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Value chain analysis of potato: The Case of South Achefer and Jabi Tehinan districts of West Gojam Zone, Ethiopia

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The study was conducted in South Achefer and Jabi Tehinan districts for mapping, identifying actors and analyzing constraints and opportunities of potato value chain. Simple random sampling technique was used to select producers (100), traders (70), and end consumers (40). Quantitative and qualitative data were collected from primary and secondary sources. Hence, qualitative and quantitative data were analyzed through narration and descriptive statistics, respectively. Input suppliers, producer, collectors, wholesalers, retailers, processors and end consumers were potato value chain actors. Quantitative data result reveal that, processors add most value compared to the other value chain actors; 722.68 and 93.21 birr/qt in South Achefer and Jabi Tehinan districts, respectively whereas producers add least value that is 13.74 and 4.56 birr/qt in South Achefer and Jabi Tehinan districts, respectively. Producing more yields from small plot of land, favorable climatic condition and easiness of work were some major opportunities. Some of the major constraints were pests, perishable nature of potato, shortage of supply, storage problem and shortage of input (oil and light). Developing innovation platform incorporating different actor is crucial for reducing factors affecting potato value chain. Education/training on consumption of potato should be given to improve habit of consuming potato.

Key words: Actors, constraints, potato, producers and value chain.

INTRODUCTION

Ethiopia has untouched resource bases for agriculture development. Nevertheless, the sector faces several challenges to produce adequate food supply for domestic consumption and export earnings (MoA, 2011). To alleviate such problems in the country, vegetables are important for economic, nutrition, health, smallholder farming system sustainability and attract foreign direct investment through creating marketing opportunities (Amsalu et al., 2014). For the end consumers, if they consumed daily in sufficient amounts, they could help to prevent major diseases and improve nutrition and health (WHO, 2005). Vegetables like potato are the best resource for overcoming micronutrient deficiencies and provide smallholder farmers with much higher income and more yield per hectare than staple crops (AVRDC, 2006). However, they are under-utilized crop in Ethiopia

(IBC, 2012). Potato is one of the horticultural crops, the most predominant produced and a strategic food security crop in the region (EIAR and ARARI, 2013).

Value chain is a means for increasing efficiency, increase productivity and add value. It also contributes to betterment of the all actors involved in chain of particular goods or services. So that, increasing productivity and efficiency of agricultural value chains are basic to the success of the one country particularly Sub Shara Africa like Ethiopia for the growth of income on their rural populations (Webber and Labaste, 2010).

In Ethiopia to attain this opportunity, governmental and non-governmental organizations were performing different activities. In value chain process, producers have possibility to build up relationships and securing commitments from various actors to cooperate on mutually beneficial actions (Bezabih and Mengistu, 2011). In value chain there is addition of value on product passed from one actor to the other (Riisgaard et al., 2010). However, to fulfill interest in value chain system actors were faced with production, marketing and consumption constraints (Abraham, 2013).

Researchers such as Abraham (2013), Bezabih and Mengistu (2011), Alemu (2015), Muluken (2014) and Biruhalem (2010) conducted research on value chain analysis of different agricultural commodities. However, there were information gap on identification of actor, value chain mapping and identification of constraints and opportunities. To the best of the author's knowledge, there was no empirical evidence on constraints and opportunities of potato value chain in the case of South Achefer and Jabi Tehinan districts of West Gojam Zone even though, more studies conducted were not commodity and location-specific. Therefore, taking all these background into consideration, the value chain analysis of potato was conducted to fill the information gap.

METHODOLOGY

Sampling techniques and sample size

The study employed three sampling technique mainly purposive, stratification and random sampling. The districts and kebeles were purposively selected due to project interest. The value chain actors were stratified as producer, trader and end consumer. Simple random sampling was employed for producers, traders and end consumer selection to avoid biasness. Producers, traders (input supplier, wholesalers, collectors, retailers and processor) and end consumers were main actors covered by the sampling.

The sample size for this study was a function of the variability of the population characteristics (either homogenous or heterogeneous), time and resource availability. The total number of the producer was determined by the Kothari (2004) formula and 100 producers (50 producers from each district) were taken. From each kebele sample, producer respondent was taken based on proportional to sample size whereas 70 traders (input supplier 10, wholesalers 3, collectors 2, retailers 46 and processor 9) and 40 end consumers were taken based on variability of the population characteristics (either homogenous or heterogeneous). Totally, 210

sample respondents were incorporated under the study.

Data collection and data analysis

Data were collected using focus group discussion, key informant interview, sample household interview and observation.

The key informant interview and a focus group discussion

The key informant interview and a focus group discussion were held with community leader, staff responsible in potato production and trade (agriculture, cooperative, and trade and transport), farmers and traders. The key informant interview was carried out to obtain pertinent in-depth information about potato value chain in target community. Data collected through focus group discussion and key informant were more of qualitative in nature.

Sample household interview

After collecting and classifying data, questionnaire was designed and both qualitative and quantitative data were collected. The main primary data types collected by sample household interview included source of input, marketing channel, buying and selling price, pricing system, input delivery, different actors (value chain actors, value chain supporter and influencer) constraints and opportunities of the potato value chain.

Under the quantitative tools, descriptive analysis was applied. In the descriptive part of the analysis range and percentage was used. Nevertheless, qualitative data were analyzed through narration. Statistical Package for Social Sciences Software (SPSS) version 20 was used to carry out analyses of value addition across each actor and constraints of different actors.

RESULTS AND DISCUSSION

Value chain map of potato in South Achefer and Jabi Tehinan districts

Value chain can be mapped and analyzed using value chain analysis (VCA) which can include qualitative and/or quantitative tools. The approach focuses on relationships among actors, role and the movement of a product or service from producer to end consumer (Riisgaard et al., 2010). The value chain map is used to show the involvement of value chain actors, value chain influencers and value chain supporters who participated directly or indirectly in the value chain.

Value in map

This indicates the price of potato in birr per quintal at which the one value chain actor sold for the next actor in the chain.

Value added in map

This is not a net margin but gross which actor got per

quintal by performing some value addition activities on the potato. One actor may add most and other may add least value. The result for value chain map of the potato in both Jabi Tehinan and South Achefer districts is shown in Figures 1 and 2, respectively.

According to the survey result in Jabi Tehinan district processor, the most value in the chain was added next to the collectors (Figure 1). However, in South Achefer retailers, the most value was added next to the processors (Figure 2) whereas producers added least value that is 4.56 and 13.74 birr /qt in Jabi Tehinan and South Achefer districts, respectively.

Different actors role and constraints in potato value chain

Value chain actors

The value chain actors involved in potato value chain in both districts were producers, traders (input suppliers, collectors, wholesalers, retailers, and processors), and end consumers. Each actor perform different role in potato value chain. Among value chain actors there was no formal way to contact or discuss for marketing of potato and its product. Therefore, innovation platform could be the best way to attain their common goal. This is in line with Habtamu (2015) which also identified lack of integration among chain actors as constraint of potato value chain. The major constraints that affect potato value chain at each actor were identified through sample respondent survey in both study areas. For each value chain actor, severity of the constraint was expressed in percentage and discussed below.

Producers

Producers were those actors that perform farm input preparation up to marketing of product. They perform different activities such as site preparation, input preparation, planting, pests controlling, watering, harvesting, and sorting/grading, post harvest handling, and marketing of the product. They access information to sell their product through visiting, asking friends and purchasers (traders and end consumers) and with no information. Additionally, they access information from government and non-government bodies like cooperative, Capacity Building for Scaling up of Evidence Based Best Practices in Agricultural Production in Ethiopia (CASCAPE) and agriculture office. However, they have no formal way of getting information regarding potato production and marketing from value chain actors. Usually, farmers in study areas lack reliable market information and because of this, they were unable to decide or influence the market price. Hence, farmers were price takers to sell their product. Farmers were price takers but traders made margins of potato in the market

(Bezabih and Mengistu, 2011).

In south Achefer there was no sample respondent who reported shortage of land but in Jabi Tehinan district, 4% of respondents reported existence of land shortage for potato production. In South Achefer sample respondent reported that natural problem like ice (8%) was a problem for potato production but in Jabi Tehinan district, there no sample respondents reported existence of natural problem like ice for potato production. As shown in Figure 3, problems encounter for production of potato in study area, were wild animals, weed, insect, disease, high rainfall, shortage of irrigation water, limited access to market information, price cheating, poor linkage and shortage of improved seed. Among different constraints, the most constraints that affected potato production in both district was disease which accounted for 88 and 84% for South Achefer and Jabi Tehinan, respectively. Shortage of improved seed (4%) and price cheating (4%) were least constraints in South Achefer. Price cheating (4%) was the least constraints for the producer compared with other constraints in Jabi Tehinan. Even if constraints that affect potato production vary, the common problem in Ethiopia potato production was disease. According to Biruk et al. (2017), constraints that affect production level of potato, were insects, diseases, weeds, seed shortage, poor market information, poorly linked to markets and lack of sufficient irrigation water. Insufficient seed tubers and diseases were potato production constraints (Hailu et al., 2017). According to Tadesse and Fayera (2018), skill gap on cultivation of potato, disease, harvesting problem and storage facility problem were constraints of potato production.

Input suppliers

They were actors who involved directly or indirectly in agricultural input supply in the study areas. For this study, input suppliers were divided into two; input suppliers in value chain actor and input suppliers in value chain supporters. In the first division, potato growing farmer (seed and transportation), traders (seed and chemical), and farm implements suppliers were considered as input suppliers in value chain actor whereas value chain supporters were governmental or non-governmental organization responsible for supply of agricultural inputs like improved seed, fertilizers, credit services and extension services which were essential for potato production.

In South Achefer, input suppliers were encountered by different problems but storage problem (100%) was the most constraint among the other while local regulation (20%) and transport cost (20%) were least problems for sample input suppliers. Regarding to input supplier in Jabi Tehinan district, poor quality of product (80%), storage problem (80%) and price fluctuation (80%) were the most sever constraints compared with other
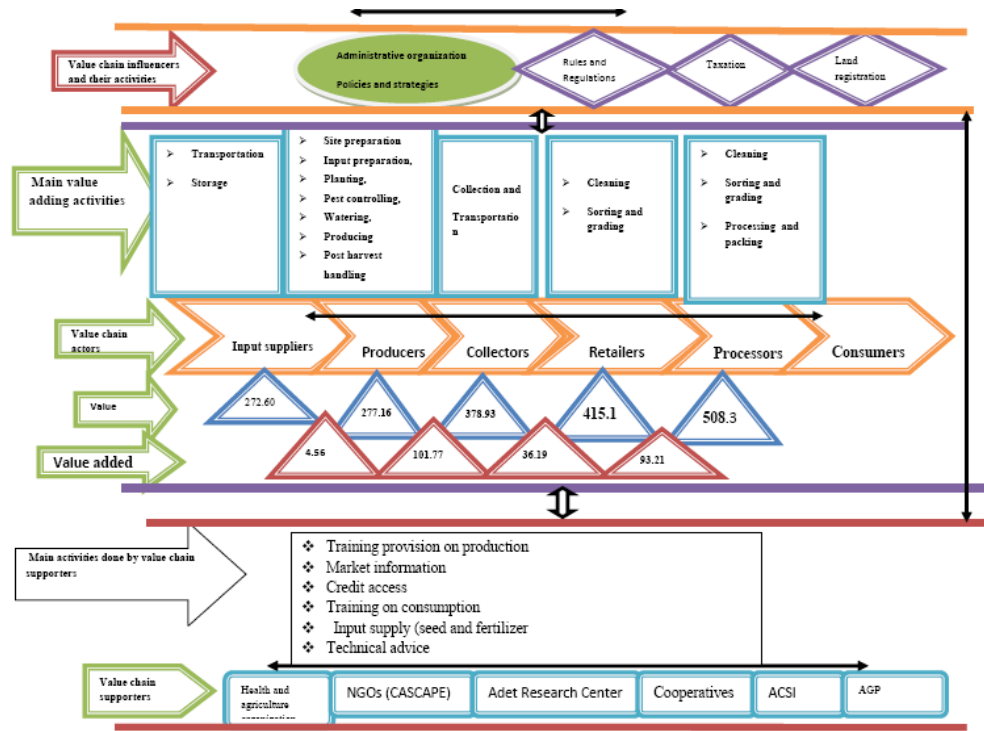
Figure 1. Value chain map of potato in Jabi Tehinan district.
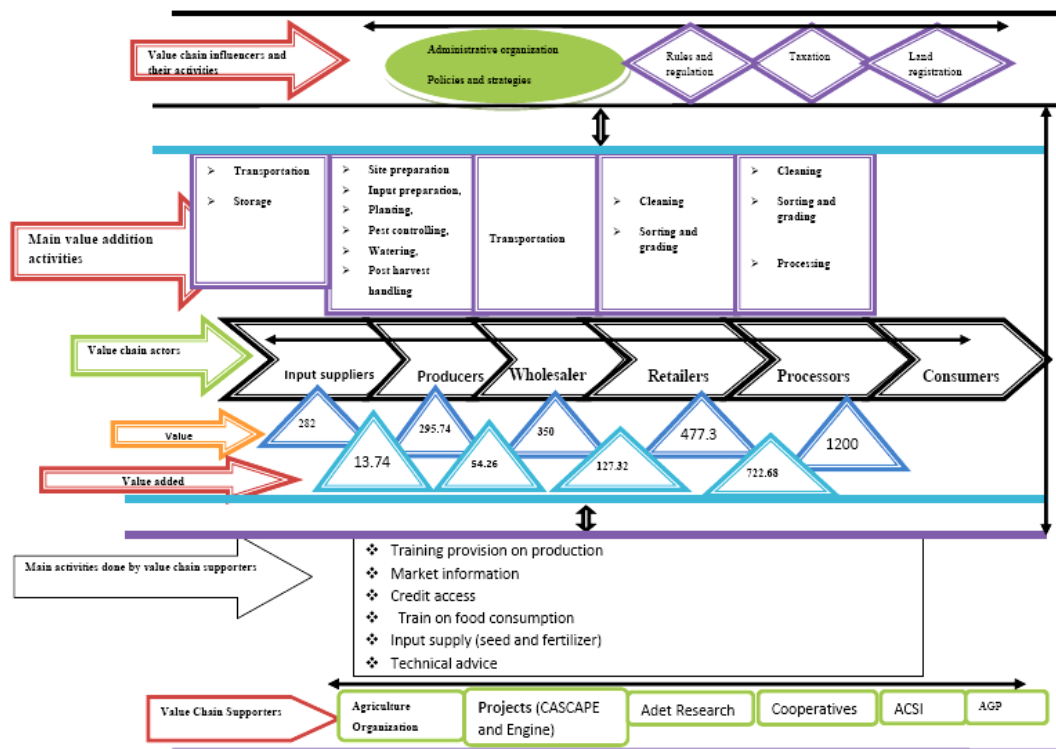

Figure 2. Value chain map of potato in South Achefer District. Shows the effect of actors on the other actor and flow of information (feedback) (across the actors) (vertical link). Shows the effect of one actor on the other within the actor and flow of information (horizontal).
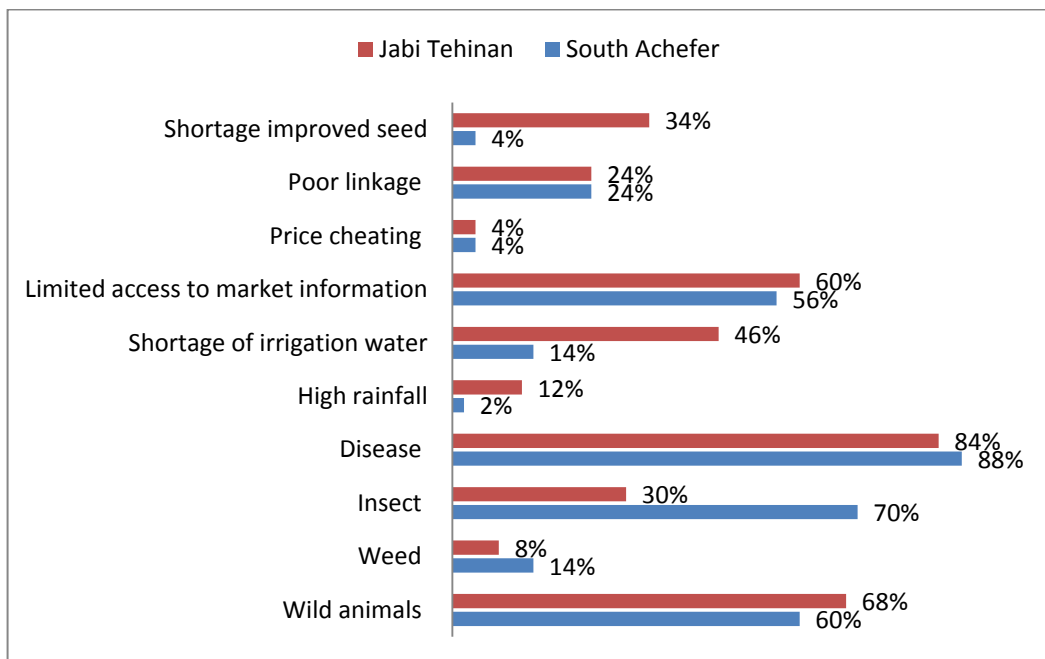
Figure 3. Potato production constraints in both districts.

constraints in study area. Too much local regulation (20%) and high transport cost (20%) were least constraints. Seed spoilage, seed supply problem, high price of input, disease, and knowledge gap were the constraints of input suppliers in potato value chain (Tadesse and Fayera, 2018).

Wholesalers

They were value chain actors who purchase ware potato produced through irrigation at farm gate and directly sold for wholesaler at Bahir Dar town without storing. Participants during group discussion also reported that there were some traders who provide seed on credit for producers to sale their product at farm gate. Traders that did this type of trade were few in number. Wholesalers had better transport and communication access than other traders with other areas of traders but they were not using properly these opportunities due to poor storage like other storage of crop. They were asking many times administrative to resolve this problem but they did not get solutions till now. Almost all wholesalers store in a market rental basis, where not suitable for potato as storage. Hence, storage problem (100%) was the most sever constraints for wholesalers but transportation cost (20%) was least constraint, which they had.

Collectors

Collectors were one of value chain actors that involve in purchasing of potato from farmer by negotiation at Menkusa and Jiga Kebele towns and sold for retailers and processors at either Fenotselam town or kebele areas. However, in South Achefer district there were no collectors that involved in potato value chain. This was crosschecked by sample respondent interview, key informant interview and focus group discussion held with producers and traders. They add value on the potato by transporting from one area to other. Shortage of supply (100%), cost of transportation (100%) and too much competition (100%) were the most sever constraints for the collectors however there rest of constraints have equal share (50%).

Retailers

Retailers were traders without license in both districts towns that perform activities like buying of potato from farmers and collectors, retailing, cleaning, grading and sorting and sell to processors and end consumers. Retailers were key actors in potato value chain in both districts. They preferred to purchase from producers unless they bought from wholesalers when there was no potato supply by the producers. They add value on the potato by doing activities like cleaning, sorting and grading. In South Achefer district, shortage of supply (75%) and perishable (8.3%) were the most and least constraint for the retailers, respectively. Poor qualities of product (72.70%), and price fluctuation (72.70%), were the most sever constraints for the retailers but perishability (13.6%) was least constraint compared with

other constraints in Jabi Tehinan.

Processors

Processors are the small-scale traders in nearer markets responsible for supplying of the processed potato to consumers in the study areas. They have no license like retailers in both district towns, involved in purchasing a product (raw potato) through a negotiation from farmers, retailers and collectors and usually did routine set of procedures, steps and activities to convert potato from one form to another, such as transporting, cleaning, sorting and grading, processing, packing and selling to end consumers. They were the last link between producers and end consumers. They sell processed potato (chips, *tibs* and cooked) for the consumers at street or inside their house. Processors major constraints in South Achefer distrct were local regulation, no access to credit, lack of capital, lack of working place, light and oil problem. In Jabi Tehinan, oil and light problem (87.5%), and quality of product (87.5%) were the most sever constraints for the processors compared with other constraints. However, perishability (12.50%) and lack of market demand (12.50%) were least problems that affect processors. In addition to constraints mentioned in Table 1, quality problem of road (20%) was the other constraint in Jabi Tehinan. According to the Addisu (2016), vegetable like potato processors were constrained by lack of processing facility.

Among traders, there was formal and informal way of contact for marketing of the potato at market or farm gate. As a result, they set selling price of potato by themselves but they negotiate when they purchase from producer. Quality, color, cost incurred to purchase and size were basic determinant for traders to set purchasing and selling price of potato. However, there were different constraints, which affect marketing such as supply shortage, oil and light problem, price fluctuation, too much competition, storage problem, high transport cost, perishable, poor quality of product, high price of product and lack of capital. According to Habtamu (2015), some of marketing constraints in potato value chain were lack of improved storage facility, poor road and transport facilities, availability of potato, lack of market information, high market price instability, lack of capital and lack of marketing facilities.

Potato end consumers

End consumers were those actors that purchase potato product from producers, retailers and processors for consumption. In most cases, end consumers bought potato from retailers. Retailers offer potato according to requirement and purchasing power of the consumer. Traders (retailers) set end consumer's purchase price of potato but end consumers negotiates when they purchased from producers. The sample respondents annual mean purchase price of potato was 535.48 and 450 birr/qt in South Achefer and Jabi Tehinan districts, respectively. According to the study result in South Achefer district, on average single household consume potato 1.74 qt per year and spent 931.74 birr. In Jabi Tehinan district, a household annual consumption on average was 1.02 qt and cost 459 birr. End consumers have their own quality criteria to purchase potato. They prefer medium size potato with smooth skin, fresh, red color and free from damage.

Support given for consumer on potato consumption at urban town was poor. In Jabi Tehinan district, only 5% of sample respondent got potato importance training by health organization. In South Achefer district during sample respondent interview, there was no sample respond that got any service on consumption of potato. However, during focus group discussion and key informant interview with value chain supporters ENGINE project provide service on potato nutrition at the rural areas. Potato consumption in different form was very poor in the study areas due to skill gap. This is in line with the report of Alemu (2015) that stated that potato consumption is limited because of knowledge gap about making different dishes from potatoes. Tadesse and Fayera (2018) also reported that poor habit of potato consumption and lack of potato processing habit were problems of the consumers. The increment in price of product (100%) was the most sever constraint for the end consumer and capital/income shortage (5%) was the least sever constraint in South Achefer. In Jabi Tehinan, perishability (100%) was the most sever constraint for end consumer but shortage of capital (20%) was the least constraint. According to the Addisu (2016), constraints that face vegetable consumers were income shortage, lack of consumer's cooperatives and high price of product.

Value chain supporters

Potato value chain supporters are those who provide supportive services for value chain actors. Agriculture office, Amhara Credit and Saving Institution (ACSI), primary cooperatives, CASCAPE project, ENGINE project, Adet Agriculture Research Center, health organization, and Agriculture Growth Program (AGP) were supporting actors that plays great role in potato value chain by providing different services such as improved seed, fertilizers and credit and extension services. CASCAPE project was rank second as source of seed next to local market in Jabi Tehinan but rank 3rd as source of seed in South Achefer. During key informant and focus group discussion, farmers said that CASCAPE project was sole source of improved seed from value chain supporters.

Table 1. Potato marketing constraints in both districts in percent.

Constraints	South Achefer				Jabi Tehinan				
	Input suppliers	Wholesaler	*Retailers*	End consumers	*Input suppliers*	Collector	*Retailers*	*Processor*	End consumers
Supply shortage	20	66.7	75	40	40	100	59.1	62.5	40
Income shortage/ Lack of capital	33.33	33.33	12.5	5		50	22.7	25	20
High price of product	-	-	-	100	-	-	-	-	55
Poor quality of product	40	66.7	70.8	80	80	50	72.7	87.5	50
Lack of market information	-	-	-	10	-	-	-	-	25
Perishability	80	33.3	8.3	85	60		13.6	12.5	100
Skill gap	-	-	-	10	-	-	-	12.5	25
Too much local regulation	20	33.3	-	-	20	-	27.3	-	-
High transport cost	20	20	-	-	20	100	-	-	-
Storage problem	100	100	37.7	-	80	50	27.3	-	-
Too much competition	33.3	33.3	41.7	-	40	100	50	50	-
Price fluctuation	60	66.77	66.7	-	80	50	72.7	62.5	-
No access to credit	-	-	16.7	-	-	-	22.7	37.5	-
Lack of market demand	33.33	-	25	-	-	-	22.7	12.5	-
Gov t policy	-	-	-	-	-	-	45.5	37.5	-
Oil and light problem	-	-	-	-	-	-	-	87.5	-
Selling place problem	-	-	-	-	-	-	-	37.5	-

Value chain influencers

Value chain influencers were organizations/ institutions that influence value chain actors directly or indirectly like administrative at different level. They perform activities like formulating rules which were written and unwritten (constitutions and laws), rules, regulations, policies and strategies that positively or negatively affect the potato value chain.

Opportunities in South Achefer and Jabi Tehinan district for value chain actors and supporters

The common value chain actors opportunities in both districts were: potato did not need more irrigation water like other crop; possibilities of producing more yields from small plot of land; presence of suitable climatic condition and land to produce. Besides these, presence of supply of fertilizer; easiness to work by male and female; can work at free time and importance of potato for food and marketing purposes were other opportunities. In the South Achefer, nearness of Bhair Dar and kola districts for marketing (*Jawi* and *Shewra*) was the opportunity that can create suitable condition for the creation of linkage with value chain actors. Presence of irrigation water potential in the Jabi Tehinan district was other opportunity for the producers.

Through key informant interview and focus group discussion for value chain, supporters also identify opportunities in both districts. The major opportunities identified were presence of peace at market place, presence of improved variety, suitable land and air condition, need and motivation of farmer to use technology, suitable condition for the creation of linkage with actors, presence of market, transportation and other marketing centers. Besides opportunities for potato value chain were presence of training given at different workshops, farmer's awareness on potato production, and its importance on their economy. In lined with these, suitable climatic conditions, existence of favorable land and high output from a small plot of land were opportunities of producing potato (Biruk et al., 2017). According to Shambel (2017), opportunities of potato production were favorable weather conditions and

good strategic location.

Conclusion and Recommendation

In both districts, different value chain actors were identified in potato value chain that involve exchanging of potato and its products between producer and end consumer. The common value chain actors for both districts were input suppliers, producers, retailers and end consumers. Wholesalers were value chain actors that exist only in South Achefer while collectors were present only in Jabi Tehinan district. This indicates that there was actor variation in involvement of potato value chain. As a result, value chain mapping and constraints that face value chain actors also vary. Hence, in both study districts each value chain actors were affected by different constraints that hinder their development in the potato value chain. Even if there were common constraints, the degrees, in which constraints affect each value chain actor was different.

The study result revealed that there were enormous opportunities to be involved in potato value chain activities but those opportunities were not well unitized due to different constraints. Natural, social, economic and policy issues were the sources of constrains facing value chain actors. In both study districts, there was no formal way of contact among value chain actors to share information or to discuss an issue that would help to fill the gap of potato value chain development. Therefore, each actor (value chain actors, value chain supporters and influencers) should come together to tackle complicated potato value chain development constraints and for further improvement and achievement of common goal of the potato production and marketing through developing innovation platform.

Farmers were not well organized for production and marketing. Hence, special attention should be given to organize farmers cooperative to produce quality potato with full package, which is supported by experts. Besides, the government should also give attention for production of potato like other crop by providing timely and required amount of input (seed and fertilizer). Result of study also indicates that end consumer sample respondent consume potato either cooked, *tibs*, chips and in the form of *watt*. Scientifically, potato is consumed more than this. This is due to the fact that end consumers have little knowledge on potato consumption in different form. Therefore, education/training on consumption of potato should be given to consumers to fill knowledge gap.

ABBREVIATIONS

ACSI, Amhara Credit and Saving Institution; **ARARI,** Amhara Regional Agricultural Research Institute; **AVRDC,** Core Funding to the World Vegetable Center; **CASCAPE,** Capacity Building for Scaling Up of Evidence Based Best Practices in Agricultural Production in Ethiopia; **EIAR,** Ethiopian Institute of Agricultural Research; **IBC,** Institute of Biodiversity Conservation; **MoA,** Ministry of Agriculture; **WHO,** World Health Organization.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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