

Potato Value Chain Analysis in Degem District, North Shoa Zone of Oromia National Regional State, Central Highlands of Ethiopia

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Abstract

Degem is one of the major potato growing Districts in Ethiopia. However, farmers are not getting the right income from their product and information concerning entire potato value chain was also not studied in the study area. This study was therefore initiated with the objectives to describe and analyze the potato value chains and to identify improvement possibilities thereby to improve the position of potato farmers within the potato supply chain in Degem. Primary data for the study were collected through observation, household survey and case study from selected respondents. A total of 97 farmer, 7 retailers, 9 individual household consumers and 2 hotels were participated in providing the information. The results indicated that the major potato value chain actors were input suppliers, producers, retailers and consumers. Potato productivity (148.84qt/ha) in the district was better than the national average (100qt/ha) but much below the potential (350qt/ha). Average production was about 113qt/farmer of which 80% goes to market while 20% used as seed and household consumption. District market was the major outlet while retailers were the main costumers of the farmers who resell mainly for individual household consumers. The use of poor quality seed and disease were reducing productivity while seasonal price fluctuation and shortage of buyers at peak season were major bottlenecks for potato marketing. Improving the seed and storage system, linking farmers to institutional consumers and exporting to other region will likely improve the income from the sector and improves the position of potato farmers in the chain.

Keywords: Potato productivity, price, seed, storage, value chain

1. INTRODUCTION

Potato was introduced in the Ethiopia in 1858 but its adoption occurred very gradually at the end of the nineteenth century in response to a prolonged famine. Its production has increased considerably through the twentieth century. In 1975, the area of cultivation was estimated at 30,000 hectares, with an average yield of approximately five tons per hectare. The area reached 50,000 ha in 1980s while increased to 160,000 in 2001. As compared to the potential growing areas (70% of the 13 million country's arable land), it is still by far small (Hirpa *et al.* 2010).

According to Hirpa *et al.* (2010), about one million farmers are growing potato in Ethiopia of which 83% is mainly in four major potato growing areas; Northwestern part accounts about 40%, Southern Ethiopia 30%, the central highlands 10%, and the Eastern Ethiopia about 3%.

The central highlands potato growing area is located at 150 km radius to the capital city (Addis Ababa) dominantly West Shoa and North Shoa zones in the vicinity of Holetta Agricultural Research Centre (HARC). In this area potato is an important crop for smallholder farmers serving as both cash and food security crop. It is one of the crops with the highest growth rates in this area as a result of increasing markets demand especially in urban areas, change in eating habits of the youth and the high yields it gives. This represents an opportunity for resource poor growers to generate additional income by selling their products.

The potato sector is faced with numerous problems in the countries, resulting in low productivity of less than 10 t/ha (Gebremedhin *et. al.*, 2008) while it has a potential to yield more than 35t/ha in the country (Bymolt, 2014). The major constraints are shortage of good quality seed tubers, lack of adaptable and disease resistant varieties and sub-optimal production practices (Gebremedhin *et. al.*, 2008).

Market-oriented farmers can play a significant role in rural agricultural sector. However, potato farmers in Ethiopia are always faced with marketing problems (Beliyu *et al.*, 2013). They are lacking the actual market data and usually get low price for their products (Haar, 2013). Traders and intermediaries dominate the connection between farmers and consumers. Those intermediaries also play around with the numerous lots, trying to increase their profits by blending different qualities and transporting to far-away destinations (Haar, 2013). Besides intervention areas are not clearly identified as there is no clear evidence on the performance of the entire value chain in the central highland growing areas. The need for studying the performance of the entire value chain was vitally important to describe production practices, post harvest handling and marketing of potatoes so that the challenges can be clearly identified and improvement options can be designed. Therefore this study was initiated with objective to describe and analyze the potato value chains in Degem district and to identify improvement possibilities of potato supply chain to improve the position of potato farmers within the potato supply chain in the Degem district

2. MATERIALS AND METHODS

Description of the study area

Degem is one of 13 districts found in North Show administrative zone in Oromia Regional state.

It has total area of 64, 919ha of land of which 32,451 is arable. The district is subdivided in to 18 villages (*kebeles*) (lowest administrative division) and two town *kebeles*. The district holds a population of about 118,431 people of which only 4,934 people are living on off farm while the rest are dependent on agriculture. According to Degem district agriculture office report 2015, Potato production is practiced by 2385 household (2,266 male and 119 female farmers during the main (May to October) production season.

Research Strategy and data collection procedures

A combination of three research strategies (desk study, survey and case study/the use of key informants and group discussion) were implemented to accomplish this research work.

Field data collection was started by collecting secondary data on potential potato producing *kebeles* (peasant associations). District agriculture office and District irrigation authority were sources of these secondary data. Once the major potato growing *Kebeles* (Ana jiru Gedam, Ano Degem and Ali Doro) were selected based on their producing potential and distance from market/road, field visit was done with District agriculture office horticulture expert and DAs from each *kebeles* to verify the information gained from the two district offices. In the mean time three interviews, one per each selected *kebeles* was carried to test the appropriateness of prepared questionnaires for the survey. Accordingly modification was made based on the feedback gained.

From selected target *kebeles* a total of 64 producers randomly selected for an interview (producers' survey). Both qualitative and quantitative primary data were collected under this survey part (at farmers' level) using semi-structured questionnaire. Group discussion was also designed to complement the survey. Discussion were made with a group of producers having 15 members in Ana jiru gedam, 7 in Ano Degem and 11 in Ali Doro *kebeles*.

Data were also collected through discussion from five randomly selected retailers of Degem District and two from Fitch town. Discussion and data collection was ended on consumers, last actors in the potato value chain. Discussion was made in three market places (Hambiso, Fitch and Ali Doro) each having three randomly meet buyers/consumers while purchasing potato from open market and small retail shop. Two hotels were also included separately for discussion as institutional consumer. The researcher also did visual observation and collected data at those market places. All discussions were taken place with the help of checklist

Data analysis

The collected data were coded and subjected to SPSS statistical software for analysis. Descriptive statistics, frequency (percentages), graphs and one sample T-test were used to describe and compare results. Excel sheet was also used to calculate economic parameters. Tables and graphs were used to present the results while actors and their function with their value shares are presented in value chain map.

3. RESULTS AND DISCUSSIONS

3.1. Potato Production In the study area

3.1.1. Seed System and varieties

As defined by Sthapit *et al* (2008), seed system is the way in which farmers produce, select, save and acquire seeds. This system can be classified as informal/local and formal. Endale *et al.* (2008) further defined the informal seed system as system in which tubers to be used for planting are produced and distributed by farmers without any regulation while the formal seed system is seed production and supply mechanisms operated by public or private sector specialists in different aspects of the seed system, ruled by well-defined methodologies, with controlled multiplication, and in most cases regulated by national legislation and international standardization methodologies.

Informal/local seed system was found to be the main type of seed system exists in Degem District. 100% of the respondents in the district use their own seed selected from ware potato. The result is in agreement with the findings of Gildemacher *et al.* (2009) who stated as the informal seed system supplies 98.7% of the seed tubers required in Ethiopia.

Two potato varieties were reported to be dominantly used in the study area namely Gudene and Jalene with some other varieties (table 1). These varieties were released by Holeta agricultural research center. Gudene is the most used (59%) variety among the others in the study area. According to respondents response, this variety has the capacity to stay in the soil up to 5 months without significant quality and quantity loss if the weather condition is dry which makes it most preferable. The problem occurs when moisture availability is high which causes rotting, sprouting and increase insect damage. Both producers' survey and group discussion result showed, 100% of the producers agreed that Jalene has higher (tuber) yield than Gudene in their area. However it can only be stored for short period in the soil. Therefore it is rarely grown during the main rainy season.

Varieties grown by the sample farmers and their proportion are given in table 1.

Table 1. Varieties and their proportion used by the respondent farmers in Degem district

No.	Variety used	Respondents proportion(N=64)	
		Frequency	Percentage
1	Gudane	38	59.4
2	Jalene	4	6.3
3*	Jalene & Gudane	20	31.3
4	Dagimegn	2	3.1
5	Local	0	0

*Either planted in mixture or side by side in the same field

Source: survey result, 2016

As indicated in the above table none of the respondents use local varieties in the study area unlike different reports that farmers are growing local varieties in the country. According to Bezabih and Mengistu (2011) local varieties were grown in the range of 25-71% in different districts in southern growing region. The level of awareness on improved varieties in the study area seems better. During group discussion with farmers, even these (improved) varieties are getting older, genetically mixed and are losing their potential and becoming susceptible to disease. All agree that they are welcoming other new varieties which are more yielders and resistance to environmental hazards like disease and long storage capacity in the soil.

3.1.2 Ware Potato Production and Productivity

Production season- in general there are two production seasons in Ethiopia; *Meher* and *belg*. *Meher* is the main and longer rainy reason which lasts between June to December and *belg* is short rainy season between January and June (Bezabih and Mengistu, 2011).

The producers' survey result also revealed that except slight variation in months of planting and harvesting, potato production takes place in two season of the year. The main production season is totally rain fall dependant and lasts between mid May to mid September. The second production season is short rainy production season which lasts from October to April/may. Due to shortage of moisture in this production season the need for supplementary irrigation were reported as mandatory. According to Mengistu Lema (Degem district irrigation authority representative), the number of producers in this season is as high as 8748. However, the exact area of land has not registered separately for potato rather all vegetables together. According to Mengistu, the number of producers is high due to higher price potato at harvest but they grow on small area of land due to shortage of moisture.

Table 2. Potato production season in Degem

Month	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	
Production		Main production/rain-fed							Production under supplementary irrigation				
Market supply	Peak		Medium		Peak			Medium			Limited		

Source: survey result 2016

The survey result showed that, potato is grown for household consumption and market. It serves as a supplementary food security crop during months of low availability of cereal crops (September- December). The surplus is used for cash generation up to five months after September. About 81% of the respondents grow their potato for this dual purpose while the 19% of growers were growing only for market (Table 3).

Table 3 .Proportion of potato production for food and market in Degem

No.	Reason for potato production	Respondents proportion(N=64)	
		Frequency	Percentage
1	Only for market (M)	12	18.8
2	Only for HH consumption	0	0
3	Both market and HH consumption	52	81.3

Where HH= house hold

Source: survey result 2016

Land allocated for potato varies among producers in the study area ranging from 0 .25 to 2.25 ha (table 4) making an average of 0.79ha per household. Almost the same figure (0.74ha) was reported by Alemu (2015) in Sinan district of northern Ethiopia.

Average production of potato per household farmer is about 113.4qt which is about 11 tones. The survey also indicated that, farmers can supply about 9 tones for the market at household level. Only 20% of the total production was used for household consumption and seed while 80% goes to the market.

Potato productivity is also assessed and found to be 149qt/ha. One sample T-test indicated that productivity in this district is significantly higher (p=0.000) than that of the national average of 100qt/ha. However, this is by far lower than its potential (350qt/ha) reported in different parts of the country (Bymolt,

2014). This could have been resulted due to the use of poor quality seed (genetically mixed and inferior in seed size) and poor crop management like limited cultivation and poor disease control. This producers' survey results also revealed that there has been huge productivity difference (80 to 250 qt/ha) among producers in the same growing area (table 4). During group discussion, producers themselves witnessed that they recognized the difference and proved that the lower yield is due to poor crop management. Those who are financially strong and/or with high number of family labour can manage their farms (including fertilizing and disease control) than farmers with poor financial power and/or shortage of family labour and harvest higher yield per the same unit of land.

Table 4. Descriptive Statistics for land allocated (ha), productivity (qt/ha), volume produced and sold (qt) by the sample potato producers

	N=64	Minimum	Maximum	Mean	Std. Deviation
Land allocated for potato		0.25	2.25	0.7850	.47875
Productivity		80	250	148.84	40.267
Volume produced		25	367	113.41	82.117
Volume supplied to market/ sold		20	298	90.41	69.123

Where qt=quintal=100kg

Source: survey result 2016

The survey also indicated that, farmers can supply about 90 qt for the market at household level. This result indicated that only 20% of the total production was used for household consumption and seed while 80% went to the market.

3.2. Storage

Postponed harvesting (leaving in the soil un-harvested) was found as the only storage method used for ware potatoes for sample farmers in study area. The result of the current study revealed that about 94% the farmers leave their potato in soil un-harvested for an average of 108 days (three and half months) after crop maturity (table 5). Only 6% of the sample farmers sold their products immediately at maturity time. The result is in line with the findings of Hirpa *et al.* (2010) who stated that potato storage like leaving the tubers in the soil un-harvested (postponed harvesting); by other traditional storage methods like in a local granary, on bed-like structures or the floor in their house; or by diffused-light store is a common practice in all potato producing areas of Ethiopia. On the other hand such traditional storage methods can't maintain the right storage requirements of the product and the loss is high. During discussion with group of farmers in all three sample kebeles, the problem with this storage method was high quality and quantity loss of their potato due to rotting and sprouting especially in seasons of high soil moisture availability in the soil in addition to big animal and insect attack which are common problems affecting their potato regardless of weather conditions. The study by Endale *et al* (2008) also quantified that 30– 50% of produced potato is lost annually because of storage and other post harvest problems Ethiopia.

Table 5. Potato storage practice in Degem

No.	Potato storage	Respondents proportion(N=64)	
		Frequency	Percentage
1	In the soil	60	93.8
2	Diffused light store	0	0
3	Under roof	0	0
4	Under tree	0	0
5	Immediate sell/no storage	4	6.2

Source: Survey Result, 2016

Farmers were also asked why they store (leave in the soil un-harvested) their potato instead for selling at the time of maturity, the only reason for 60 out of 64 farmers or 100% of those who left their potato un-harvested for long period of time was to wait for market and better price. However they start selling right at maturity in small amount to cover their household expenses.

Storage duration varies from non storage to 150 days (5 months) (table 6).

Table 6 Descriptive Statistics for potato storage duration (number of days) in Degem

n=64	Minimum	Maximum	Mean	Std. Deviation
	0	150	107.97	40.756

Source: survey result 2016

3.3. Transporting, Market Outlets and Price

Transporting- Pack animals (Donkey) and truck are the main means of transporting for potato to the market.

About 31% of the producers used truck as the main transport system for their potato while 28% of the respondents use donkey back as the main transport. The rest about 41% of interviewed potato producers use the combined transport viz., half way the on donkey back to the road side and the rest halfway by vehicle (table 7) especially on the top of public transport.

Table 7. Means of potato transport in Degem

No.	Means of transport	Respondents proportion(N=64)	
		Frequency	Percentage
1	Pack animals (PA)	18	28.1
2	Vehicle (V)	20	31.2
3	PA +V (half way each)	26	40.6

Source: survey result 2016

As can be seen from the table tradition transport system (using pack animal) is high contributor for potato transportation in the study area be it the alone or supported by half way by the vehicle. This poor and tedious transportation system is resulted due to complex and interrelated economic factors; poor road access and small proportion of the produce transported to the market resulted in difficulties for the truck to inter the farm get. On the other hand the lower market demand and low price at peak production season forced farmers to sell their potatoes in small proportion on extended time interval. The peak production season also coincides with the opening of school so that they have to buy school materials including uniform for their children that enforce them to bring their products to the market regardless of low price but in small mount. Unlike southern growing region where by traders go to the farmers' field and negotiate about price, purchase it and eventually transport the potato to urban markets (Bezabih and Mengistu, 2011), producers in this district are obligated to transport their potato to the nearby markets be it rural or urban centers to sell their potato.

Market outlet- The survey result also indicated that more than 78% of the farmers sell their potatoes in the open market (table 8). They are the one who bring their product to the open market. 100kg and 50kg sacks are the main packaging materials to bring products from farm get to market. Hambiso (district town) is the major market outlets for their potato. Villages like Ali Doro and neighboring districts town like Gebre Guracha, Fitcha, Debre Tsige and Muke turi are important market outlet. Their main customers are retailer located in those mentioned market outlets. In rare case they get trader who buy their products at farm get but even they don't know who they are and from where they are; what they know is they are from different region.

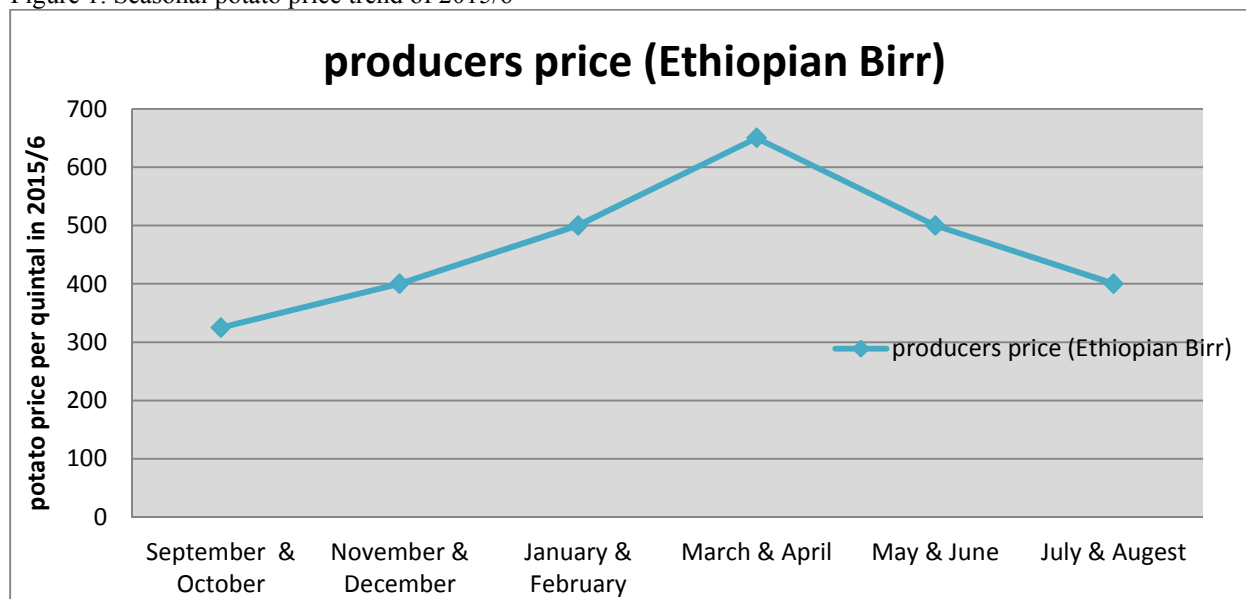
Table 8. Potato market distribution in Degem District

No.	Market place	Respondents proportion(N=64)	
		Frequency	Percentage
1	Farm get	8	12.5
2	Open market	50	78.1
3	Combination of 1 & 2	6	9.4

Source: survey result 2016

Price-Prices of agricultural products in general have peculiar nature where the prices drastically drop at harvest time and increase substantially during planting time. The current study also revealed that price variability for potato was very high ranging from 325 to 650 ETB/qt in seasons of the year in the study area. Price during peak production season (Sep and Oct.) is always lower than the slack season (fig 1). The price increases gradually up to February and the peak price reached at March and April because of two main reasons; time when supply is decreasing and vice versa to the demand. These two months are fasting times for orthodox Christian followers where animal products are excluded from their table and potato and other vegetable are commonly consumed resulting in increased demand.

Figure 1. Seasonal potato price trend of 2015/6



Source: survey and case study result 2016

3.5 Retailing

Retailers are key actors in potato value chain in Degem. They are the link between producers and consumers. They mostly buy from producers in the open market and resell to urban consumers. Their purchasing power is limited to a maximum of 5 qt per week. Of course they are not only buying and selling potato but also other vegetables. They purchase potato in a sack of 100kg, 50 kg and sometimes even less. They buy in the morning between 9:00AM-11:00AM and sit for the whole day up to 5:00 PM in the sun and rain selling in small quantities of about 1-5kg. Their customers are mainly individual household consumers in the same town they purchase and other neighboring towns. They do the same thing at least 5 days a week in different market places in the District and neighboring towns.

As Degem district trade and industry office representative, none of them has a trade license or registered as trader for potato or any other vegetable. Such small scale traders are not obligated to have trade license and anyone who is interested can involve this activity. Due to this free trading system and they are located in different districts the researcher could not able to get their number.

3.6 Consumption

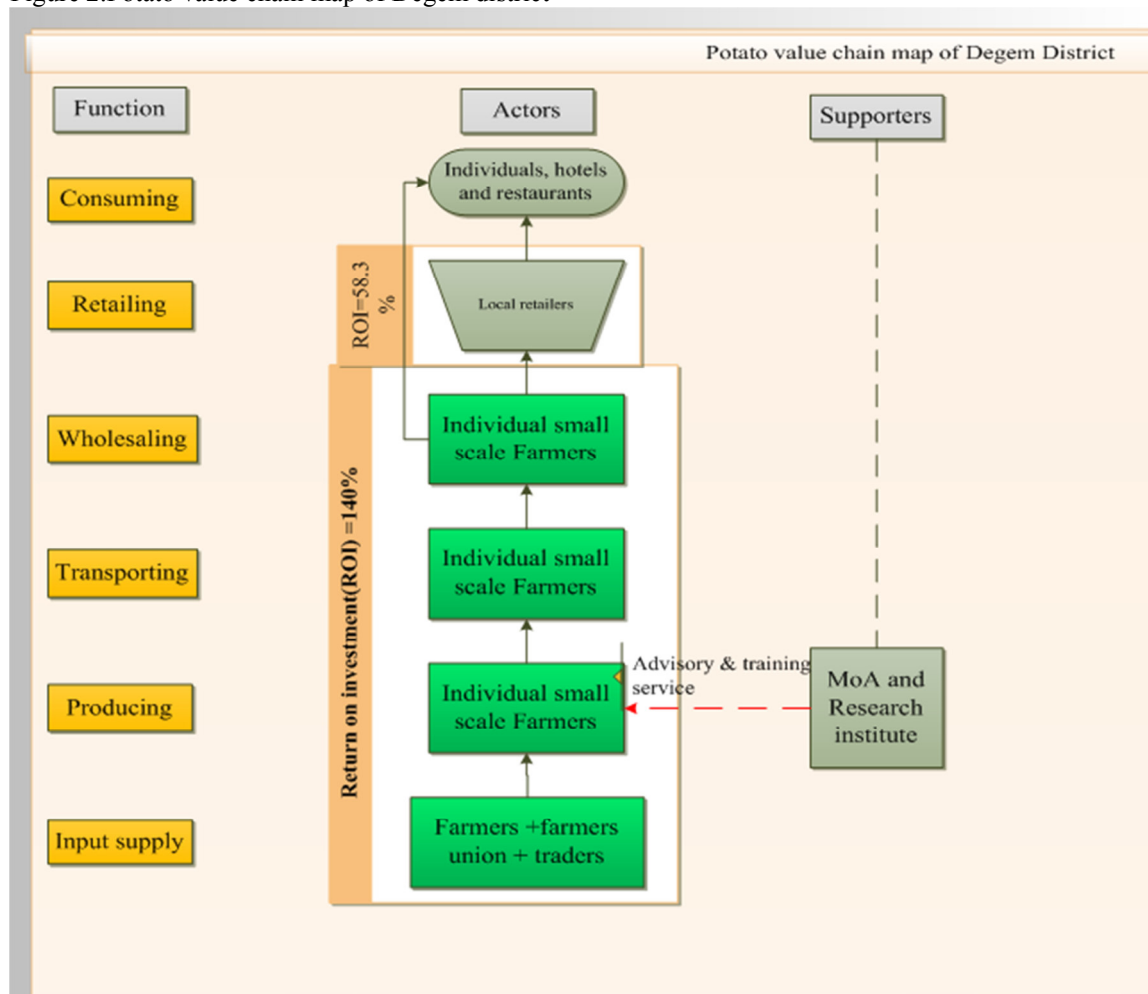
Two major types of consumers were identified in the study area (in the district and neighboring towns like Fitcha, Gebre Guracha, Debre Tsige and Muke turi). Individual households and institutions like hotel and small restaurants. The major consumers are individual households while institutional consumers are limited in number and also purchase in small amount.

According to those interviewed consumer, individual household consumers purchase 3-5kg per week in peak season and 2-3kg in slack season. Hotels and restaurants in average purchase 200kg per week.

Given the above information the annual per capita potato consumption for the town was 31 kg while it was about 197kg for rural areas (calculated as the total production per household – (volume sold + used for seed) then divided by average family size) in the study area. This indicates that the per capita potato consumption of rural areas was greater than that of the urban. This makes the overall average annual per capita consumption (rural + urban) of 114kg in the study area which is by far higher than the national per capita potato consumption of 50kg reported by Bezabih and Mengistu (2011). Peak season of potato consumption also coincides with the harvest time. According to Bezabih and Mengistu (2011) the national seasonal potato consumption varies from 33kg (for 7 month) to 17kg (for 5 months) peak and slack season respectively.

Overall chain functions and their corresponding actors are presented in chain map (fig. 2)

Figure 2. Potato value chain map of Degem district



Source: drawn from survey and case study result 2016

3.7. Economics of Potato Production and Marketing

Taking all the actual and opportunity costs under consideration, profitability of potato production and marketing was computed for the study area as indicated in table 9 below.

Table.9 Average production costs and revenues of potato production and marketing in Degem

Production		Marketing	
Cash investment/ha		purchasing cost/kg	4.63
land preparation (opportunity cost)	3200	transport cost	0.05
Labor & transport (opportunity cost+)	2000	total cost/kg	4.68
Fertilizer	5000	Average selling price/kg	7.3
Fungicide	1400	net benefit	2.67
land lease (opportunity cost)	4800	Return on investment	58.3%
Seed (opportunity cost)	11250		
total cost/ha	27650		
Average yield in kg/ha	14900		
Production cost/kg	1.9		
Revenue			
Average annual price /kg	4.63		
net benefit/kg	2.73		
Return on investment (%)	140%		

Source: Computed from potato value chain analysis survey and group discussion

As indicated in table 9, the return on investment was more than 100% for potato production and 58% for marketing/retailing. This indicates that farmers were making relatively better profit than retailers. In line with this result the previous study by Glidemacher *et al* (2009) indicated that potato production in small-scale farmer's context is profitable in Ethiopia particularly in the central highlands are healthy

3.8 Value Addition and value share among the Actors

As defined by Boland (2009), value addition is economically add value to a product by changing its current place, time and from one set of characteristics to other characteristics that are more preferred in the marketplace. The survey result indicated that though change product characteristics is hardly done by either producers or traders or any other actor in the chain, bringing the product from farm to market and making smaller packages for ease of customer are some of the value addition process done in potato value chain in Degem. Value share of farmers and retailers was **63.8%** and **36.11%** respectively. Unlike reports by Bezabih and Mengist (2011) and Alemu (2015) who indicated the greater value share of retailers, the value share of the farmers in this area is greater than that of the retailers. This could most likely happened due to the absence of brokers and/collectors or wholesaler. The chain is short and farmers are acting as wholesalers in addition to producing which might positively affected to earn additional income.

Tabl 10. Value share of the actors in Degem potato value

Chain actors	Var. cost	Revenue (selling price)	Gross income Revenue-V.Cost	Added value Revenue Previous actor's revenue	Gross margin – Gross income / Revenue	Value share Added value / Retail price
Producers	2.4	4.6	2.2	4.6	47.8	63.8%
Retailers	0.05	7.2	7.15	2.6	99.3	36.11%

Computed from household survey and retailers' interview (see table 10 for detail)

3.9. Chain Relation/Linkage among Actors

As explained by KIT and IIRR (2008) chain relation is the relationship between the producers/farmers and trader is a chain relation. Many different types of chain relationships can exist among many different chain players. The relation can be among farmers may be organized into cooperatives or can be between traders like creating their own trade association and vertically between farmers/producers and traders.

As indicated in the earlier chapter in this document, none of the actors in the chain has any formal relation either horizontally or vertical. The result of this survey revealed that if not all, most producers supply their potato to open market and sell for retailers. They do not have regular customer. Large number of producers/suppliers brings their products to the market. This creates competition among producers/suppliers to get buyers. On the other hand buyers are small in number and have opportunity to buy from those who sell with cheaper price. This un-balanced buyer and supply phenomena again creates barrier between these two actors not to come closer and create relationship. Producers do not know to whom they sell their potatoes in the market. Sometimes two or more buyer/retailers may purchase their potatoes in the same day in the same place. Farmers are not organized rather small scale and powerless to decide on the market; where and when to sell their potato and or to fix a price. As one can understand from the above information, the linkage between actors especially upper once is very poor to the extent that they don't know each other. According to KIT and IIRR (2008), such a weak linkage doesn't result in profit rather all actors in chain should have stable, well organized and transparent relationship to each other.

The relation is weak not only between farmers and their buyers or suppliers, but also traders (retailers) have no any organized system. Their capacity is limited to buy and resell to a maximum of 5 qt per week. Having limited purchasing power of individual traders (retailers) most likely resulted in limited area of action to towns near the production area while exporting to other regions of the country is possible trade option.

3.10. Potato support service providers and their function

The only support/service provider for potato in Degem district is agriculture and rural development office through district expert and development agents. The service is also limited only to advisory and training for production practices and crop protection. The type of service and proportion of beneficiaries are indicated in table 9.

Table 11. Type of service and beneficiaries

No.	Service	Respondents proportion(N=64)	
		Frequency	Percentage
1	No service	2	3.1
2	Training	6	9.4
3	Advice	39	60.9
4	Training + Advice	17	26.5

Source:

None of the respondents report other essential value chain services like input supply, financial services, business management services, access to market information or any technology service for the last five years.

More than 70% of the respondents reported that advisory service is given by DAs while about 21% of got the service by both DAs and district experts.

3.11 Gender role in potato value chain

As Potato is bulky in its production and marketing, it requires high labour. According to this household survey and discussion with a group of farmers, land preparation is mainly done by male members of household while every working member of the family is equally involved in production activity (from planting to harvesting).

Potato marketing is also labour intensive as it needs transporting to longer distance to the market. The role of the family members in marketing was assessed and the result is presented in figure below. The result revealed that husband (the head of the household) is more important (59%) than any other family members in the marketing of potato. This is due to physical power it needs while loading and unloading to transporting to the market be it on truck or pack animals.

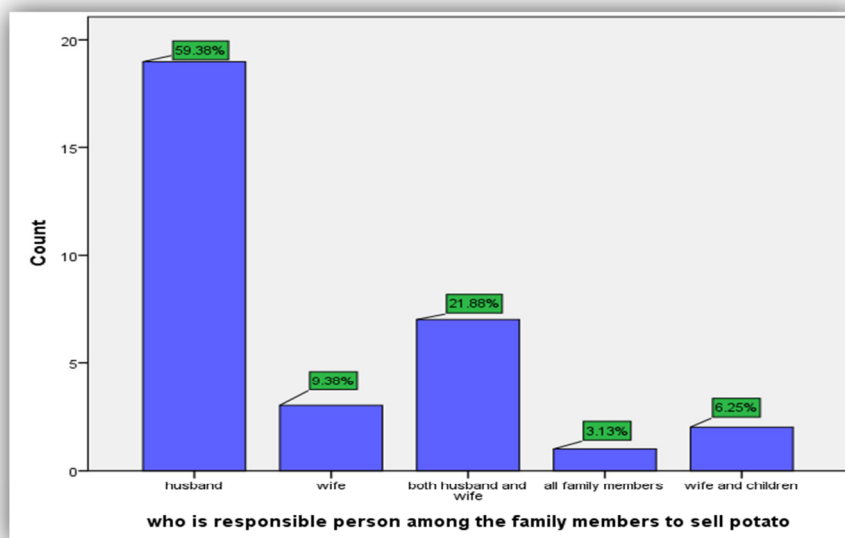


Figure 3. Responsibility of family members for potato marketing

3.12 Challenges of potato production

Producers are asked an open ended question on the challenges of production and marketing for their potato. Accordingly many challenges were raised as summarized in table 12.

Table 12. challenges of potato production and marketing in Degem as identified from survey

Production Challenges	% of responders	Marketing challenges	% of responders
Disease	56.3	Low price at maturity time (1)	53.1
Shortage of pure Seed	6.3	Lack of market/buyer (2)	25.0
Disease & Lack of fungicide	21.9	Lack of modern transport/truck (3)	6.3
Disease+ lack of fungicide + Labor shortage	3.1	Absence of buyer at farm get (4)	3.1
Disease & Labor shortage	12.5	(1)+(2)	9.4
		(1)+(2)+(3)	3.1

Source: survey result 2016

Disease

Disease (Late blight) was found to be the major challenge for potato production in the area. As can be seen from table 12, about 94% of respondents reported disease as the challenge for potato production either alone or combined with other factors. It was also supported by group discussion results in which all the groups put it as the first challenge for their potato farm. This finding was also in line with a previous report by Bezabih and Mengistu (2011) who indicated as disease was common problem in all potato growing areas of Ethiopia mainly because of home saved seed, use of local markets limited use of resistant varieties, poor storage practices like leaving potato underground un-harvested.

Shortage of fungicide

The shortage of fungicide to control the disease (late blight) was also reported as equally important factor to affect productivity. Considerable percentage (22%) of producers reported that they do not have access to buy either the required amount of fungicide or at the required time. It was also strongly stressed out during group discussion as important problem. Trader who has license for agro-chemicals is hardly found the district. Small retail shops and individuals are sources of fungicide supply. These small retail shops also start to import and supply the chemical too late after they are sure that the disease infestation is already existed.

Shortage of pure seed

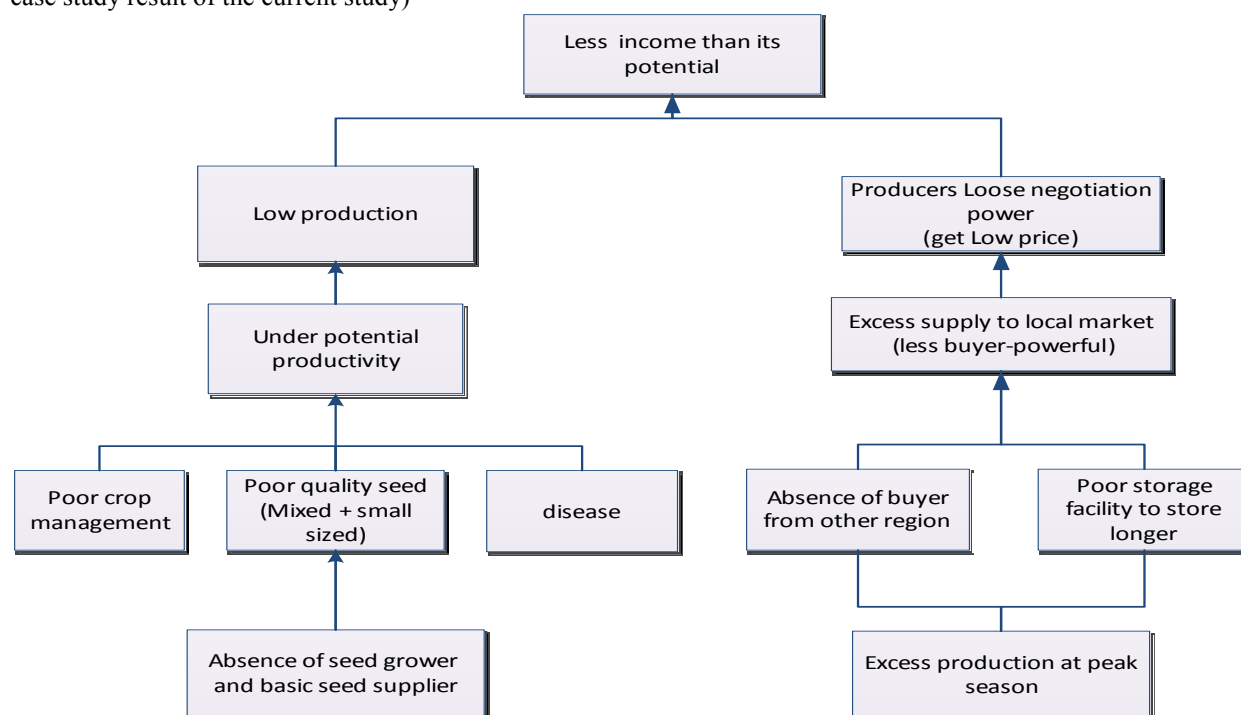
Up on discussion with group of producers/farmers and household survey in all sample *kebles*, the use of own (home saved) seed (improved varieties which were introduced before 8 years ago) were reported to be the only seed source in the area. None of producers/farmers produce/grow seed rather select from ware potato they produced. Accordingly tubers they are using for seed is genetically mixed (of different varieties). Secondly they are saving tubers for seed that are too small and inferior to be sold for consumption. Such a practice was also reported (Mulatu et al., 2005; Endale et al., 2008; Gildemacher et al., 2007) in the other potato growing regions of country.

Though the number of respondents who rose shortage of pure seed as a challenge during producers' survey is low (only 6.3%), stress was give during group discussion as shortage of pure seed is affecting productivity of their potato. Producers are aware of the problem as both the use of genetically mixed and/or inferior quality (small sized) seed are resulting in low productivity. For the former, they are doing because they don't have access to new/basic seed as seed supplier is rarely found in the area. The only reason farmers prefer to use those inferior quality seeds was to save seed (lower seed rate) while using tuber of smaller size was.

5. CONCLUSIONS AND RECOMMENDATIONS

A prospect for potato production and marketing in Ethiopia particularly in the study area is promising due to the agro-ecological suitability of the land. It has also been growing mainly for market in the area beside household consumption. However, the current value chain is not well developed. Though the chain is short and direct actors are limited to Input suppliers, producers, retailers and consumers in the area, the chain linkage is so weak. Farmers are getting advisory service on production practices while storage and post harvest handling and quality control aspects are neglected. Generally challenges in the potato value chain are not simple rather complex and interlinked to each other. For clarity of these interconnected bottleneck it is summarized in the following problem tree (fig 4).

Fig 4. Cause and effects of challenges in the potato value chain in Degem district (Summarized from survey and case study result of the current study)



Based on the current study, the following intervention areas were identified with suggested recommendation

Improve the seed system/promote seed producers; - Producers are using varieties which were introduced earlier and getting genetically mixed with other known and unknown varieties of course also farmers use seeds having small seed size which resulted in lower productivity. So promoting small scale seed growers and connecting them to those ware potato growers can be best alternate for both seed and ware potato growers to increase productivity and generate better income

Improve storage system- Leaving potato in the ground un-harvested up to 5 months is common practice used as the only means of storage facility in the area. Animals, rat and insect pest attack for such storage system is high. Farmers are also losing considerable amount of their products due to rotting, soil born disease and sprouting of their potatoes whenever the soil gets moist due to uncertain whether condition. Therefore promoting other storage facilities like diffused light store (DLS) which were successful in other parts of the country like west show can reduce post harvest loses and increase income of producers and benefit from the sector.

Organize and link farmers to institutional consumers: -Due to the absence of long distance traders and the higher production volume of potato in area, the supply exceeds the local market. Therefore if farmers can be organized as producers' cooperative and supply for big institutional consumers like Selale University and others, they can earn more income by increasing their product volume through reducing loss poor storage facility

Encourage and help farmers to export their product to other regions- Absence of collector/buyer especially during peak production season is one of the challenges for potato marketing in area. Therefore organizing and capacitating farmers so that they can able to supply to other markets/regions in the country wherever demand is high. Acting as trader in addition to production can help them to generate additional income.

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References

- Alemu, T. 2015. Inclusive potato value chain: Cooperatives Vs SolaGrow Plc models in Ethiopia. Sky Journal of Agricultural Research, 4, 132 – 146.
- Beliyu L, Tewoderose T. and Lahiff .E. 2013. Determinants of Adoption of Improved Potato Varieties in Welmera Woreda. In: Gebremedih W., Schulz.S and Baye B. (Ed). Seed Potato Tuber Production and

- Dissemination: Experiences, Challenges and Prospects. *Proceedings of the National Workshop on Seed Potato Tuber Production and Dissemination*. 12-14 March 2012, Bahir Dar, Ethiopia.
- Bezabih E, Mengistu N (2011). Potato Value Chain Analysis and Development in Ethiopia. Case of Tigray and SNNP Regions. International Potato Center (CIP-Ethiopia).
- Boland M. 2009. What is Value-added Agriculture?. *Kansas State University* ; Agricultural Marketing Resource Center, United States.
- Bymolt R. 2014. Creating Wealth with Seed Potatoes in Ethiopia. Report Prepared for the Common Fund for Commodities, Royal Tropical Institute, Netherlands
- Endale, G., Gebremedhin, W., Bekele, K., Lemaga, B. 2008. *Post-Harvest Management in Root and tuber crops: The untapped resources*, ed. Wolde Giorgis, G., Endale, G., Lemaga, B., Ethiopian Institute of Agricultural Research, Addis Ababa, Ethiopia
- Gebremedhin, W., G. Endale, and B. Lemaga. 2008. Potato variety development. In *Root and tuber crops: The untapped resources*, ed. W. Gebremedhin, G. Endale, and B. Lemaga, 15–32. Addis Abeba: Ethiopian Institute of Agricultural Research
- Gildemacher, P., P. Demo, P. Kinyae, M. Nyongesa, and P. Mundia. 2007. Selecting the best plants to improve seed potato. *LEISA Magazine* 23(2): 10–11
- Gildemacher, P., Kaguongo, W., Ortiz, O., Tesfaye, A., Gebremedhin, W., Wagoire, W., Kakuhenzire, R., Kinyae, P., Nyongesa, M., Struik, P., and Leewis, C. 2009. Improving potato production in Kenya, Uganda and Ethiopia. *Potato Res.*, 52: 173- 205.
- Haar, J. J. 2013. Opportunities and Challenges for Commercial Seed Potato Production in Ethiopia. In: Gebremedih W., Schulz, S and Baye B. (Ed). *Seed Potato Tuber Production and Dissemination: Experiences, Challenges and Prospects. Proceedings of the National Workshop on Seed Potato Tuber Production and Dissemination*. 12-14 March 2012, Bahir Dar, Ethiopia. Pp 1-6.
- Hirpa A., Miranda P. M., Meuwissen, Agajie T, Willemien J. M., Lommen, Alfons O.L., Admasu T, and Paul, C.S. 2010. Analysis of Seed Potato Systems in Ethiopia. *American Journal of Potato Research*, 87:537-552 In: Tsedeke Abate (ed) *A review of crop protection research in Ethiopia*. Proceeding of KIT and IIRR. 2008. *Trading up: Building cooperation between farmers and traders in Africa*. Royal Tropical Institute, Amsterdam; and International Institute of Rural Reconstruction, Nairobi.
- Mulatu E, Osman E I, Etensh B (2005). Policy challenges to improve vegetable production and seed supply in Hararghe, Eastern Ethiopia. *J. of Vegetable Sci.*, 11(2): 81-106.
- Sthapit, B., Ram, R, Pashupati, C., Bimal, B. and Pratap, S.. 2008. Informal seed systems and on-farm conservation of local varieties. In *Farmers, seeds and varieties: supporting informal seed supply in Ethiopia*, ed. M.H. Thijssen, Z. Bishaw, Beshir, A. and W.S. de Boef, 133–137. Wageningen: Wageningen International.