

# Analysis of Potato Seed Tuber Value Chain: Implication for Private Sector Development: The Case of Small Scale Farmers in Jeldu District of West Shewa Zone, Oromia, Ethiopia

Getachew Biru\*

Agricultural Socio-economic Researcher Bako Agricultural Research Centre, Bako, Ethiopia

Jemma Haji

Associated Professor, Haramaya University, Haramaya, Ethiopia

## Abstract

The study presents value chain analysis of potato seed tuber based on the data generated from 120 randomly selected farm households, 15 traders and 20 consumers. The analysis was made using descriptive statistics and value chain framework approaches. The value chain analysis revealed that the major actors in the district are input suppliers, producers, cooperatives, collectors and wholesalers. Accordingly, the value chain functions performed by major actors in the study area during the survey period are input supply, production, marketing and consumption. The study shows that the value chain is governed by wholesalers who have high percent share of profit from the produce and capital advantage over the other major chain actors. Therefore, the study confirmed that farmers are forced to capture a lower share of profit margin compared with collectors and wholesalers. Potato seed tuber produced in the study area passes through intermediaries, i.e. cooperatives, collectors/assemblers and wholesalers with little value being added before reaching the end-users. The intermediate buyers (collectors and wholesalers) obtain the potato seed tuber from the small scale farmers at a lower price and sell to the consumers at a higher price and they handle less volume of the product but they get more share of the profit from potato seed tuber. The percentage of the share of profit from potato seed tuber for a quintal of potato seed tuber was 30.0, 3.96, 30.35 and 35.62 for small scale farmers primary producers' cooperatives, collectors and wholesalers respectively. From the finding of the study policies intended to increase small scale farmers and their cooperatives' bargaining power to increase their profit share from their produce are recommended.

**Keywords:** value chain, value chain actors and value chain governance.

## Introduction

The development of Ethiopian economy is heavily dependent upon the speed with which agricultural growth is achieved. This is because agriculture is the basis of the country's economy and this economy is highly influenced by the performance of the agricultural sector. The rate of agricultural growth in the country in turn depends on the speed with which the current subsistence oriented production system is transformed into a market orientated production system (Berhanu *et al.*, 2006).

Cognizant of the fact that agriculture is found to be the starting point for initiating the structural transformation of the economy, the current Agricultural Development Led Industrialization policy (ADLI) of the government emphasizes on modernizing smallholder agriculture and intensifying yield productivity through the supply of appropriate technology, certified seeds, fertilizers, rural credit facilities and technical assistance generally full package technology. Inauguration of a nationwide agricultural extension program, transmission of laws that liberalized procurement and distribution of inputs (fertilizers and certified seeds), and efforts to increase and avail rural credit facilities for farmers were some components of this policy to enhance production and productivity and value chain of agricultural sector economy of the country (FSS, 2002).

To materialize and help the success of these developmental activities of the government different bodies have been participating and contributing their own part. Among those different bodies, research institutes and development organizations deals with root crops, in which potato is one to enhance livelihood of the community in the potato producing areas of the country.

The Ministry of Agriculture and Rural Development (MOARD) of the country through its various agencies and departments is the primary government body responsible for directing, structuring and regulating the agricultural sector at federal level in Ethiopia. At the level of regional governments, the Bureau of Agriculture and Rural Development, in each region, is responsible to direct and support the sector. Furthermore, the Ethiopia Institute of Agricultural Research (EIAR) is the national body responsible for coordinating agricultural research in Ethiopia. This institute and regional research institutes have responsibility of providing improved agricultural technologies that would enhance productivity and quality of crops, livestock, forestry and natural resources. Almost all universities are providing tertiary level and postgraduate training in agriculture and related disciplines; while agricultural technical and vocational colleges are providing diploma level training

courses in federal and in each regional state for those who help farmers at PA level (Abebe, 2008; IFPRI, 2010).

According to Girma *et al.*, (2006), potato production in potato producing areas of Oromia is preferable compared to other food crop because of its contribution to food security, income generation, double cropping advantages, it's comparative advantage in terms of high yield per unit area and ease of utilization of potato. It is mainly produced to overcome the transitory food shortage that happens during rainy season. Therefore, it serves as food and source of income to farmers especially during hunger months when grains deplete from store.

As the base of production for majority of crops, seed is probably the most important input in all crop based farming systems determining the upper limit on yield and on the ultimate productivity of all other inputs (Abdissa *et al.*, 2001). Therefore, the potential values of new potato seed tuber cultivars can be realized only if they access and sustain its production.

Therefore, to enhance production of potato seed tuber of smallholder farmers in the study area as of current supply to consider local and distance growing demand of the seed in the country, development programs and approaches which bring all potato seed tuber actors together is fundamental to improve quality and strengthen linkages among them. Fore and backward linkages among actors along value chain will be required to bring fruitful result for the system as a whole. Therefore, this paper is intended to present constraints and opportunities in the value chain of potato seed tuber in Jeldu district of West Shawa Zone.

### **Statement of the Problem**

The success of agricultural development depends, among other institutions, on the existence of an efficient production, marketing, input supply system and coordination and cooperation among these stakeholders, that is, coordinated value chain is needed. When the input supply for agricultural production is absent or low, the productivity will be decreased. At the same time if the production and marketing system is inefficient, high production and marketing costs will render products uncompetitive.

Jeldu, which is the study area, has been experiencing the above all mentioned problems which may starts from input supply to the final consumption of potato seed tuber. As an example, Jeldu farmers who have been producing potato seed tuber faced critical market linkage problem. According to LSB, (2010) those farmers who faced critical market linkage have organized themselves under cooperatives to market their produce through coordinated way. The project highlighted that unbalanced buyers and seed supply, little or no seed promotion, and insufficient understanding of the cooperative members of market mechanisms were reasons of insufficient marketing system. As could be understood from the shallow and lack of holistic approach of the report of the project, it needs further investigation to identify problems prevailed in the value chain of potato seed tuber. Besides for mentioned problems, constraints and opportunities for potato seed tuber production and marketing are not fully exploited yet in value chain framework approach in the study area. In response of this fact, this study was undertaken to narrow the research gap that has been observed in potato value chain analysis in Jeldu district.

Therefore, this paper was aimed to identify potato seed tuber marketing channels and to explore the value additions of the different actors along the value chain of potato seed tuber in Jeldu district of west shawa. As a result, framers, traders, consumers and all the value chain participants were provided with all information within the value chain they were encouraged in. It was also to give information for policymakers to know constraints and opportunities for further development activities and improvement of the policy intervention to enhance production and productivity of potato seed tuber.

### **Description of the Study Areas**

The study was undertaken in central highland of Oromia regional state Ethiopian, where potato seed tuber has been among the cash crop. Jeldu district, which is located at 72km to the east of Ambo (Zonal town) and 115 Km west of Addis Ababa, was the target district for this study. The district is characterized by its mountain, plateau, and hills and has three types of soil type such as nitosol, veritisol and sandysol. According to the data from Agricultural Development Office, the elevation of the district on average is 2800m and gets rainfall of the highest and the lowest 2000mm and 900mm annually respectively. The district comprises mixed farming zones where crops are grown for food and cash, and livestock are kept for complementary purpose, as a means of security during food shortage, and to meet farmers' cash needs. The dominant crops grown in the district are ware potato, potato seed tuber, wheat, barley, teff, sorghum, maize, field beans, peas, chickpeas, and potato, sweet potato, onion, garlic, enset etc.

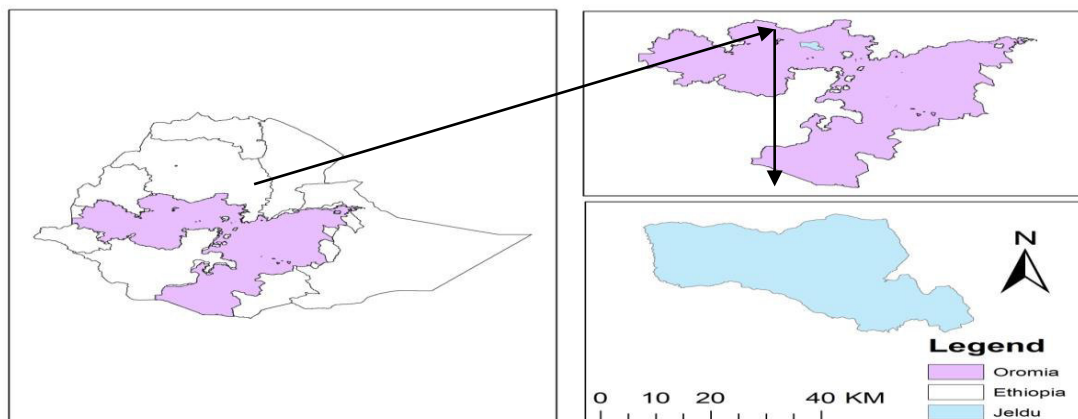


Figure 1. Geographical location of the study area

### Types, Sources and Methods of Data Collection

The study used different information collected on different variables such as data on potato seed tuber production, potato seed tuber marketed, prices of potato seed tuber supplied, and distance to district market, distance to all weather roads, age of the household head, extension service, educational status of the household head, family size, access to market information, credit facility, and type of sellers and buyers and etc. These data were collected to calculate market margins and different market metrics.

### Sampling Techniques

For this study, in order to select a representative sample that should represent the population and meet the objective of the study a multi-stage sampling technique was implemented. In the first stage, with the consultation of the district agricultural experts, development agents and local seed business project in Jeldu, out of 38 PAs 4 highland representative PAs in which the major two inclusive primary producers' cooperative on potato seed tuber production and marketing were selected purposively. In the second stage, from purposively identified or selected 4 PAs, small scale farm households producing potato seed tuber were stratified into participants of primary producers' cooperative and non-participants of primary producers' of potato seed tuber. In the third stage, from the identified or selected 4 PAs and stratified farmers 48, 28, 27 and 17 sample farmers were selected each randomly using probability proportionality to size from those PAs. The following table shows sample size of different categories of small scale farm households.

Table1. Sample size of cooperative and non-cooperative members of farm households

Name of selected PAs	Total number of producers	Sample household	Cooperative	Non-cooperative
Edensa Galan	200	48	28	20
Sariiti	120	28	17	11
Cilanqo	115	27	16	11
Koolu Galan	70	17	10	7
Total	505	120	71	49

Source: Own computation from BoARD and PAs administration data

### Methods of Data Analysis

As products move successively through the various stages, transactions take place between chain actors, money and information are exchanged and value was progressively added. The analysis of potato seed tuber value chains highlights the need for enterprise business development, enhancement of product quality, and quantitative measurement of value addition along the chain, promotion of coordinated linkages among producers and improvement of the competitive position of individual enterprises in the marketplace. Moreover, individual enterprises may feed into numerous chains; hence, which chain (or chains) was/were targeted depends largely on the point of entry for the research inquiries (Kaplinsky and Morris, 2001). The following four steps of value chain analysis were applied to this study:

1. Mapping the value chain to understand the characteristics of the chain actors and the relationships among them, including the study of all actors in the chain in the study area, and the flow of potato seed tuber through the chain. This information was obtained from conducted surveys and interviews as well as by collected secondary data from various sources.
2. Identifying the distribution of actors' benefits in the chain. This involves analyzing the margins and profits within the chain and therefore determined who benefits from participating in the chain and who would need

support to improve performance and gains.

3. Defining upgrading needed within the chain. Therefore, profitability was assessed within the chain and chain constraints were identified, upgrading solutions were defined.

4. Emphasizing the governance role was considered. Within the concept of value chain, governance was defined for the structure of relationships and coordination mechanisms that exist among chain actors. By focusing on governance, the analysis identified actors that may require support to improve capabilities in the value chain, increase value added in the sector and correct distributional distortions.

Following the above procedure, the main aspects of potato seed tuber value chain analysis was done by applying some quantitative and qualitative analysis. First, an initial map was drawn which depicts the structure and flow of the chain in logical clusters. This exercise was carried out in qualitative and quantitative terms through graphs presenting the various actors of the chain, their linkages and all operations of the chain from pre-production (supply of inputs) to consumption. After having developed the general conceptual map of the value chain, the next step is analyzing the chain's economic performance and benefit share of actors.

### Potato seed tuber value chain performance Analysis

Estimates of the marketing margins are the best tools to analyze performance of market. Marketing margin was calculated by taking the difference between producers and retail prices. The producers' share is the commonly employed ratio calculated mathematically as, the ratio of producers' price to consumers' price. Mathematically, producers' share can be expressed as:

$$PS = \frac{P_p}{C_p} = 1 - \frac{MM}{C_p}$$

Where: **PS** = Producer's share

**P<sub>p</sub>** = Producer's price

**C<sub>p</sub>** = Consumer price

**MM** = marketing margin

The above equation tells us that a higher marketing margin, diminishes producers share and vice versa. It also provides an indication of welfare distribution among production and marketing agents.

Calculating the total marketing margin was done by using the following formula. Computing the Total Gross Marketing Margin (TGMM) is always related to the final price paid by the end buyer and is expressed as a percentage (Mendoza, 1995)

$$TGMM = \frac{\text{consumer price} - \text{producer price}}{\text{consumer price}} \times 100$$

Where, **TGMM** = Total gross marketing margin.

Net Marketing Margin (**NMM**) is the percentage over the final price earned by the intermediary as his net income once his marketing costs are deducted. The equation tells us that a higher marketing margin diminishes the producer's share and vice-versa. It also provides an indication of welfare distribution among production and marketing agents.

$$NMM = \frac{\text{Gross Marketing Margin} - \text{Marketing Cost}}{\text{consumer price}} \times 100$$

From this measure, the allocate efficiency of the market was measured. Higher **NMM** or profit of the marketing intermediaries reflects reduced downward and unfair income distribution, which depresses market participation of smallholders farmers. An efficient marketing system is where the net margin is near to reasonable profit.

To find the benefit share of each actor the same concept was applied with some adjustments. In analyzing margins, first the Total Gross Marketing Margin (TGMM) was calculated. This is the difference between producer's (farmer's) price and consumer's price (price paid by final consumer) i.e.

**TGMM** = Consumer's price - Farmer's price

Then, marketing margin at a given stage 'i' (**GMM<sub>i</sub>**) was computed as:

$$GMM_i = \frac{SP_i - PP_i}{TGMM} \times 100$$

Where, **SP<sub>i</sub>** is selling price at i<sup>th</sup> link and **PP<sub>i</sub>** is purchase price at i<sup>th</sup> link.

Total gross profit margin also computed as:

$$TGPM = TGMM - TOE$$

Where, **TGPM** is total gross profit margin, **TGMM** is total gross marketing margin and **TOE** is total operating expense.

Similarly concept of profit margin that deducts operating expense from marketing margin was done as follows:

Then profit margin at stage "i" is given as:

$$GPM_i = \frac{GMM_i - OE_i}{TGPM} \times 100$$

Where, **GPM<sub>i</sub>** = Gross profit margin at i<sup>th</sup> link

**GMM<sub>i</sub>** = Gross marketing margin at i<sup>th</sup> link

$OE_i$  = Operating expense at ith link  
 $TGPM$  = Total gross profit margin

## Results

### Distribution of sample farm households by their age, family age groups and their farm character

Age of the household head of sample respondents ranged from 18 to 70 years with mean of 37.13 years and standard deviation of 10.17. The average ages of cooperative member and non-member was found to be 37.48 and 36.61 years with the standard deviations of 9.32 and 11.36, respectively. The mean difference, i.e., 0.46 was found to be statistically insignificant among cooperative members and non-members (Table 1).

The man equivalent (ME) of the economically active family labor (16-64 years) was calculated for the sample respondents based on Bekele, (2001) as depicted under Appendix table 1. The average number of economically active labor force for cooperative member and non-members were 3.22 and 2.94, with standard deviations of 1.56 and 1.99, respectively and that of the total sample was 3.12 with a standard deviation of 1.75. The size of labor force in the household is expected priori to contribute for productivity of potato tuber seed. However, in this study significant difference was not observed with regard to the size of labor force between cooperative member and non-members (Table 1).

Family size of the sample respondents ranged from only one (single farmer) up to 14 persons, with an average family size of 6.58 and a standard deviation of 2.70. The average family size in the sample was higher than the average family size of the district which was 6.06 (CSA, 2008). The average family size of the cooperative members and non-members was 7.15 and 5.73, with standard deviations of 2.63 and 2.56, respectively and with mean difference of 2.92 that was found to be statistically significant at 1% (Table 1).

The respondents' average experience in potato seed tuber production for market was 4.38 years with standard deviation of 2.34. Furthermore, the average farming experience of cooperative was 5.05 years with standard deviation of 2.51, while for the non-members was 3.36 with standard deviation of 1.63. The mean difference, 4.09, in farming experience was statistically tested and it was found to be significant between cooperative members and non members at 1% (Table 1).

When we look at the distribution of means of years of schooling, the total average educational level was 5.90 years of schooling with standard deviation of 3.48. The mean educational level of cooperative member was 6.10 years and that of non members was 5.61 years with 3.42 and 3.58 standard deviations respectively. The study hypothesized those farmers who had higher education level show keenness to grasp new ideas and to try to be a member and exploit the market advantage through membership. This could explain the variation with regard to membership decision of cooperative. But, in this study it was found that there exists insignificant difference between cooperative members and non members in relation to education level.

Table1. Sample respondents' age, family age groups and size, labor availability, farm experience on potato seed tuber and years of schooling

Variables	Cooperative members		Non-members		T- value	Total sample	
	Mean	Std. Dev.	Mean	Std. Dev.		Mean	Std. Dev.
AGH ( in years)	37.48	9.32	36.61	11.36	0.46	37.13	10.17
0 – 10	2.99	1.33	2.23	0.86	3.35	2.69	1.22
11 – 15	1.83	.89	2.00	1.10	0.70	1.89	0.97
16 – 60	3.48	1.69	3.27	2.11	0.60	3.40	1.87
ME (active labor)	3.22	1.56	2.94	1.99	0.86	3.12	1.75
>60	1	0	1.2	0.44	1.11	1.10	0.30
FS	7.15	2.63	5.73	2.56	2.92***	6.58	2.70
FEX ( in years)	5.05	2.51	3.36	1.63	4.09***	4.38	2.34
YS ( in years)	6.10	3.42	5.61	3.57	0.77	5.9	3.48

Source: own survey result, \*\*\*, \*significant at 1% and 10%, FS = family size, FEX = Farm experience in potato seed tuber, YS = Year of schooling

### Distribution of sample farm households heads by sex and educational status

Sample households were composed of both male and female household heads. It was found that among the total sample household heads 95.8% were male and the remaining 4.2% were female. The proportion of male-headed households was 97.1 % for cooperative members and 93.9% for non-members. The result revealed that the percent of male-headed households of cooperative members and non members were higher than that of female-headed households. This could be attributed to various reasons, which could be the problem of economic position of female headed households, including shortage of labor, limited access to information and required inputs due to social position, etc. (Table 2). The chi-square test of sex distribution between the two groups was run and the difference was found to be insignificant ( $\chi^2=0.79$ ).

The distribution of total sample respondents in terms of literacy level has shown that 14.2% were illiterate, 40% had attended formal education from grade 1 to 6, 37.5% had attended formal education from grade 7 to 10, 8.3% had attended from grade 11 and above (Table 2).

Table 2. Distribution of sample respondents by sex and education status

Education level	Cooperative members		Non members		Total sample		$\chi^2$ -Value
	N	%	N	%	N	%	
Illiterate	8	6.7	9	7.5	17	14.2	0.35
From 1 – 6	30	25	18	15	48	40	
7 – 10	25	20.8	20	16.7	45	37.5	
11 and above	8	6.7	2	1.7	10	8.3	
Sex							0.79
Male	69	97.1	46	93.9	115	95.8	
Female	2	2.9	3	6.1	5	4.2	

Source: own survey result, 2011,

### Major production constraints of potato tuber seed

There have been different factors that hamper the production of potato seed tuber crops in Jaldu. According to the sample respondents, weak extension support service, limited land holding, seasonal labor shortage, disease and pest, absence of market that absorb produced potato seed tuber, chemical ineffectiveness, oxen shortage, input supply delay and continuous increases of input price were the production side constraints that discourage farmers. The statistical significance test revealed that sample respondents from cooperative members and nonmembers have no significant difference on these constraints. The survey result also confirmed that the above mentioned production constraints were problem of more than 95% of the sample respondents except for oxen shortage which was a problem of 80.83% of sample respondents (Table 3).

Table 1. Distribution of respondents by constraints of potato tuber seed production

Production constraints	Cooperative members		Non members		Total sample		$\chi^2$ - Value
	N	%	N	%	N	%	
Land scarcity	69	57.50	47	39.17	116	96.67	0.14
Labor shortage	67	55.83	48	40.00	115	95.83	0.94
Diseases and pest	71	59.17	49	40.83	120	100	1.46
Input supply delay	71	59.17	48	40.00	119	99.17	
Chemical ineffectiveness	71	59.17	48	40.00	119	99.17	1.46
Increases in input price	71	59.17	49	40.83	120	100	1.46
Weak extension service	71	59.17	48	40.00	119	99.17	
No market that attract production	71	59.17	48	40.00	120	100	0.58
Oxen shortage	59	49.17	38	31.67	97	80.83	

Source: own survey result

Different literature discusses constraints of production categories into different categories. According to Emanu, (2007), the constraints of potato seed tuber production identified above in the study area could be viewed from institutional factors, natural, farmers related and infrastructure related factors.

**1. Institutional factors:** in the case of this study institutional factors are related to the provision of improved potato seed tuber technologies which includes relevant varieties, agronomic practices and improved product management techniques, supply of inputs such as fertilizer and pesticides. The study revealed that farmers faced problems of delay in supply of fertilizer, continuous increases in fertilizer price as opposed to their product price, poor extension service, no market for their product and chemical in-effectiveness. According to the survey result, farmers in Jeldu district had reported that they have good access to new varieties of potato seed tuber from Holota Agricultural Research Center. Therefore, these farmers have the capacity to distinguish between varieties even by simple observation. Research based practical recommendations on agronomic practices and pre and post harvest management were given for farmers who were selected and work with Holota Agricultural Research Center but these who have no contact with this research center have no such type of extension services from any organization.

**2. Natural factors:** such as rain fall, flood, unexpected diseases and pest devastation and other natural phenomenon are beyond the control of farmers and institutions. According to the survey result farmers in Jeldu district had suffered due to unexpected pest and disease devastations. To avoid such devastation of disease, they had faced chemical ineffectiveness, though; these chemicals were bought from market by high price.

**3. Infrastructure:** such as irrigation scheme development, rural road and means of communication for efficient production enhancement, flow of goods and market information are limiting factors. Even though, the production

of potato seed tuber in the study area was based on rain fed, if irrigation could be developed to produce it at least two times a year production will be enhanced.

**4. Farmers related:** potato seed tuber production in the study area was based on tradition, which is poorly supported by scientific recommendations. This situation was previewed on households who have no enough agricultural extension service. This was because inadequate farmer skills and knowledge of production and product management affects the production.

**Major marketing constraints of potato tuber seed**

Unfair price prevailing in the study area especially during harvest time, lack of marketing information regarding potato seed tuber; most of the time distant marketing information hold-up by traders, insufficient infrastructure, mostly road absence and the distance from farm household to the main market were identified major marketing constraints. Accordingly, the statistical test was undertaken and the result shows that statistical significance among cooperative members and nonmembers was only observed on distance from farm household to main market at 10% (Table, 4)

Table 2. Distribution of respondents on market constraints of potato seed tuber

Marketing constraints reported	Cooperative members		Non-members		Total		X <sup>2</sup> -Value
	N	%	N	%	N	%	
Distance from main market							
Yes	24	20	9	7.5	33	27.5	3.45*
No	47	39.2	40	33.3	87	72.5	
Infrastructure absence							
Yes	23	19.2	10	8.3	33	27.5	2.08
No	40	40	39	32.5	87	72.5	

Source: own survey result, \* significant at 10%

**Value chain map of potato seed tuber in Jeldu District**

According to McCormick and Schmitz, (2002) and Raphael Kaplinsky and Mike Morris, (2000) value chain mapping enables to visualize the flow of the product from conception to end consumer through various actors. It also helps to identify different actors involved in the value chain, and to understand their roles and linkages. Accordingly, the value chain map of potato seed tuber in Jeldu district during the study time can be depicted in Figure 2.

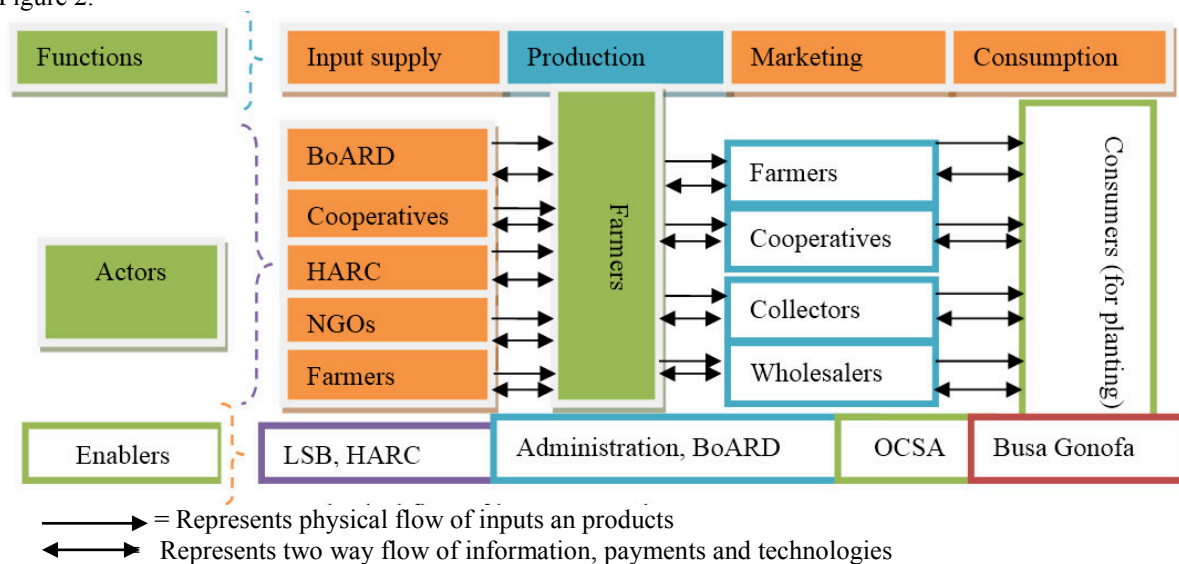


Figure 2. Value chain map of potato seed tuber,

Source: Own sketch from survey result

**Actors, their role and value additions in potato seed tuber value chain**

The value chain map highlighted the involvement of diverse actors who are participated directly or indirectly in the value chain. According to KIT *et al.*, (2006) the direct actors are those involved in commercial activities in the chain (input suppliers, producers, traders, consumers) and indirect actors are those that provide financial or non-financial support services, such as credit agencies, business service providers, government, NGOs, cooperatives, researchers and extension agents.

### **Primary actors**

The primary actors in potato seed tuber value chain in Jeldu district were seed and other input suppliers, producer farmers, traders and consumers. Each of these actors adds value in the process of changing product title, time of delivery and etc. Some functions or roles are performed by more than one actor, and some actors perform more than one role.

### **Input Suppliers**

At this stage of the value chain, there are many actors who are involved directly or indirectly in agricultural input supply in the study area. Currently, Holeta Agricultural Research Center (HARC), bureau of agriculture and rural development (BoARD), primary cooperatives/ union and private input suppliers are the main source of input supplier. Potato seed tuber producer farmers are also participated in this stage especially for potato seed tuber supply for those who need the material to plant. All such actors are responsible to supply agricultural inputs like improved seed varieties, fertilizers, herbicides, pesticides and farm implements which are essential inputs at the production stage. For major potato seed tuber produced in Jeldu district, the majority of the sample producers get from local farmers and HARC. HARC is the primary supplier of potato seed tuber through its demonstration and scaling-up and scaling-out works. Regarding fertilizers, all farmers used only inorganic fertilizer for potato seed tuber production while their source was BoARD.

### **Producers**

Potato seed producers are the major actors who perform most of the value chain functions right from farm inputs preparation on their farms or procurement of the inputs from other sources to post harvest handling and marketing. The major value chain functions that potato seed producers perform include ploughing, planting, fertilization, digging, and weeding, harvesting, and postharvest handling.

Postharvest handling, which includes different activities like sorting, storing, transportation, loading and unloading, is done by the farmers themselves or traders. If potato seed tubers are sold at the farm gate, activities like transportation, loading and unloading are performed by the buyer. For postharvest handling, most farmers in the study area use sacks, underground storage, and ground floor of their residential house and use DLS (diffused light store) which is low cost storage structure. According to Girma *et al.*, (2006) this structure would provide to store potato seed tubers for 8 months safely with very less damage. The structure can be constructed from locally available materials.

There are high losses during storage due to improper handling and weight loss of potato seed tuber in the study area. The result of the sample farmers' survey shows that 16.84%, 13.06% and 15.3% of potato seed tuber per quintal damaged/lost from cooperative members, non-cooperative members and total surveyed farm households respectively before it reach market. The survey result also shows that farmers of potato seed tuber in Jeldu district practices storing their product this was why high loss registered.

The value adding activities like sorting (cleaning) out the damaged and deteriorated once, adjusting the storage to sun light, storing, transporting, loading and unloading were undertaken by producer farmers. Most post harvesting handling, which includes decreasing losses during storage time by shifting the place of storage and decreasing losses during harvesting were undertaken by producer farmers. By doing the above mentioned activities producer farmers add the time value, standardize by cleaning and sorting and add place value by transporting potato seed tuber to the market mostly cooperative.

### **Cooperatives**

The issue of marketing is challenging in the study area because of unbalanced buyers and seed supply, little or no seed promotion, and insufficient understanding of the market mechanisms LSB, (2010). The production of potato seed tuber was mainly not demand driven but it was based on producers market supply push. This scenario makes the marketing of potato seed tuber challenging in the study area. To overcome the marketing problem of potato seed tuber, farmers of Jeldu district were organized under the above mentioned two main primary producers' cooperatives. Consequently, the cooperatives are struggling to overcome the problem and designed their own marketing strategies. They have divided their members into zones; each zone consists of proportional members. The zone groups have made an agreement to sell their seed turn by turn but all zones have the same stamp for each of the cooperatives. These two cooperatives have the licence of potato seed tuber production and marketing. The survey result shows that majority (68.12%) of the potato seed tuber produced and marketed were handled by cooperatives (Figure 3).

The two primary producers' cooperatives identified in the study area were practicing storing, sorting (cleaning) out the damaged and deteriorated once and certifying potato seed tuber they receive from their members. Those primary producers' cooperatives receive and certify Jalanne and Gudanne variety of potato seed tuber. The cooperatives add value to potato seed tuber by storing in their own storage structure called DLS (diffused light structure), certifying and cleaning. The sorting (cleaning) out the damaged and deteriorated once



were undertaken once in a month to keep the purity of the seed.

### **Collectors**

These are farmer traders in the study area who collect potato seed tuber from farmers in village markets and from farms of the farmers for the purpose of reselling it to wholesalers and consumers. They use their financial resources and their local knowledge to buy potato seed tuber from the surrounding area. They play important role in the non-cooperative members village of farmers and they do know areas of surplus well and where to sell in the district. Collectors are the key actors in the potato seed tuber diffusion from farmer to farmers in the value chain of the study area, but responsible for the trading of 10.5% of potato seed tuber from production site in the study areas (Figure 3). The trading activities of collectors include buying and assembling, repacking, sorting, transporting and selling to wholesalers.

Collectors in Jeldu district collect the seed in the village from non members of primary producers' cooperatives and take it to their customers (wholesalers and consumers) in the district or/and outside the district. These collectors use animal back like horse, donkey and mule to collect the seed from villages and transport to the wholesalers and consumers. They practice sorting (cleaning) out the damaged and deteriorated once before they took to their customers but storing even for a week is not practiced by them. The value adding activities done by collectors includes collecting the seed from villages where it is spread, cleaning and transporting.

### **Wholesalers**

Wholesalers are mainly involved in buying potato seed tuber from farmers and collectors in larger volume and supplying it to traders who come outside the district and consumers either from outside of the district or inside the district. Survey result shows that wholesale markets are the main assembly centers for potato seed tuber from non cooperative member in their respective surrounding areas. They have better storage (DLS), transport and communication access than other traders. Almost all wholesalers have a DLS around their residential area; all of them live in Gojjo town the district capital.

The value adding activities which wholesalers accomplish includes, storing potato seed tuber they receive from producer farmers and collectors in their own store, sorting (cleaning) out the damaged and deteriorated once and transporting the seed to consumers using vehicles rented for this purpose. The wholesalers supply their potato seed tuber mostly for consumers outside the district

### **Potato seed tuber consumers**

Consumers of potato seed tuber purchase the products to sow it for the next cropping season: as the seed is expected to give high yield. About three types of potato seed tuber consumers were identified; farmers in the district and around, Governmental organizations (BoARD of different areas), and non-governmental organizations. These different bodies distribute the seed to farmers of their locality.

### **Supporting actors (Enablers)**

Such actors are those who provide supportive services including training, extension, information, financial and research services. Access to information or knowledge, technology and finance determines the state of success of value chain actors (Martin *et al.*, 2007) these enablers contribute for betterment of potato seed value chain. Administration offices of the district, micro finance and NGOS (mostly local seed business) are the main supporting actors who play a central role in the provision of supporting services like training how to form and manage primary producers' cooperative, providing extension and financial service in the study area.

### **Extension Services**

HARC and BoARD were the main sources of potato seed tuber training in Jeldu district. The survey result revealed that sample respondents participated in potato seed tuber production were accessible to extension service, input supply services, market information service from these bodies. The services were given on fertilizer application and others such as crop management, harvesting and post-harvest handling in composition.

### **Financial services**

In the study area, Oromia Credit and Saving Company (OCSC) and Busa Gonofa have been identified as a potential source of credit for potato seed tuber production. The survey result showed that 56.46%, 0.02% and 25.91% of sample respondents use credit from Oromia Credit and Saving Company (OCSC), Busa Gonofa and both respectively. Most of the respondents use credit from Oromia Credit and Saving Company. A reason for this scenario was the interest rate of OCSC is less than Busa Gonofa's interest rate during the survey time.

### **Value chain governance**

According to Kaplinsky, (2000) the dominant value chain actors play facilitation role. They determine the flow

of commodities and level of prices. In effect they govern the value chain and most other chain actors subscribe to the rules set in the marketing process. The study result indicates that the cooperatives and wholesalers were the key value chain governors. The consumer market was heavily dependent on cooperatives supply and therefore the potato seed tuber value chains were highly influenced by the cooperatives. Wholesaler traders in the study area usually refer to outside district markets for high price and they fix price of potato seed tuber from collectors and farmers. There was no linkage between trading actors in the study area except between farmers and their association (cooperatives). Overall, the governance of the potato seed tuber value chain is producers push with minimum consideration of customers need. Even though majority of potato seed tuber producers were organized, due to poor market linkage and minimum or no customers oriented production they were not governing the value chain. Hence, they are price takers and hardly negotiate the price due to fear of post harvest loss, in case the product is not sold.

### Marketing Channels and Performance Analysis

#### Marketing channels

Marketing channel is a business structure of interdependent organizational activities that start from the point of product origin to the final consumer with the purpose of moving products to their final consumption destination (Kotler and Armstrong, 2003). Analysis of marketing channels is intended to provide a systematic knowledge of the flow of goods and services from their origin (producer) to the final destination (consumer). The channels to different potato seed tuber value chain actors were different and analysis was done depending on the paths potato seed tuber follows.

#### Potato seed tuber marketing channels

In the study area, five main alternative channels were identified for potato seed tuber marketing. It was estimated that 107,185.2qts of potato seed tuber were marketed in Jaldou district markets in 2010. From the total quantity marketed 72,713.41 qts and 34,471.74 qts of potato seed tuber were supplied by cooperative and non-cooperative members respectively. Of the total potato seed tuber amount supplied for market during specified year sample household farmers from cooperative and non-cooperative members contributes 17,178.14qts and 8,038.26qts in that order. A total of 25,216.4qts of potato seed tuber were supplied for market from sample households. The main marketing channels identified from the point of production until the product reaches the final consumer through different intermediaries were depicted in Figure 3.

From figure 3 below, we can summarize that the main receivers from producers were cooperatives, whole sellers and collectors with an estimated percentage share of 68.12%, 12.81% and 10.15%, respectively. Therefore, channel comparison can be made based on volumes of potato seed tuber that passed through each channel.

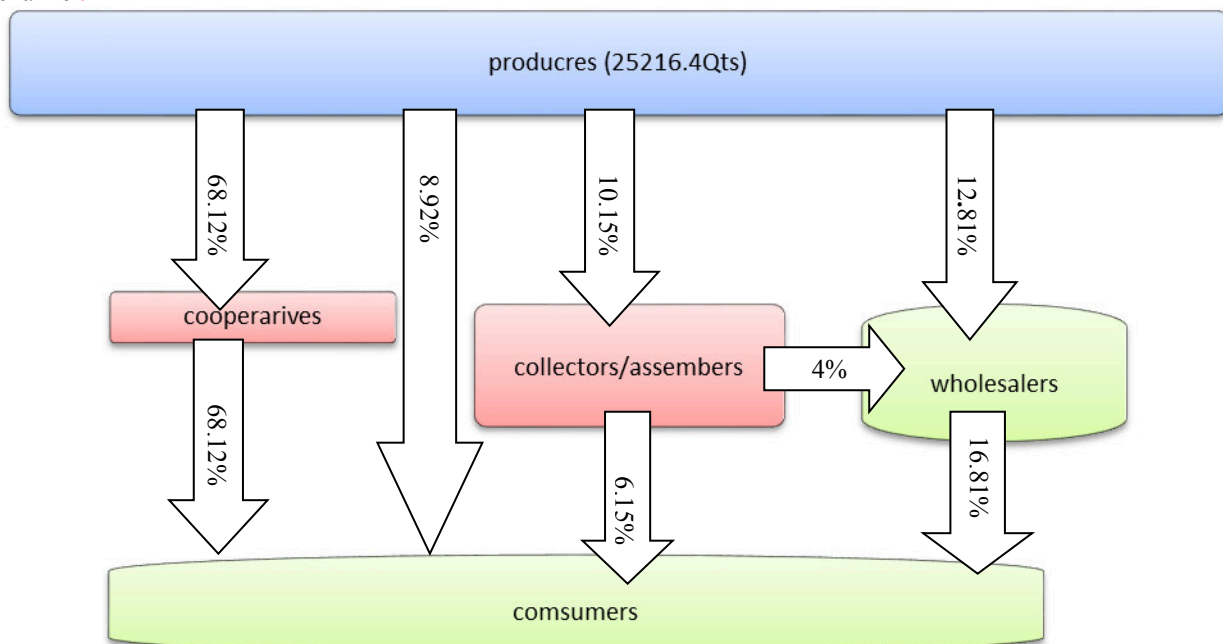


Figure 3. Potato seed tuber market channel  
 Source: Own sketch from survey result

### Performance of Potato seed tuber market

The performance of potato seed tuber market was evaluated by considering associated costs, returns and marketing margins. The methods employed for analysis of performance were channel comparison and marketing margin. The analysis of marketing channels was intended to provide a systematic knowledge of the flow of goods and services from its origin of production to final destination/ultimate consumers. The estimated volumes of production of potato seed tuber were about 107,185.2 quintals, from which about 25,216.4qts supplied by sample farmers.

The distribution of costs and gross income at different levels is important in the business of potato seed tuber. Being perishable, potato seed tuber require greater attention during harvesting, storing, packaging and transporting from the point of production to the final market. The marketing cost of the potato seed tuber mainly involves the cost of post-harvest activities incurred before reaching the consumer. This includes cost of storing and packaging (material and labor costs), handling (sorting, cleaning, grading, loading, and unloading), and transportation and tax costs. Generally, these components constitute a large share in the total margin between the final retailer price and the cost of production. The margin calculation was done to show the distribution throughout the various actors as potato seed tuber move from production to cooperatives, collectors, wholesalers, and finally to consumers.

Marketing margin can be used to measure the share of the final selling price that is captured by a particular agent in the value chain. The relative size of various market participants' gross margins can indicate where in the marketing chain value is added and/or profits are made. In order to calculate the marketing margin of an agent, the average price of potato seed tuber for that particular agent was taken. For example, the buying price of consumers was obtained by taking the average purchasing price of consumers. In order to measure the market share of each agent, the marketing channel where all agents have participated was selected. Marketing margins, associated costs and benefit share of value chain actors and marketing margins through different main channels was presented below (Table 5).

### Marketing costs and benefit shares of actors in potato seed tuber value chain

Table 3. Potato seed tuber cost and benefit share of value chain actors

Variables (birr/Qt)	Producers	Cooperatives	Collectors	Wholesalers	Horizontal sum
Purchase price	-	200	150	180	530
Production cost	23.70	-	-	-	-
Marketing costs					
Storage	2.55	3	-	3	8.55
Cleaning	1.20	1.50	1.50	1.50	5.70
Loading unloading	2	4	2	2	10
Transportation	7	12	9	10	37
Packing material	20	20	20	20	80
loss	30	40	25	20	115
Overhead	4	4	7	10	25
Tax	2	2	2	2	8
Total marketing cost	68.75	86.5	66.5	68.5	290.25
Total cost	92.45	86.5	66.5	68.5	313.95
Sale price	195	300	320	370	1185
Marketing margin	171.30	100	170	190	631.3
% of share of margin	27.13	15.84	26.93	30.1	100
Profit margin	102.55	13.5	103.5	121.5	341.05
% of share of profit	30.07	3.96	30.35	35.62	100

Source: Own survey result

Marketing cost related to the transaction of potato seed tuber by producers, cooperatives collectors and wholesalers and the benefit share of each marketing actors are presented under Table 5 above. The arrangement of marketing cost revealed that loss due to perishable nature of potato seed tuber was the highest cost for each marketing agents. Thus, the cost of loss is the highest amount followed by packing material cost and transportation cost in the same order.

Each of the potato seed tuber value chain actors adds value to the product as the product passes from one actor to other actor. In a way, the actors change the form of the product through improving the grade by cleaning, create space and time utility. Compared to farmers and their association- cooperative, traders' (collectors and wholesalers) operating expense was around 43.00% but their profit margin was around two fold of that of farmers and their associations. That means by simply buying from the farmers and selling to consumers, traders took above 65% of the total profit margin. While farmers and their associations, doing all the work of producing potato seed tuber and bearing the associated risks, took only 19.4% of the profit margin. This

disproportionate share of benefits is the reflection of power relationship among actors. Potato seed tuber producers added 34.03% of the total value of potato seed tuber in the district. Collectors and wholesalers were responsible for 30.35% and 35.62%, share of profit respectively (Table 5).

### Marketing margins of potato seed tuber in different channels

Table 4. Marketing margins of actors in different marketing channel of potato seed tuber

Marketing margin	I.	II.	III.	IV.	V.
TGMM	0	35	47.30	47.30	39.06
GMMp	100	63.14	47.41	32.24	50.19
GMMcop	-	36.86	-	-	-
GMMc	-	-	-	32.00	49.81
GMMw	-	-	52.59	35.76	-
NMMcop	-	33.33	-	-	-
NMMc	-	-	-	27.97	32.34
NMMw	-	-	32.84	32.84	-

Source: Own survey result, where GMMp, GMMcop, GMMc, and GMMw are gross marketing margins of producers, cooperatives, collectors and wholesalers, respectively. NMMcop, NMMc and NMMw are net marketing margins of cooperatives, collectors and wholesalers, respectively.

Marketing margins of potato seed tuber in the five channels for each group of market players are given in Table 18. The total gross marketing margin (TGMM) is the highest in channel III and IV which is about 47.30 %. Wholesalers have got the highest gross marketing margin in channel III and IV whereas collectors/assemblers were got good gross marketing margin in channel V relative to channel IV (Table 6).

Concerning the producer's share; it is, (GMMp) is highest (63.14%) from the total consumers' price in channel II and lowest in channel IV (32.24%) because of the involvement of collectors/assemblers and wholesalers in this channel to share the margin. The NMM were somewhat high in all channels showing profitability of channel members (Table 6).

### Policy Implications

The policy implications to be drawn from this study are based on the findings gained by value chain approach analysis of the study. Accordingly, to assure benefits of producers, primary producers' cooperative there should be a need to improve their competitiveness with traders in the study area being the price cooperatives offers to consumers was less than those traders. This is because, farm households participating in the primary producers' cooperative were better off in terms of gross income and producers share, but they couldn't enjoy the returns because of limited working capital and business management skill. So, primary producers' cooperative need to be capacitated via business management training and encouragement to made them more competitive. To be more strategic non members of primary producers' cooperative are advised to come under primary producers' cooperative member or organize them self under cooperative to become more profitable as the members do now. Lastly, improving transportation and market information access to the farmers is essential to make potato seed tuber market efficient in addition to developing road infrastructures. In addition, government should give special attention to link seed producers in the study area and consumers elsewhere to change farmers from production push market to customer oriented production. This market oriented production inter motivate farmers to produce market demanded products which increases the productivity of farmers.

### References

- Abdissa Gameda, Girma Aboma, H. Verkuijl, and W. Mwongi, 2001. Farmers' Maize Seed System in Western Oromia, Ethiopia. Mexico, D.F: International Maize and Wheat Improvement Centre (CIMMYT) and Ethiopian Agricultural Research Institute (EARO), Addis Ababa, Ethiopia.
- Abebe Kirub, 2008. Assessment of agricultural information needs in African, Caribbean & pacific (ACP) states. Ethiopia Country Study. Addis Ababa, Ethiopia.
- Bekele Hundie, 2001. Factors influencing input loan repayment performance of smallholders in Ethiopia: the case of Oromia and Amhara National States.
- Berhanu Gebremedhin, Hoekstra D. and Azage Tegegne, 2006. Commercialization of Ethiopian agriculture: Extension service from input supplier to knowledge broker and facilitator. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 1. ILRI (International Livestock Research Institute), Nairobi, Kenya. 36 pp.
- Bezabih Emanu and Hadera Gebremedhin, 2007. Constraints and Opportunities of Horticultural Crop Production and Marketing In Eastern Ethiopia. DCG Report N.46. Pp35.
- CSA (central statistics Agency), 2008. Summary and Statistical Report of the 2007 Population and Housing Census Results. Addis Ababa, Ethiopia, 2008, CSA.

- Food Security Strategy of Ethiopia (FSS), 2002. Addis Ababa, Ethiopia.
- Girma Abera, Hailu Gudeta, Mathewos Belissa, Gemechu Shale, Ashenafi Degefe and Bikila Akassa, 2006. Gender Based Roles and Resource Use Wright in Potato Production and Marketing System: The Case of Some District in Oromia, Ethiopia. Bako: Oromia Agricultural Research Institute.
- International Food Policy Research Institute (IFPRI), 2010. Seed System Potential in Ethiopia; Constraints and Opportunities for Enhancing Production. Working Paper Addis Ababa, Ethiopia. 12p.
- Kaplinsky, R. and M. Morris, 2000. A handbook for value chain research, IDRC. Ottawa, Canada.
- Kotler, P. and G. Armstrong, 2003. Principle of marketing, 10th Edition. Hall of India Pvt. Ltd. New Delhi. pp 5-12.
- Local Seed Business Newsletter 2010. Potato farmer research group evolving towards commercial seed producers Issue 3.
- Martin G., O. Boualay and B. Julio, 2007. North Houaphanh bamboo value chain analysis. Netherland.