension services

Pas	Who have access to Agricultural Extension Service (N=90)	Percent
Melka aman	44	48.88
Wabaro	36	40.0
Irba	58	64.44

3.1.4. Input utilization

Inputs used by farmers of the study area are fertilizer, herbicides and pesticides. These inputs are supplied to farmers either by cooperative/unions and private traders. But there is no herbicides and pesticides that supplied to mung bean crop cultivated in the area which affect product performance of the crop.

Cooperatives and unions are major suppliers of fertilizer for producers in the study area. But there is lack of improved mung bean seed, fungicides and pesticides in study area.

The survey result indicated that all sample respondents applied DAP (Di Ammonium Phosphate) and UREA used fertilizer on their mung bean field. The rate of application was 68.18 and 65.9kg's on average for DAP and UREA respectively as indicated in table 5 below which is below average recommended. Fertilizer application is one of the most important agricultural practices that are used by mung bean growers in the study area. Moreover, proper application of the recommended fertilizer rate is important to obtain the required production and marketable supply. However, farmers in the study area apply varying fertilizer rate, which is below the blanket recommendation rate this is due to lack giving awareness on input usage from agricultural extension workers as respondents said.

Table 5: Amount of seed and fertilizers used per hectare by the respondents in kilogram

Variables (N=120)	Minimum	Maximum	Mean	Std. Deviation
Improved seed used	-	-	-	-
DAP	50	100	68.18	12.3
UREA	50	100	65.9	13.6

Source: own computation from survey result

3.1.5. Mung bean production

Mung bean cultivation is gaining popularity day by day among the farmers and Ethiopia's. Mung bean export has grown slightly to 1363 tons in 2002 from 822 tons in 2001.Though its production in Ethiopia is very negligible when it is compared to other pulse crops, holder farmers in drier marginal e bean and it has been an important grain legume for resource poor farmers in these areas. Mung bean is a recent introduction in Ethiopian pulse production grown in limited area in smaller quantity. It has green or yellow skin and sweet in flavor. It is drought resistant crop compared to other pulse crops. However, its consumption is not widespread like the other pulses in the country. Reliable information is lacking on the potential and actual production levels of mung bean at the national scale in Ethiopia. The main production areas of mung bean in Ethiopia are Amhara Region North, Shewa zone, some parts of Benishangul Gumuz and south east of Oromia Bale Delo mena is particularly known for its extensive Mung bean production.

Mung bean is dominant oil crop that grows in Bale zone, so that all of the respondents (100%) in Delo mena district were mung bean growers and allocates large proportion of the average land holding for the crop compared to other crops .The result of study indicates that on average respondents allocated 1.5ha for mung bean production which is 60% of their total average landholding. On average, a farmer household produced 10.3qt and 12.3qt of mung bean in Bona and Ganna season respectively. The average productivities of the crop were 27.4qt/ha and 24.8qt/ha in Bona and Ganna seasons respectively.

Table 6: Area allocated and productivity of mung bean per hectare

Variables (N=90)	Mean	Std. Deviation
Area allocated for mung bean in 2010/11 in hectar	1.5	0.23
Productivity of mung bean per hectare in Bona season (quintal	10.3	2.26
Productivity of mung bean per hectare in Ganna season (quintal)	12.3	2.45

Source: Own computation from survey result

3.2. Demographic Characteristics of Traders

Age is one of the demographic factors which are useful to describe traders experience and networking. The average age of all sample traders was 35.1 years. With respect to the sex, unfortunately all respondent traders were male. The marital status of traders also depicts that all traders interviewed were married. In terms of education most of traders were educated.

Table 7: Demographic characteristics of traders

Variables	**Measurement (N=20)**	**%**
Age in years	Mean	35.1
Experience in years	Mean	2.1
Educational level in %	Illiterate	0
	Primary school	40
	Secondary school	60
	College	0
Gender in %	Male	100
	Female	0
Marital status %	Married	100

4.5. Major Constraints in Production and Marketing of mung bean

Factor affecting mung bean production and marketing sector takes into account the systematic analysis of the problems that exist across the value chain from input supply to marketing of the final product which affects value addition at different stages. The identification of problems and opportunities at all stages of the chain helps to upgrade the mung bean value chain sector that exist across the value chain from input supply to marketing of the final product.

3.5.1. Production constraints

Despite the potentials of Mung bean production in the region there are several factors which affect the production of Mung bean. Under this section, we would like to present the main problems which were obtained from respondents and field observations.

3.5.1.1. Occurrence of pests and diseases

In developing country most of the production was lost due to occurrence of pests and diseases. Similarly mung bean crop production los is related to pests and diseases outbreak. Hence, the occurrence of such crop pests and diseases would affect the productivity and quality of Mung bean. This problem can be severe

when the availability of pesticides is limited. In this regard, the interviewees stated that accessibility of pest sites significantly affect the production of those commodities in the area. Further they noted that the negative impact of pest and disease in the zone is high due to lack chemical that the suitable to mung bean crop in the area. Likewise, the discussant noted, for the time being, pest and other related crop diseases are to be a potential problem of mung bean production. Last year in 2010/11 production season most of the farmers in the interviewed area loss there production due to unexpected pests. So scholars and research centers are try to investigate mechanism of pest and weeds control to solve production loss.

3.5.1.2. Unpredictable rainfall

The majority of the farmers/producers stated that the productivity of those commodities is highly dependent on the amount and distribution of rainfall. Indeed, the amount of rainfall required to produce Mung bean is lower than the minimum requirement of rainfall for other crops. However, the amount and distribution of rainfall is irregular and sometimes unfavorable for Mung bean production. Hence, such unfavorable rainfall challenged the production of Mung bean interms of amount and quality. Most of the farmers in interviewed area said we lost all production of mung bean in 20009/10 due to unpredictable rainfall.

3.5.1.3. Lack of input supply and development

In agriculture the availability of improved inputs like seed, fertilizer, and so on is prerequisite for high and quality production. However, very little efforts were made to improve commodity varieties by agricultural research institutes particularly on Mung bean. Furthermore, extensive extension service does not exist for Mung bean to enhance its productivity as well as its quality

Also less farmers awareness of improved crop management practices, high cost of harvesting and threshing lack of mechanized mung bean production system, lack of credit, less availability and efficacy of many pesticides available in the market, untimely supply of fertilizers and shortage of capital to buy farm inputs were also remaining constraints explained by farmers as factors that affected production and productivity of mung bean in the study area. As it can be observed from the data, the majority (91%) of the respondents disagreed on availability of the essential inputs for Mung bean production. In other way the interest of farmers in improved varieties; the availability of market for the crop; strong interest of national and international research organizations in the crop improvement; the importance of the crop in export market as strategic crop at regional and national levels are some of the major opportunities available for the crop improvement and expansion of its production in the study area.

3.5.1.4. Lack of proper storage and handling

Post-harvesting activities such as collecting, storage and handling improve the quality of crops. This in turn help farmers to have a substantial bargaining power in the market and for a better market return. The respondents from the interviewed area suggested that 50% of mung bean production lost during post-harvesting activities due to infected by pests on storage and drying stage. So scholars and research institute can do better effort to develop way of solving post-harvesting production loss. Etefa, 2016. For instance, a certain amount of the products are exposed to excessive sun light as well as rain falls. As a result, its quality become deteriorates and may not be preferred by traders

3.5.2. Marketing constraints

The major marketing constraints rose by farmers and traders of the study area were:

3.5.2.1. Lack of legal buying and selling place

According to Ethiopian trade and market agency all crops and other traded material have their own legal buying and selling area in town. However, mung bean marketing system is not given consideration when compare to other crop in the study area. The respondents in the study area said in our area there is no legal buying and selling area in the market. Moreover traders and brokers buy the crop in the village, besides road and so on which lead favorable condition for illegal traders and actors.

3.5.2.2. Unfair pricing and cheating of traders on balance

During post harvesting season they are high production yield on hand of producers which cause shortage of storage facilities in addition to regular market fluctuations that make low price of commodities at harvest time. The farmers in the interviewed area responded that the cost they expend on buying seed, production and post-harvesting activities is high relative to the selling price on market during this season.

3.5.2.3. Interference of brokers

According to the respondents in the study area there is weak linkage between producers and traders so that the trader do not directly communicate with producer to buy the crop with fair price. Furthermore, the experts disclosed that these traders are not formally registered for Mung bean trading. Due to this, traders are irresponsibly bid lower price for producers by weakening their bargaining power. As a result, the brokers and agents were reaping more profit margins from the sales of Mung bean than the producers. It needs to increase the bargaining power of farmers in the market to decrease the opportunity of brokers and agents.

3.5.2.4. Lack of stakeholder's commitment

The respondents mentioned the limitations of stakeholders‟ involvement as below. There is very little support from the government side particularly agricultural sector in providing the necessary inputs, ECX limited participation they still do not accomplish enough work for the betterment of Mung bean producers and traders. The trade office at woreda level has not done enough to bring informal traders in to formal. There is also poor weeding and inferior harvest management techniques. The small scale farmer does not have an insurance mechanism that safeguards its harvest from natural hazards, such as unwanted rain. Due to the above problems farmers supply different quality products to actors involved in mung bean business in the study area.

3.5.2.5. Lack of standard market chain

Traders collect their merchandise from different sources, places and individuals and don't have quality standards. What traders tend to do is to purchase any quantity from anyone offering the same price for whatever quality or offering a lesser price for inferior quality products. After purchasing, the traders then don't pack the products they have collected in accordance with the different grades of quality and standard.. Rather they tend to mix up the good and bad quality grains together and sell it at the price of good quality as the prevailing price doesn't give quality premium. Traders do this for two reasons, one they increase their profit margin and secondly because buyers are unable to check the quality and pay quality price for quality produce.

Despite the considerable constraints listed above, there are many opportunities for the mung bean value chains actors in Delo mena district. The potential marketing opportunities of the area are the buildup of road that connects zone market to different towns in the country which creates potential demand for the products produced in the area. Obviously the increased demand would be followed by better farm price for producers. As a result farmers will have an incentive to expand their output. Furthermore, the increasing export is creating additional demand for agricultural commodities like mung bean. Consequently, this contributes for commercialization of rural economy and creates many off-farm jobs opportunities. Furthermore, provision of infrastructure facilities like telecommunication, power supply and financial institutions (Banks, Micro-Finance) supports the marketing activities in the study area.

3.6. Factors affecting volume of mung bean supplied to market and market outlet choices by using Econometrics Model

3.6.1. Determinants of market Supply

As result indicated from survey of respondents Factors that determine supply of mung bean to the market were: Access to market information, access to extension service, access to credit service, size of land holding, livestock (TLU), farming experience, quantity produced of mung bean, lagged price, educational level of household head, own price of the commodity and age of household head.

3.6.2. Factors affecting mung bean producers market outlet choices

Producers choose their marketing plans and assess outside options that are available before participating in any marketing outlet. The producer's choice of a marketing outlet is based on utility maximization among the existing alternatives. After identifying choices of outlets, they choose where and for who to sell based on comparative advantage in bargaining and accessibility of outlets for farm products. These factors are distance from market place, frequency of extension contact, own price of the commodity, membership to cooperative and ownership of market transport facilities. Robust regression option was used in STATA to analyze and correct heteroscedasticity problem. So the instrumental variables were selected by checking its correlation with the endogenous and exogenous variables.

Quantity produced of mung bean: It is the total amount of mung bean produced in quintals in 2018/19 production season in the study area. It was hypothesized that quantity produced of mung bean affects marketable supply positively. Accordingly the result indicated that quantity of mung bean produced affects market supply positively and significantly at 1% probability level. Positive sign of coefficients indicate that farmers who produce more quantity of mung bean supply increase volume of marketable supply. Ayelech (2011) found that the amount of tomato, papaya, avocado and mango produced by farming households has augmented marketable supply of the commodities significantly. Abraham (2013) also found that the amount produced of tomato, potato and cabbage significantly affects quantity supplied to market positively. Size of landholding: It is a continuous variable refers to the total area of farmland a farmer owned. It is assumed that the larger the total area of the farmland the farmer owns, the larger land is allocated for mung bean and the higher would be the output that influences large quantity of wheat supplied to market. So it is hypothesized that size of land holding positively and significantly at 1% probability level influences volume of mung bean supplied to market.

Accordingly the size of landholding affects quantity of mung bean positively and significantly. As the area of landholding by farmer increased by one hectare, the quantity of mung bean supplied to market would increase by 4.25 quantals. The finding by Alemayehu (2012) also indicated that a unit increase in land allocated for ginger, would give rise to 11.1qt increase in the amount of ginger supplied to market.

Table 10: 2SLS results for factors influencing volume of mung bean supplied to market

Variables	Coefficients	Robust Std.Er	t-value	P>[t]
QP	0.562**	0.421	1.95	0.034
TLU	0.473	0.206	2.05	0.026
EXT	-3.802	6.507	-0.45	0.600
LPR	0.031	0.032	0.79	0.264
MKI	3.89	4.211	0.69	0.426
ACCRE	0.456	2.762	0.26	0.756
TOTAR	3.425**	1.662	2.31	0.027
FS	-0.061*	0.534	-1.65	0.086
EDL	0.129	1.42	0.06	0.823
AHH	-0.193	0.124	-0.82	0.512
DMK	-0.032	0.042	0.68	0.354
SHH	0.886	3.45	-0.29	0.68
Costaant	-21.341	24.60	-0.59	0.256

N= 90 , R^2=0.83,** and *Significant at 1% and 5%

Livestock (TLU): It is a continuous variable measured in tropical livestock unit. It affects quantity of wheat supplied to market positively and significantly. As farmers' livestock ownership increased by one unit the amount of mung bean supplied to market is increased by 0.37 quintal. This is because livestock ownership in highlands of Bale are an important input for mung bean production.

Family size: It is the number of members living household. The variable affects supply of mung bean to market negatively and significantly. The negative effect of the variable shows that as the number of household members increased more part of wheat produce is allocated for household consumption. As the member of household is increased by one, volume of mung bean supplied to market is decreased by 0.05 quintal.

3.6.2. Factors affecting mung bean market outlet choices

Multinomial logistic regression was used to analyze factors affecting choice of mung bean marketing outlets with four alternative categories. If there are a finite number of choices (greater than two), multinomial logit estimation is appropriate to analyze the effect of exogenous variables on choices. The model was tested for the independence of irrelevant alternatives (IIA) assumption based on Hausman test. The possible heteroscedasticity and multicolleaniarity problems are also corrected. The command robust (in STATA) was used to correct for heteroscedasticity. There is no multicolleaniarity problem because the result of VIF is less than 10 for all variables

Producers choose their marketing plans and assess outside options that are available before participating in any marketing outlet. The producer's choice of a marketing outlet is based on utility maximization among the existing alternatives. After identifying choices of outlets, they choose where and for who to sell based on comparative advantage in bargaining and accessibility of outlets for farm products.

The alternative "assembler" was used as a base category. This implies that the discussion of the results focuses on the impact of the explanatory variables on a use of cooperatives, wholesaler and processors category relative to use of assemblers (the base category). The result of MNL and its marginal effect is explained below in Table 11.

Distance from market place: Distance from the closest market place positively and significantly affected accessing processors market outlet as compared with accessing assembler market outlet. It also affected wholesaler market outlet negatively and significantly. The marginal effect indicates that probability of choosing processors increases by 0.02% as compared with accessing assembler market outlet for a unit decrease in kilo meters. The likelihood of accessing wholesaler market outlet decreases by 0.4% for a unit increase in kilo meters from market place.

Table 11: Results of Multinomial Logit and marginal effects for choice of mungbean market outlets

		Robust			Robust	
	Coefficient	Std.err	Z-value	Dy/dx	Std.err	Z-value
Wholesalers						
EXT	0.76*	0.345	2.20	0.221	0.121	1.82
COMB	1.321*	0.645	2.04	0.234	0.282	0.82
LP	0.074**	0.024	3.08	0.027	0.005	5.4
OTR	-0.746	0.643	1.16	-0.282	0.167	1.68
ACC	0.546	1.563	0.349	0.312	0.523	0.59
OFI	-0.065	0.712	-0.09	0.165	0.148	1.11
DMK	-0.186	0.068	-2.73	-0.051	0.024	2.12
FS	-0.056	0.068	-0.82	-0.025	0.032	0.78
Constant	-47.04**	10.234	-4.59			
Cooperatives						
EXT	0.086	0.621	0.13	0.005	0.013	0.38
COMB	-0.089	0.543	0.16	-0.015	0.032	0.46
LP	-0.040*	0.017	2.35	-0.002	0.002	1.0
OTR	-0.846	0.643	1.31	-0.021	0.042	0.5
ACC	1.284	1.043	1.23	0.033	0.029	1.13
OFI	0.576	0.710	0.81	0.007	0.042	0.16
DMK	-0.256*	0.082	-3.12	-0.002	0.003	-0.66
FS	-0.069	0.211	-0.32	-0.002	0.004	-0.5
Constant	21.231	11.684	1.81			

N=90 ,Log pseudo likelihood=58.15,R2=0.56 Chi-square=64.72 ** and * are statically significant at 1% and 5% respectively

Frequency of extension contact: Frequency of extension contact positively and significantly affected accessing wholesales market outlet choices as compared with assembler market outlet choices at 10% probability level. The marginal effect result shows that the likelihood of accessing wholesale market outlet choice increases by 22.1% as compared to assembler market outlet choices for a unit contact of extension services.

Own price of the commodity: It is continuous variable, which was, price given for the commodity with different market outlets per hundred kilograms. Hence, it was hypothesized that price given by market outlets can negatively affect cooperative market outlet choice. Price offered by mung bean market outlet per kilogram significantly and negatively affected accessing cooperative mung bean market outlet as compared with accessing assembler mung bean market outlet. It also affected wholesaler and processor mung bean

market outlets positively and significantly at 1% probability level respectively. The marginal effect result shows that the likelihood of accessing cooperative mung bean market outlet decreases by 0.1% for a birr increase per kg, the likelihood of accessing wholesaler outlet increases by 1.07% for a birr increase per kg. The study by Birhanu (2013) also found out that price offered by milk market outlet per liter of milk significantly and negatively affected accessing cooperative milk market outlet as compared with accessing individual consumer milk market outlet.

Membership to cooperative: It influences positively and significantly wholesaler market outlet as compared to accessing assemblers wheat market outlet. The likelihood of accessing wholesaler market outlet increases by 23.4% for those persons who were member of cooperatives as compared to base category.

Ownership of market transport facilities: This variable affects negatively and significantly accessing processors mung bean market outlet. Ownership of market transport facilities decreased the likelihood of choosing processors market outlet by 0.03% compared to accessing assemblers' market outlet.

3.6.3. Factors affecting decision of participation in value addition

Probit model was used for estimation of factors affecting the probabilities of the farmer households to add values to mungbean are given in Table 7. The Table also contains the values of marginal effects which are evaluated at the means of all other independent variables. Marginal effects indicate the effects of one unit change in an exogenous variable on the probability that an operator adds value to his product. Pseudo R2 indicated that the independent variables included in the probit regression explain significant proportion of the variations in the mung bean producer farmers' likelihood to add values to mung bean. The probit model explains 52.8% of the variations in the likelihood of mung bean producer farmers to add values to their product.

Table 12: Probit result for factors influencing value addition

Variables	Coefficients	Std. Error	Marginal effect (dy/dx)	P>|z|
MKI	2.123**	0.543	0.213	0.002
EXT	1.242**	0.652	0.312	0.028
FEP	0.032	0.026	0.100	0.793
AMB	0.053	0.322	0.003	0.678
FS	-1.209	0.85	-0.021	0.214
EDLH	-0.024	0.078	-0.008	0.572
DMK	-0.087**	0.065	-0.004	0.077
ACC	0.782**	0.545	0.003	0.047
QP	-0.064**	0.024	-0.080	0.005
Constant	3.348**	1.732		0.020

N=90 , R2=0.49 LR Chi2 =78.23, **,* are statistically significant at 1% and 5% respectively

Quantity of mung bean produced: Amount of mung bean produced in quintals by farmers affects decision of value addition negatively and statistically significant at 1% significance level. As yield of wheat increase by one quintal the probability of farmers to add value decreased by 9%. This could be attributed to the fact that farmers who produce larger amount of mung bean get better income from the bulk sale of the product. Farmers who produced smaller amount of quintals adds value to get better price from the smaller amount produced.

Distance from market place: distance to the nearest urban center is statistically significant and negatively associated with farmer's likelihood to add values to mung bean produce. This indicates that as farmer's distance from the nearest urban center increases by a km, farmer's likelihood to add values to mung bean produce decreased by 0.4%. The reason behind this is that famers nearest to market sale most their wheat grain to processors. This could be attributed to the reality that wheat processors need quality product compared to other actors involved in mung bean marketing system in the study area.

Access to credit: Access to credit positively and significantly affected the probability of farmer's to participate in value addition to mung bean produce. The result indicated that farmers access to credit services increase the probability of adding values to mung bean produce by 0.3%. This may be due to the fact that most part of value addition by farmers are conducted during financial shortage times that requires money. Because of this, farmers who can get credit can participate in value addition of mung bean

Access to market information: Access to market information statistically significant and positively associated to value additions. The marginal effect shows that access to market information increase the probability of adding values to mung bean produce by 21.3%.

Access to extension services: Access to extension services positively and significantly affected decision to value addition of mung bean produce. The marginal effect indicated that access to market services increase the probability of adding values to mung bean produce by 31.2%.

4. SUMMARY AND RECOMMENDATION

4.1. Summary and Conclusion

This study was conducted in Delo mena district of Bale zone in Oromia region. The main focus of this study was analyzing mung bean market value chain. The specific objectives of the study include analyzing the market performance of mung bean in the study area; identifying the determinants of mung bean supply to the market in the study area; Identifying factors affecting marketing mung bean outlet choice decisions of mung bean producers; and to determine factors affecting mung bean value addition at different stages of the marketing chain.

Primary data were collected from 90 sample mung bean farmers drawn from three kebeles in Delo mena district, 20 wholesalers were interviewed using structured questionnaire. Additionally Secondary data which assisted this study were collected from woreda agriculture office, bureau of development and trade, each kebele offices and from published and unpublished materials. The data were analyzed using descriptive statistics tools by employing.

Out of the respondents, 88.3% and 11.7% were male and female household heads respectively. The minimum and maximum ages of the respondents were 30 and 70 years respectively with mean age of 39.5 years. The average family size in the study area was 6.3. The minimum and maximum sizes of landholding of the respondent farmers were 0.5 and 6.0 hectare respectively with mean landholding of 3.25 hectares. Respondents allocated most of their plots for mung bean plantation which was 1.5 hectares on average out of total holding.

The most important services that are expected to promote production and marketing of mung bean in the study area include access to credit, access to extension service, and access to market information. Mung bean producer farmer's market major sources of information were traders, friends/neighbor farmers, radio and television which is 35.55%, 26.66%, 20.0 and 17.77% respectively. The result also showed that 89.2% of the respondents have access to credit. Extension service in agriculture is indispensable and it provides assistance for farmers in improvement of production and productivity, it also enables flow of information and transfer of knowledge and scientific findings to practice. Out of the interviewed farmers, 83.6% have access to extension services delivered by different stakeholders in the study area.

Inputs used by farmers of the study area are fertilizer, seed, herbicides and pesticides. These inputs are supplied to farmers either by cooperative/unions and private traders. The survey result indicated that all sample respondents applied DAP (Di Ammonium Sulphate) and only 62.5% of them used UREA fertilizer on their mung bean field. The rate of application was 96.81 and 43.65kg's on average for DAP and UREA respectively

On average a farmer household produces 67.5qt and 7.8qt of wheat in Bona and Ganna season respectively. The average productivity of the crop was 27.4qt/ha and 24.8qt/ha in Bona and Ganna season respectively.

The main mung bean value chain actors in the area are input suppliers, farmers/producers, assemblers (collectors), wholesalers and commission agents.

Factors affecting mung bean production and volume supplied to market were also analyzed using econometric model. Out of thirteen variables included for affecting mung bean production total livestock owned (in TLU), farmers experience in mung bean production, total farmland owned by farmers positively and significantly affect mung bean production. Amount of fertilizer applied to mung bean per hectare of mung bean farm negatively and significantly affected mung bean production. Quantity produced of mung bean, size of landholding, livestock ownership positively and significantly affected volume of mung bean supplied to market. Family size affected volume of mung bean supplied to market negatively and significantly.

4.2. Recommendation

Recommendations (policy implications) those are relevant to improve mung bean marketing system in the study area which will indicate production and market orientation were set based on the significant variables and raised problems by the value chain actors.

To improve the production and productivity of mung bean in the study area resolving the prevailing production problems deems a necessary condition. Among these increasing farmers' awareness on the importance of integrated crop management packages for increased productivity and sustainable production is one of them. Additionally it is important to develop high yielding varieties that combine durable resistance because Bale highlands are mostly susceptible to rust races that immediately breaks resistance of mung bean varieties and lead to complete loss of harvest. In order to strengthen farmer's production potential, making available credit to farmers for input purchase also needs attention.

To solve shortage of improved varieties seed, improving farmers' knowledge in quality seed production through training is important. Improving knowledge of farmers on production of quality seed by themselves will solve shortage problem and save expenditures incurred by farmers. In addition farmers also reported

the existence of weed problem in the study area influences production and productivity of the crop. In order to avoid the effects of weed in Bale lowlands promoting importance of crop rotation through training and strengthening the present crop protection services through availing important chemicals are solution.

Market information dissemination is an important issue for producers to help them decide on marketing their products. So it is important to disseminate market information to all the mung bean value chain actors throughout the year. In addition to print and electronic media, district trade and industry office could extend this information in collaboration with agricultural extension agents.

The enhancement of mung bean producers' bargaining power through cooperatives is the best measure that should target increasing farmer's share of benefit from his marketable produce. Creating access to flexible credit system for traders is also a necessary condition which targets at reducing the market shortage. Strengthening horizontal and vertical linkages of the mung bean value chain actors in the study area is also an important input that improves the marketing system of the crop in the study area.

In order to enhance volume of mung bean supplied to market increasing surplus production through promotion of appropriate input technologies such as seed of improved varieties, recommended fertilizer rates, pesticides and other appropriate agronomic recommendations can improve production and productivity of mung bean in the study area.

The likelihood to choose wholesalers market outlet was influenced by frequency of extension contact, own price of the commodity given by the outlet and membership to cooperative as compared to accessing assemblers mung bean market outlet. Therefore strengthening the extension system to boost surplus production and supporting cooperative membership to increase farmers bargaining powers are important issues to be considered. The likelihood of accessing wholesaler's market outlet is also significantly influenced by distance from the nearest market place. Improving road infrastructures can improve the delivery of mung bean to wholesaler's market outlet because mostly wholesalers are found at market places rather than in villages.

Access to credit significantly affected farmer's decision to participate in value addition. Smallholder farmers are not a homogenous group; they differ in their resources and capabilities. The household economic portfolio provides a link between smallholders' resource levels and their abilities to respond to value addition opportunities. They may be unable to invest in agricultural upgrading due to shortages of working capital and lack of liquidity for longer term upgrading investments. Therefore, it is important to create credit access and simplify way of provision for farmers because it will help farmers to participate in value addition activities which will increase their income.

Access to market information affects decision of participation in value addition of mung bean. This shows that farmers are willing to participate in value addition if higher value markets for value added agricultural produce information is readily available. Therefore, facilitating and improving the quality and types of market information delivery used by farmers shall take policy attention.

Access to extension services affects the probability of participating in value addition in agriculture is indispensable and it offers more than just expert assistance in improvement of production and processing, it also enables flow of information and transfer of knowledge and scientific findings to practice that will help

farmers in production of value added products. Therefore, strengthening agricultural extension services should be considered as important input for producing value added products.

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