

Potato Value Chain Analysis



Updated November 2016

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Acronyms and abbreviations

AARC	Adet Agricultural Research Centre
AGP	Agricultural Growth Programme
ARARI	Amhara Region Agricultural Research Institute
ATVET	Agricultural Technical and Vocational Education and Training
BoA	Bureau of Agriculture
BoFEC	Bureau of Finance and Economic Cooperation
BoTIMD	Bureau of Trade Industry and Market Development
BW	Bacterial Wilt (soil-borne disease)
CSA	Central Statistical Agency
DLS	Diffused Light Storage
ERCA	Ethiopian Revenue and Customs Authority
ESE	Ethiopian Seed Enterprise
FREG	Farmers Research Extension Groups
FRG	Farmers Research Groups
FTC	Farmer Training Centre
GAP	Good Agricultural Practices
GoE	Government of Ethiopia
GTP	Growth and Transformation Plan
IDRF	Innovation, Demonstration and Research Fund
ISSD	Integrated Seed Sector Development
KIMCU	Koga Irrigation Marketing Union
LB	Late Blight (disease/pest; seed-borne)
m.a.s.l	metres above sea level
MFA	Ministry for Foreign Affairs of Finland
MGF	Matching Grant Fund
MoFEC	Ministry of Finance and Economic Cooperation
ORDA	Organization for Rehabilitation and Development in Amhara
PIF	Policy and Investment Framework (2010/11-2014/15)
PSU	Programme Support Unit (Agro-BIG)
SMS	Subject Matter Specialist
SNNP	Southern Nations, Nationalities, and Peoples
SNNPR	Southern Nations, Nationalities, and Peoples Region
TC	Tissue Culture

VC	Value Chain
VCA	Value Chain Analysis
VCD	Value Chain Development
VCF	Value Chain Fund
WoA	Woreda Office of Agriculture (woreda is equivalent to district)
WoFEC	Woreda Office of Finance and Economic Cooperation
WoTIMD	Woreda Office of Trade Industry and Market Development
Belg	short rainy season, January to June
Kebele	neighbourhood (location of about 5,000 people)
Meher	long rainy season, June to December

Executive summary

Ethiopia has a very high potential for potato production as much arable land is located in the mid and high altitudes, which are suitable for potato production. Close to half of the country's current potato production comes from Amhara region.

Potato is an important food security and a hunger reliever crop in Amhara region and in several other parts of the country. This is because of its ability to mature in advance of most other crops, in particular grain, at the time of critical food need, mainly from September until November. During these months, late blight prevents the production of potato. However, with the availability of late blight resistant varieties in the highlands, potato can now be grown during the long rainy season. This not only has the potential to eliminate the September–November period of food shortage, it has provided potato producers with an income from the sale of ware potatoes during this period. Furthermore, potato has a wide flexibility in terms of the time of planting and harvesting, and can be harvested and consumed before the crop is fully mature. In addition, potato can be planted in various multiple cropping systems because their short and highly flexible vegetative cycle fits well into that. The grow cycle of potato is relatively short, around 100 days, depending on the variety and the local climate conditions.

In addition, potato produces more food per unit area than any of the other major food crops. This is illustrated by the fact that potato accounts for approximately 3.5% of the area devoted to the world's four main food crops, but contributes some 14% of the share of food production. The production of dry matter and protein from potato is significantly higher than other food crops such as wheat, rice and maize. From a food security point of view, it is important that potatoes produce more nutritious food more quickly, on less land and in harsher climates than most other major crops. Up to 85% of the plant is edible human food, compared with around 50% for cereals.

Market opportunities are emerging for potato as a popular source of affordable food for growing urban populations. Potato is not prone to speculative commodities trading on global markets; instead, prices are more likely set by local supply-and-demand conditions. Yet, potato has long been regarded as a subsistence crop and is still one of the underexploited food crops with a huge unrealized potential to improve food security, income and human nutrition. Also in Ethiopia, there is a growing interest in the potato crop by private investors and policy makers. Cultivation of potato is rapidly expanding to irrigable areas. For instance, in Koga irrigation project, out of the total 5,060 ha of land covered by different crops, 2042 ha (41%) was used to produce potatoes in 2014 and a total production of around 40,000 tons was achieved.

Seed potato supply has, as yet, not been taken up by the seed companies and has thus been overlooked in the formal seed system. Consequently, the informal seed system still prevails in much of the country. Due to the gap in seed quality control, the incidence of diseases as bacterial wilt and late blight have become serious and need due attention. As quality control and certification is weak, farmers are not very interested in paying higher prices for seed potatoes because they cannot be sure that they are getting the genuine product. National average yield of 8t/ha is still far below attainable yields which are as high as 45 tons/ha for the improved potato varieties. At regional level (ANRS) average yields of 12-13 ton/ha for rain-fed and up to 20 tons/ha for land under irrigation have been reported. Another constraint in the value chain is that farmers are, for various reasons, not applying recommended improved agricultural practices. Furthermore, because of lack of adequate storage facilities, packing and processing facilities, post-harvest losses are significant.

As for most of the agricultural value chains, women do participate in the cultivation of potato but are much less involved in decision-making and sale (except for some retailing). Potentially potato can

generate more employment in the farm economy than many other crops and serve as a source of cash income for low-income farm households. Potato can also offer opportunities for processing at an industries scale, for instance for starch.

1. Introduction

1.1. Characteristics

Potato is one of the world's four major food crops, along with rice, wheat and maize. It is a crop that can be grown in a variety of altitudes. It has a wide flexibility in terms of the time of planting and harvesting, and can be harvested and consumed before the crop is fully mature. In addition, potato can be planted in various multiple cropping systems because its short and highly flexible vegetative cycle. The growth cycle of potato is relatively short, around 100 days, depending on the variety.

Potato produces more food per unit area than any of the other major food crops. Potato accounts for approximately 3.5% of the area devoted to the world's four main food crops, but contributes some 14% of the share of food production. Potato generates more employment in the farm economy than many other major crops. From a food security point of view, it is also important to realize that potatoes produce more nutritious food more quickly, on less land and in harsher climates than most other major crops. Up to 85% of the plant is edible human food, compared with around 50% for cereals

A highly dependable food security crop, potato offers important advantages over major food grains. Potato is not prone to speculative commodities trading on global markets; instead, prices are more likely set by local supply-and-demand conditions. Yet, potato has long been regarded as a lowly subsistence crop and is still one of the underexploited food crops with a huge unrealized potential to improve food security, income and human nutrition.

The production of dry matter and protein from potato is significantly higher than other food crops such as wheat, rice and maize. Furthermore, the biological quality of the potato protein is high, with a well-balanced amino acid content that is comparable to that of milk and eggs.

1.2. Importance to Ethiopia

In Ethiopia, food shortages often occur from September until November, prior to the grain harvest. During these months, late blight has in the past prevented the production of potato, particularly in the highlands. With the availability of late blight resistant varieties producers in the highlands of Ethiopia can now grow potato during the long rainy season. This not only has the potential to eliminate the September–November period of food shortage, it provides potato producers with an income from the sale of ware potatoes in September and October.

Ethiopia has a very high potential for potato production as its 70% arable land or over six million ha are located in the mid and high altitudes, which is suitable for potato production. It can be noticed that in Ethiopia there is a growing interest in the potato crop by private investors. In recent years, the production of this crop is expanding because of availability of improved technologies, expansion of irrigation culture, increased market value and production systems diversification.

However, national average yields of 8 tons/ha are still far below attainable yields that are as high as 45 tons/ha for the improved potato varieties. At regional level (ANRS) average yields of 12-13 ton/ha for rain-fed to 20 tons/ha for land under irrigation have been reported. The main bottleneck to increased potato productivity in Ethiopia is lack of access to improved seed material.

Improved varieties are not yet easily available to the potato growers. An important reason is because of inadequate multiplication and dissemination. Potato is a rewarding crop that is in high demand but which has failed to appeal to seed companies, being overlooked in the formal seed system. Consequently, the informal seed system prevails in much of the country. Due to this gap in seed quality control mechanism, diseases as bacterial wilt and late blight have become serious in many areas, to the extent of deferring potato production.

1.3. Importance to Amhara

Close to half of the country 's potato production comes from Amhara region. Potato is an important food security and a hunger reliever crop in Amhara region and in several other parts of the country by virtue of its ability to mature in advance of most other crops at the time of critical food need. Cultivation of potato is rapidly expanding to irrigable areas. For instance, in Koga irrigation project, out of the total 5,060 ha of land covered by different crops, 2042 ha (41%) was under potato production in 2014 yielding and a total production of around 40,000 tons.

2. Production

2.1. Seed

The informal system is the predominant seed production system accounting for 98.7% of the total potato seed produced in the country. The formal system involves seed certification by Ministry of Agriculture according the Ethiopian Standard for Seed Potato (ES 494:2005). The legal framework for a formal root and tuber seed certification scheme not implemented. Given the size of Ethiopia, with a limited road infrastructure and the fact that seed potatoes are being produced by hundred thousands of small-scale farmers, the costs for implementing a formal seed certification scheme would be high. However, it might be feasible to certify seed produced by large-scale producers, particularly for those aiming at exporting potato seed to neighbouring countries. To produce quality seeds for the potato production in Ethiopia, land need to be available at two different altitudes is needed; at highland farms (more than 2,400 m) to produce healthy seed during the warm and rainy spring season (January-May) and at midland farms (1,500-2,000 m) to produce healthy seed during the cold autumn season (October-January).

Seed quality is an important determinant for tuber yield and quality. A centralized approach whereby G2 (generation 2) and G3 (generation 3) seed is produced at only a few locations would involve huge logistics and cost to make this seed available to potato farmers in major rural seed production areas. This calls for a more decentralized seed production and multiplication system. It links producers of pre-basic minitubers with farmer-based seed multiplication and dissemination systems, thereby creating a new hybrid system that incorporates components of the alternative as well as informal seed systems. Such a system would have the potential to give large numbers of potato farmers 'access to quality seed.

So far, in Koga command area, farmers are supplied with seed potato directly from nearby traders located both in Bahir Dar and Merawi towns. Local traders' supplies potato seeds that are brought from distant places such as Debre Markos, Hawassa, Shashemene, Koser, Gaynt, and Gondar towns. The quality of seed potato, however, is reported to be inferior in quality. Farmers witnessed that there have been unfavourable practices such as mixing up different varieties. It is common to find plots in Koga and elsewhere with white and purple colours and varying tuber sizes during harvesting. Farmers distinguish the available potato varieties by observations and own experience. They differentiate potato varieties by colour. According to farmers the dominant varieties are white, red and mixed. According to farmers in Kudmi block, red colour potato is preferred on the local market instead of the white ones. For Addis market they are aware that they should grow white colour potatoes, preferred for chips.

Agro-BIG has organized two cooperatives consisting of 87 farmers producing potato seed in the highlands of Mecha. In 2015 cropping season AgroBIG in collaboration with Adet RC, has been starting community based potato seed multiplication pilot initiative. Adet RC has supplied 9,800 mini tubers to selected four farmers. The performance and productivity was found very promising. After harvest each farmer has returned back the equivalent number of tubers initially was given and those seeds were replanted through irrigation on the organized youth group's plots in the same kebele. The remaining seeds were reserved for next planting season and part of it shared to fellow cooperative members.

The Koga Irrigation Marketing Union (KIMCU): Cognizant of the seed potato problem, the KIMCU has supplied improved potato variety secured from Shashemene area, albeit rejected by the farmers as the quality was found to be inferior compared to the ones delivered by local traders. Farmers in Kudmi Block wanted to get guarantees that the potato seed supplied by KIMCU is good quality. The union has created linkages with Ras Gaiyut seed producing cooperative.

Amhara Seed Enterprise (ASE): The Amhara Seed Enterprise is mandated to multiply and distribute certified seeds for cereal crops, horticultural crops and animal feeds, but have done little on potato. Its central focus so far has been in the multiplication and distribution of cereal crop seeds. With respect to seed potato, the enterprise has shown some interest and willingness to engage in seed potato production with the condition that support from Agro-BIG is rendered and linkage is created with the Regional Tissue Culture Centre. Minimum required materials and quality parameters shall also be fulfilled beforehand. Basic seed/early generation seed can be supplied from ARARI and from ORDA having a tissue center close to Bahir Dar.

2.2. Agricultural practices

Input use

- **Improved varieties:** To date, about 30 potato varieties have been released by the research centres of Adet (based in ANRS region), Kulumsa and Holleta and have been registered by MoA. However, these varieties are mainly targeted for rain-fed potato production and not for areas under irrigation. For these latter, the research has not done much yet. Adet Research Centre has formulated packages for farmers and submitted to the BoA. These are expected to serve also the irrigated areas. The centre has also identified some potato varieties with good characteristics for processing (industrial use and nutrition purpose).
- **Fertilizer:** The main fertilizers used for production of potato are Urea, DAP and NPS. Farmers in the ANRS region apply the same; averages that were found were 0.5 and 1.5 qtl/ha respectively. These need to be further researched. Farmers in Koga area are using DAP and Urea, however they are complaining about the unprecedented price hikes. Due to this reality, the application of fertilizers to potato fields is below the recommended quantities and some may not use at all. Usually suppliers of DAP (di-ammonium phosphate) and Urea are primary cooperatives that are found in localities of farmers. Merkeb Union supplies chemical fertilizers on credit basis for Meher season production through primary cooperatives in the Koga area. Farmers are encouraged to apply fertilizers for irrigated crops including potatoes, though for Meher season credit is provided. Farmers in the area have indicated that they can obtain the quantities they require without problems.
- **Chemicals:** There is not a dominant practice in applying pesticides in the Koga irrigation command area for potatoes. Potato blight is the main disease in the area in particular during the rainy season. Farmers have confirmed that during the off-season there is no potato late blight problem as such. It is not clear yet whether there is no (felt) need for chemicals or that farmers consider it too expensive or a combination of those. Pesticides are mostly supplied by private vendors. There are few suppliers of pesticides and herbicides in the region; it remains a question

whether this is the result of the low demand or the low rate of application is, amongst others, a consequence of the non-availability of chemicals. There is no real control on the genuineness and quality of the products sold. Even if the products are genuine, due to improper storage, handling, transport they may lose their quality. Agro-BIG considering the situation initiated professional chemical service provided by organized and trained youth groups.

Agronomic practices

In Ethiopia, potatoes are often grown in rotation with other crops such as maize, rapeseed, and faba beans during the meher (main cropping) season. There are two main potato production seasons in Mecha:

- Off season, using irrigation from October to May;
- Main season, meher, rain fed, mainly outside the Koga area, April to August.

In Koga command area, the majority of farmers prepare the land in September to October, plant in October – May and subsequently harvest 100-120 day later. So, the period from February to April is the peak marketing period.

Farmers in northwest Ethiopia plant potato earlier in the season to escape late blight infection. However, this practice exposes the crop to moisture stress at the early growth stage for which potato is very sensitive and subject to considerable loss. Regardless of type of variety, yields declined as planting date was delayed. So, on the one hand when planting early, infestation with late blight can be reduced but with a risk of production losses because of moisture stress. On the other hand, when planting (relatively) late, there is less risk of moisture stress but considerable risk of LB. Therefore, May 1–June 1 are recommended planting dates around Adet for potato cultivars and similar agro-ecologies that are LB susceptible and moderately tolerant/resistant. Although there are LB resistant varieties available, there are few farmers in Koga command area that do grow potato during the rainy season. Agro-BIG has facilitated demonstration of improved and LB-resistant varieties in the Agro-BIG baseline vary from 11, 3 to 15.8 ton/ha.

Average yields reported for rain-fed conditions to around 20 tons per HA for irrigated areas (like Koga). Yields realised at research stations at a level of 35 – 40 tons per HA cannot be achieved at field level. It has become clear that the lack of quality seed potatoes is one of the main contributors to this low yield. Lack of good agronomic practices is another one. Acid soil is another problem.

2.3. Water requirements/irrigation

Potato is a water demanding crop. Where water is easily available, farmers tend to use too much water, in flood irrigation. Furrow irrigation is the preferred.

2.4. Harvesting

Harvesting is best done when the soil is slightly moist to prevent abrasion and the tubers lifted carefully to avoid damage. Ideally they should be left to dry for few hours in the field, collected in field containers and placed in a cool, shady place. Potatoes for food (ware potatoes) must not be exposed to light for more than a few hours otherwise they turn green, develop an unpleasant taste and may become toxic.

In the absence of storage technologies for ware potato, farmers in Ethiopia have the practice to keep potato harvest in the ground for a long period. This reduces tuber yield significantly as moisture is lost. An old study on extended harvesting period in Alemaya revealed that the yield of marketable tubers was reduced by 60% when tubers were harvested at 210 days after planting as compared to harvesting at 120 days.

Uprooting potatoes by using oxen ploughing causes much damage. Agro-BIG has introduced a potato digger to reduce losses but labour is then more intensive.

3. Post-Harvest

3.1. Handling

Post-harvest handling which includes sorting and grading, packing, transportation, loading and unloading which is carried out by farmers, brokers and traders. When the potato is sold at farm-gate, all the handling activities are carried out by the buyer (trader or broker). In this case, traders are responsible for sorting and grading. Normally they hire daily laborers to separate the damaged and faultless tubers. They also keep the medium and large sized potatoes apart, i.e. they are buying these and not the smaller sized ones. Farmers often use these small ones for home-consumption or try to sell them in the nearby market of Merawi.

3.2. Storage requirements

Temperature and tuber damage are the two most important factors in successful potato storage. Very careful handling is the key to preventing damage. Farmers often just store potatoes on the floor in their houses.

Since the farmers have limited space to store their products they are inclined to sell their potatoes immediately after harvest or leave them in the ground. In the former case, the price may be low because just after harvest the offer is quite high. In the latter case, the quality will deteriorate and result in losses. Experience has shown that the losses may be as high as 60%.

3.3. Shelf life

Ware potatoes are commonly stored up to six months in the highlands without significant losses provided that: (i) the variety of potato is one with a long dormancy or the tubers are treated with a sprout inhibitor if storage duration is required to continue beyond the period of dormancy; (ii) the potatoes are free from diseases, damage or insect infestation; (iii) storage temperatures are kept to levels that do not induce high rates of respiration; (iv) the relative humidity within the store is kept at sufficiently high levels to reduce water loss from the tubers; and (v) the potatoes are not wet as a result of rain or condensation.

3.4. Packaging

After sorting and grading, the potatoes are bagged in sacks. The capacity of the sacks used varies from 115 – 150 kg. Standard sacks are not available, nor are they labeled. Later on the traders re-bag the potatoes in smaller bags before selling them. Because of the way this is done, damages occur which reduces the shelf-life of the potatoes.

Agro-BIG has provided weighing scales so that products can be sold at correct weights, not estimated.

3.5. Transport

At present, the transport services in Koga area are dominated by private truck owners. Two types of trucks are used, bigger ones (capacity 9 tonnes) and smaller ones (capacity 4 tonnes).

Many farmers do not sell their potatoes at the farm gate level, but rent horse drawn carts (locally called *Garis*) to transport their potatoes to the local market in Merawi. Similarly, traders are renting trucks to transport potatoes from farming sites to regional markets, mainly Bahir Dar. They rent trucks through brokers and friends. In general, availability of means of transport both to farmers and traders does not seem to be a barrier in potato marketing despite the cost.

4. Marketing

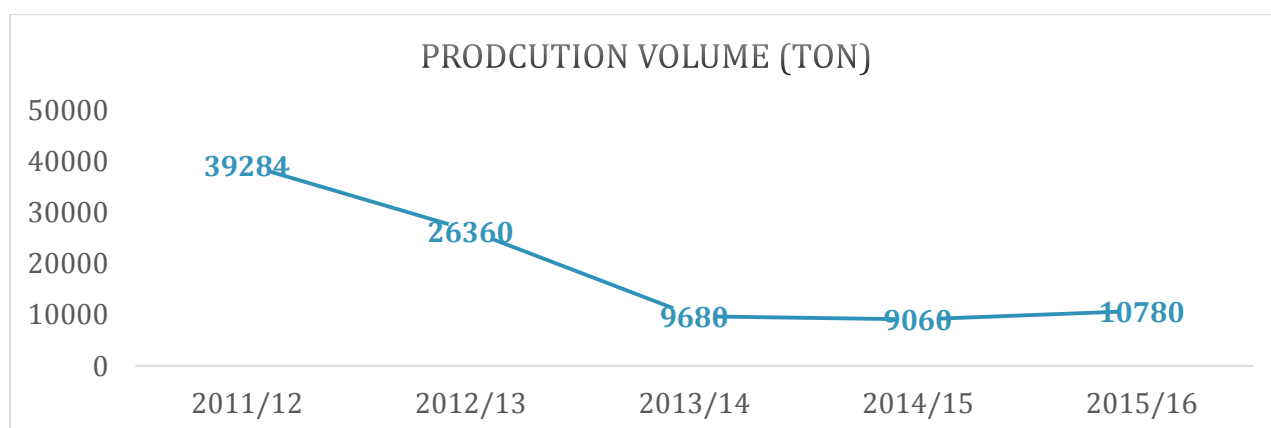
4.1. Demand and supply situation

Supply

Potato production expanded in Ethiopia significantly from 30,000 ha to 160,000ha of land in three decades. As per CSA 2014/15 main season production survey, there was 2.735 million quintal Potatoes production in Amhara region alone from which 9.21% supplied to the market and 80.15% used for household consumption. The remaining about 10% was used as seed, wage in kind and other purposes (CSA, 2015). The production in most areas relies heavily on rainfall, that makes the supply less predictable.

In Mecha irrigation command area the production of potato has a declining trend as indicated in Fig 1 in the last five years. The main reason for that were low price at pick production season, shift land to wheat production with the contractual agreement farmers has and production area allowed decrease due to water shortage in the dam. The production expected to pick up again in the coming production season referring last year production volume which was better that the previous year and next production season plan.

Figure 1: Mecha Koga Irrigation Area Potatoes Production Volume Trend (2011/12 – 2015/16 – ton)



Source: KIP

Demand

Consumption practices of potato products vary from country to country. Potato is commonly consumed in the form of cooked potato in a variety of traditional dishes. In the households of almost all eastern and central African countries, consumption of boiled potato is most dominant. Consumption of potato in the form of sauce in mixture with other spices is the most popular cultural dish in Ethiopia. Some restaurants and (bigger) hotels have French fries on the menu. A small percentage of potato is consumed in a processed form like potato crisps.

A huge part of the potatoes is consumed as sauce/wot, with boiled as a good second. The consumption of boiled potatoes is higher by elder consumers as compared to younger ones. The latter group is increasingly switching to French fries. Also in the middle income household there is a relative high consumption of French fries, compared to the lower income groups. The same applies for urban settings where the consumption of French fries is on the increase. With the population growth and potato use diversification there is more positive prospect for the demand growth.

4.2. Quality requirements

It is need for a standard to be developed to respond to quality requirement of consumers. ETfruit uses 3 grades, based on size and colour. With existing practice, the most preferred (by traders as well as farmers) and widely available potato improved varieties in Mecha area are Belete, Jaleni, Guassa and Gudeni. Suitable varieties for different purposes, table and processing types, are Gera and Jaleni for table and Zengena, Guassa and Wochecha for processing. For French fries and potato crisps, white and bigger tubers are preferred, unlike the red variety that is more common in Mecha. According to farmers and traders in Mecha, the consumers in that region prefer the red variety. Consumers in Addis do have a different preference, they like the white variety rather than the red one.

4.3. Marketing outlets/main segments/areas

The end consumers of ware-potato can, broadly, be divided in three main categories:

- Households, individuals, buying smaller quantities for daily consumption;
- Hotels, restaurants and institutional buyers like universities, prison, defense force;
- Processors (entrepreneurs) far making chips and crisps.

The first two categories mainly buy potatoes to transform it into food (eating), the third one for processing. As a consequence, their selection criteria, like size, colour, differ. Potato growers seem to be quite well-informed on the preferences of the first two categories of consumers. They know that consumers in the Bahir Dar region prefer the red potato whilst the Addis consumers prefer the white one. This makes clear that farmers have to decide in advance whom they target as their consumers as preferences differ and the choice of variety (colour) will depend on this.

Low to middle income market segment: It is estimated that the vast majority of over 85% of the Ethiopian market falls within this category of low to middle income market. This group consists mainly of individual consumers with limited purchasing power. Individuals buy potato for home consumption. Most of the time, they buy small amounts of potato from retailers.

High to middle income markets: The bracket of high to middle income markets is concerned with quality as much as prices; in particular consumers with middle to high incomes are concerned with a good quality and are prepared to pay a higher price for this. Prices are quite low in Addis Ababa.

Major buyers: The segment consists of big hotels, restaurants, cafes and institutional buyers like universities who set some quality specifications and requirements like timely and year-round delivery. For individual farmers it is hardly possible to guarantee this regular, year-round supply. Only in case they manage to organize themselves and jointly supply the institution this may be possible; however, even then, the matter remains complicated because of the seasonality of the produce. Large public institutions like the universities respect the national bidding system. One of the requirements for potential bidders is that they have a TIN number. At present hardly any farmer has obtained such a number and even most of the cooperatives do not have one.

Processed products: As potato is an important food and cash crop in Ethiopia, in particular in certain geographical areas like Amhara region, processing could bring more value addition. At the same time, it could, to a certain extent, reduce post-harvest losses. Another added advantage is that increasing the type and volume of outlets may give better prices for the farmers, in particular at

harvest time. Various surveys demonstrate that with tendencies like feed habits changing in favour of easy-to-prepared foods such as French fries. And with the population doubling every 25 years and, there is a good potential for the establishment of processing industries and also increasing market outlets for both fresh and frozen potato chips. Moreso, in Ethiopia the prices of imported French fries are higher than locally made French fries by over 200 percent, which also indicates that there may be good opportunities for import substitution. Consumption of potato chips seems to be on the increase in Ethiopia at household as well as at retail outlets such as hotels, restaurants and supermarkets. Many of the retail outlets process French fries for own use or for selling in their own establishment.

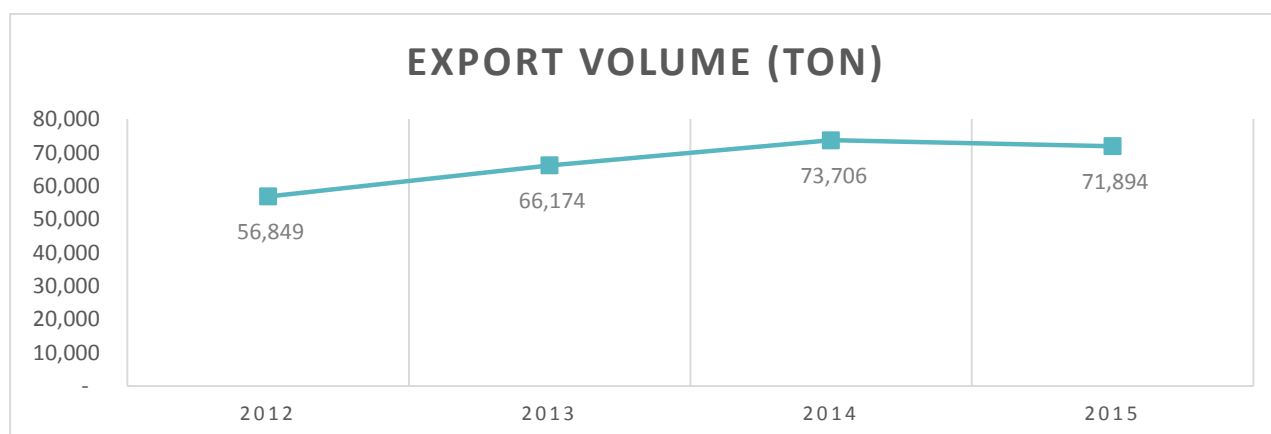
Bahir Dar Food Science and Research Unit under ARARI has been promoting different types potato use through the dissemination of recipes and processing methods. The recipes include bread, injera (potato mixed with teff), alcohol and starch. In Ethiopia and also in the ANRS region some processing facilities for potato have been established. To date these are however small-scale initiatives that as yet require only limited quantities of (ware) potato. A crucial issue regarding the processing is marketability of the processed product. The successful introduction of processed products will depend a lot on consumer acceptance of this new product.

- **French fries:** Some potato processing is going on in Ethiopia including in the ANRS, on a small scale. The demand for potato chips/crisps is still quite low which makes that a profitable processing is not yet evident. Part of this processed potato is imported e.g. frozen French fries and potato crisps. The demand for the former is from some (bigger) supermarkets and some (bigger) hotels in Addis. Demand for frozen French fries outside Addis is still limited, in fact non-existent. Although imported frozen French fries are used, most of the establishments seem to prefer preparing their French fries from fresh potatoes. The main reasons are: (1) imported frozen French fries are relatively expensive, (2) they are relatively hard to get by and (3) the difference in taste (in favour of the freshly prepared French fries). Ethiopia has only a few frozen French fries processors. One of them had started production in Addis in 2011. This company supplies French fries to hotel and supermarkets in Addis. Agro-BIG has supported chips making women groups in Bahir Dar.
- **Potato flour production:** In Bahir Dar there is one entrepreneur engaged in potato processing. The process involves drying of potatoes and, subsequently, processing them into potato flour for food. The latter is mixed with other ingredients like bean, beetroot, carrot-flour, etc. He has obtained a patent on the extraction process. Most of the operations are done manually. The capacity of processing is 10 Qtl per day. In order to get clients a stand has been set-up at the market. There have been no problems selling his products. Assistance has been obtained from various actors, like the TVET bureau and Agro-BIG.
- **Starch:** The starch used in Ethiopia is for industrial purposes. Different type of starch imported that includes potato starch from China and other countries. Agro-BIG has done a study showing the potential.
- **By-products like peels and waste:** By-products can result from processing. E.g. the peels of potatoes are a by-product. Often the economic value of such by-products is neglected but potato peels can be used for animal consumption.

Export market: Around 80 to 90% of the total volume and value of potatoes exported to Djibouti. The second biggest export country is Somalia, which accounts for 8 and 15%. The remainder of the export is to Sudan, Yemen and Saudi Arabia. The export of ware potato, both in quantity/volume and value is increasing. E.g. the volume in 2001 was approximately 6,000 tonnes; in 2010 this had reached 21,555 and 71,893 tonnes in 2015. The bulk of the potato products exported by Ethiopia are fresh or chilled potatoes, followed by frozen potatoes and a relative small portion of seed potatoes. As

indicated in the graph below (Fig 2) the export showed similar increasing trend in general in the last four years.

Figure 2: Potatoes Export Volume (2012-2015 – ton)



Data Source: Ethiopian Revenue and Customs Authority (ERCA)

Market channels

Marketing channels refer to the routes taken by products from producers to consumers. Potato produced in ANRS pass through various channels until they reach the final consumers. Three main channels have been identified in the VCA.

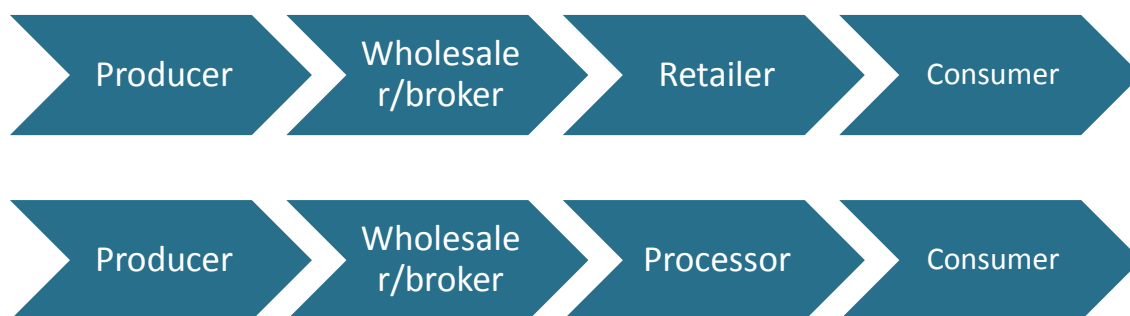
The first and shortest one, and at the same time the most insignificant one when it comes to volume, is where the producers sell directly to the consumers (channel 1). This type of transactions takes place mostly in the woreda capital of Merawi. Some Koga farmers even go to Bahir Dar to sell their produce directly on the market. The volume in this channel is relatively limited.

The second channel, which is the most common, is where farmers sell to brokers at the farm-gate. These brokers are buying on behalf of wholesalers. The wholesalers in turn sell it to big supermarkets and to retailers who subsequently sell it to final consumers.

The third channel is where producers sell it to wholesalers or brokers who deliver to other wholesalers involved in export. They transport it over the border where they have their clients. These latter ones sell it on to final consumers. The image below illustrates the three channels.

Figure 3: Ware potato marketing flows





As can be noted, in the main channel as well as in the export channel, there is a strong involvement of brokers. At the same time, the cooperatives do not play a role as such in the marketing of the produce of their members.

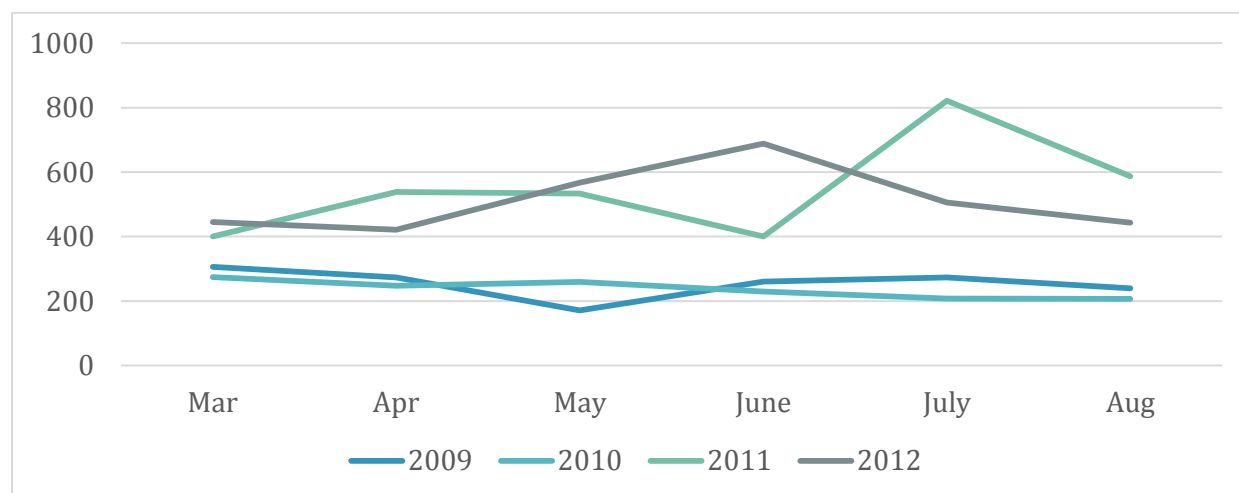
With the exception of the state enterprises, most of the agreements e.g. between brokers and wholesalers are verbal ones. Further research and analysis is needed to find out if this always works out and how often there are disputes (and on what).

It is not always possible to draw a clear line between wholesale and retail activities as it happens that both functions are undertaken by the same entity like, e.g., ETfruit acts as a wholesaler but also as a retailer selling directly to consumers.

4.4. Price fluctuations

There is price fluctuation, in some month's very significant changes but the trend is not easily predictable with general price increase as compared to previous years (Fig 4).

Figure 4: Price trend (2009-2012 - Birr/Qtl)



Source: BoTIMD data base

4.5. Main Value Chain Actors

Producers

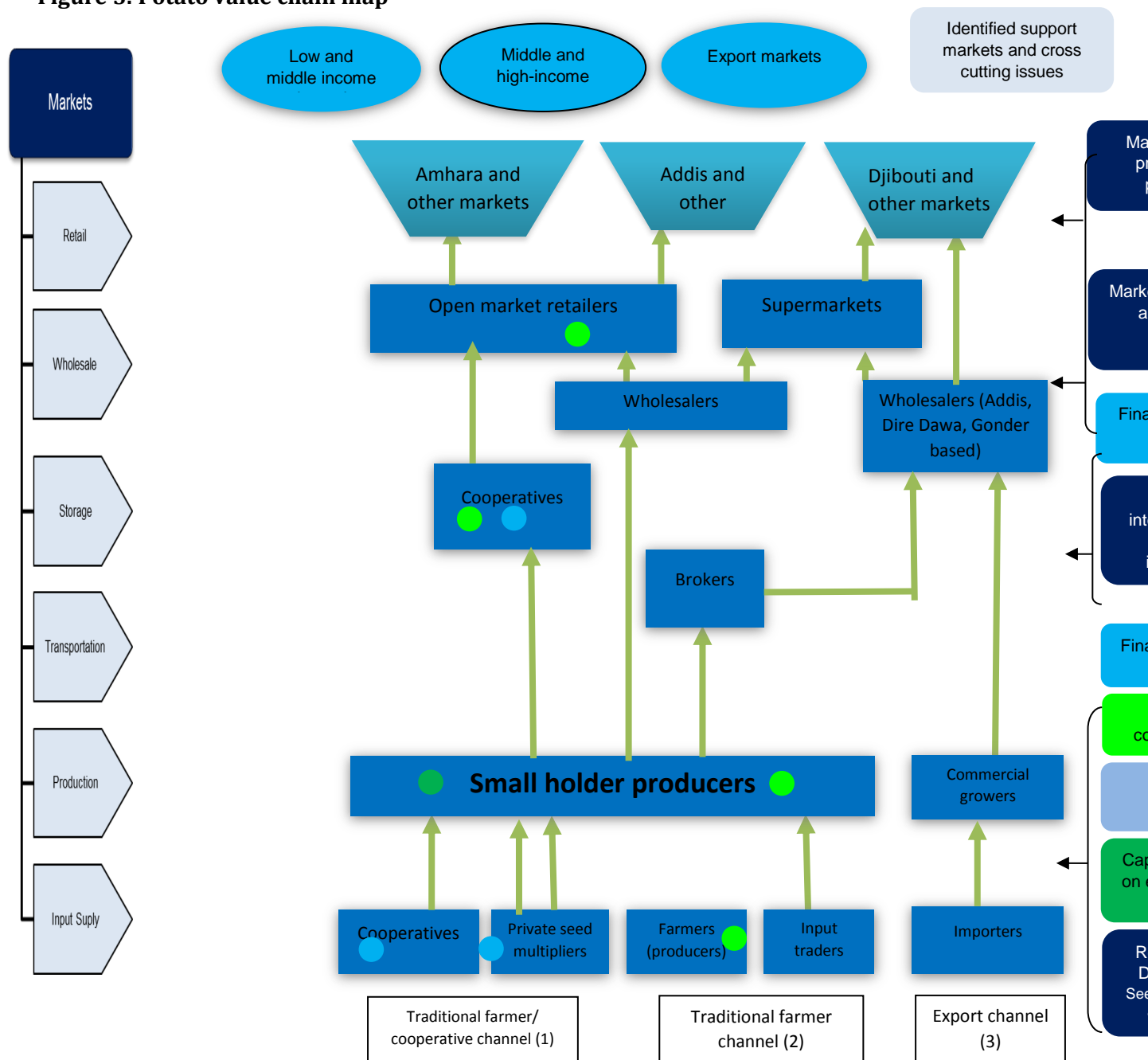
Farmers/potato producers are a key primary actors in the VC. In the Koga command area, farmers are organized based on irrigation canals and farm plot areas. Each tertiary canal has a *Ketena* leader. Each quaternary canal has water user team leaders with a maximum of 16 ha of land and 30 farm

households under their responsibility. Input use, agronomic practice and post-harvest handling described in sections above.

Bulking and trading

- **Cooperatives and associations:** Cooperatives are formally established, registered legal entities; their major source of capital is membership registration fees and shares. Associations may be informal, or formal and registered. In the irrigated farming areas farmers establish Water User Associations (WUAs). Legislation for WUA's is still being developed and currently they are not formally legal entities (source: AgroBIG programme document). In Koga area, primary cooperatives are established in 12 blocks according to secondary irrigation canals. Their main role is to manage irrigation water utilization in the command area, input distribution, transmit market information and facilitate linkage services, strengthen membership, etc. Similarly, the Koga Irrigation Marketing Cooperative Union is providing services including input/output marketing (pesticide, sprayers, and seeds including potato). Output marketing by the Union has not yet started, especially related to horticulture crops including potato, though some efforts have been made to create linkage with institutional buyers such as Bahir Dar University (BDU). It also provides support to primary cooperatives.
- **Brokers /middlemen:** Brokers play a role in the ware-potato marketing but seem to be less involved in this crop than in some other ones (like onion). They facilitate transactions by linking producers with traders, bringing wholesalers in contact with each other and wholesalers with retailers. A number of farmers indicated that often they sell their potatoes directly to the trader.
- **Wholesalers:** The wholesalers buy at the farm gate, either by going there themselves or by hiring in a broker. They subsequently sell the ware-potato to different customers at their point of sale.
- **Retailer:** This group of traders buys potato from the wholesalers and sells to individual consumers. Usually traded quantities are limited. Women's involvement in this part of the chain is substantial compared to other chains in the chain.
- **Exporters / international market:** Ethiopia is a net exporter of potatoes. The export is mainly limited to two neighbouring countries Djibouti (more than 80% of the volume exported) and Somalia.
- **Processors:** there is no significant potato processing happening to in the region, except small scale chips supply in hotels and micro business operators. With Agro-BIG support youth women group supported to engage in chips supply in Mecha and Bahir Dar town.

Figure 5: Potato value chain map



4.6. Supporters and Enablers

Woreda offices of Agriculture: The Woreda offices of Agriculture (WoA) provide various advisory and practical services to farmers producing potato. The office encourages farmers to sow potato, use improved seeds, use furrow irrigation and apply recommended level of fertilizer. The office is working towards expanding irrigation access and coverage in the woreda through different strategies such as development of small scale irrigation, use of generators, pumps and so on. Advice on agronomic practices, post-harvest handling etc. is being provided to farmers. As capacity limitations include human resources, as working premises, equipment, communications, furniture and other facilities. AgroBIG has been providing training and various materials.

Koga Irrigation Project office: The Koga Irrigation Project Office has been set up and accountable to the BOA. It is currently providing extension/advisory service on potato production in the command area. Extension services are categorized into two main parts, i.e. advisory services and cooperative development and management. Farmers Training Centres (FTCs) are also established in the Koga irrigation command area, namely, Kudmi, Amarit, Ambo Mesk, Enguti, and Andinet *Blocks*. The Koga irrigation project structure is mainly targeted to intensify irrigated agriculture engaging small holder farmers.

FTC and ATVETs: The Agricultural Technical and Vocational Education and Training Centers (ATVET) have been established in order to upgrade the skills of the Development Agents (DA) and (agricultural) subject matter specialists. The Farmer Training Centers (FTC) are, as the name already indicates, training centers for farmers. AgroBIG has supported the construction of model FTCs that include a 2.5 ha demonstration area directly linked to the FTC. Regular trainings are provided at FTC level.

Kebele Agricultural Experts: There are 3 DAs per kebele; one specialized in agronomy/horticulture, one in livestock and one in Natural Resources Management (NRM). Most of them are generalists and did not receive training in particular crops like potato. The DAs provide extension services in the field. Several farmers made the comment that the DAs are often underperforming. Lack of motivation, due to low pay and unattractive secondary labor conditions, are given as an explanation. There is skill gap among this staff.

Cooperative Promotion Agency: The Cooperative Promotion Agency (CPA) provides the following major services to cooperatives:

- Organize and provide legal certificate to cooperatives;
- Provides audit services to cooperatives which are organized in economic groups;
- Create awareness among members of cooperatives and the larger community regarding the benefits of cooperatives to solve socio-economic challenges;
- Facilitate the distribution of dividend among members of cooperatives;
- Provide training on bookkeeping, management and leadership, good governance and so on.
- The capacity and outreach of CPA remain limited.

Woreda Trade Industry and Market Development Office: The following services are rendered in Mecha:

- Strengthening of market linkages;
- Disseminating market information, (market price information collection on a weekly basis (Wednesday & Saturday) and reported to the respective Zone Office every Monday and average price information is posted on information board;
- Creating conducive market condition for traders (e.g. map prepared to cluster perishable product traders under market shades in Merawi town).
- However reliable market information system is not yet in place.

Adet Research Centre: This Centre is mandated by the GoE to conduct agricultural research activities in the Western part of Amhara Region, mainly in South Gondar, Awi, and West Gojam administrative zones. Adet Centre is also the national coordinator for potato research in Ethiopia. Its role is technology generation, adaptation, multiplication and demonstration for up-scaling. In Koga irrigated command area, Adet Research Centre has established a trial site and two potato variety adaptation trials (i.e. Belete and Jalen) have been carried out. The research has also released a variety specifically for the highland areas of Western Amhara region which is resistant to LB (Late Blight). The centre has established seed potato multiplication site at Felegehiwot kebele in Mecha (at approximately 2,500 masl). Some selected farmers are engaged in the activity. The selected variety is

Belete planted in March 2013. A storage facility is under construction. The prime requirement for potato seed production is to establish diffused light storage (DLS) facility. In the highlands of Mecha woreda, there is a collaborative effort to promote seed potato production at a place called Debre Yakob watershed supported by the Water and Land Resource Project. The centre has also been providing some training to Farmers-Research-Extension Groups (FREGs) to foster alternative seed system. There is limited capacity in the supply of disease free seed potato.

Bahir Dar Technology Multiplication and Food Science Centre: The Bahir Dar Technology Multiplication and Food Science Centre under the Amhara Metal Industry and Machine Technology Development Enterprise, METEC, regionally mandated to generate technology, demonstrate and multiply more adaptable and compatible technologies to small holder farmers. It has been conducting action oriented research undertakings and availing pre and post-harvest technologies. Although its main target is to support small holder farmers, it also collaborates with donor supported projects and small private enterprises. It provides consultation services for high-tech technologies (e.g. consultation and installation of seed processing machines for ASE). It relies on prototypes by searching from internet and partly secured from Ethiopian Science and Technology Commission. The pre-harvest case team is responsible to adapt small scale irrigation, solar power technologies, and post-harvest case team, crop processing and transportation technologies like thresher, storage, processing for milk, honey/bee hive. The role of the food science section is to conduct nutritional value analysis, availing trainings and demonstration.

Technical, Vocational, and Enterprise Development Bureau: has been striving to provide multiple services to organized business operators, both in the rural and urban areas. Prior to the administration of any training, they provided assistance to the SME to get organised, which, finally, includes formalisation of the business. The services are accessible in 287 one-stop-shops (country-wide) organized at Kebele/town level. The types of services provided so far included are awareness creation, registration, need identification, linkages to each training, saving and credit, technical support in business plan preparation, and legalization. The participation of women in skill training, employment generating schemes, market shades and clusters has reached 41%.

Potato coalition: Potato coalition was established in the region in collaboration with other stakeholders for joint planning, learning and improve coordination of actors that are working in the value chain. Agro-BIG was supporting and participating in the initiative.

Financial services

Inadequate access to financial services is one of the major bottlenecks in rural areas. Microfinance institutions (MFIs) and rural savings and credit cooperatives (RUSACCOs) are the only formal financial institutions providing financial services to poor rural households. Currently, only about 15% of rural households have access to savings and credit services. Women account for nearly 50% of the client base of MFIs and RUSACCOs.

Cooperatives have inherent constraints to develop their own capital and to provide collateral for commercial loans. The lack of working capital prevents cooperatives to participate in crop marketing. Private traders dominate the market and set the purchase prices, because they pay cash on delivery to the farmers.

Amhara Credit and Savings Institute (ACSI)

ACSI is one of the 32 microfinance institutions (MFIs) in Ethiopia and among the largest and best performing MFIs in the country. It is the main financial service provider in the rural areas of Amhara region. ACSI has a wide outreach with a network of 401 branches covering all woredas and 3,449 kebeles of the region with 9,000 staff. ACSI has one million active borrowers and 4 million active savings clients.

Granting of agricultural production loans to farmers is based on business plans submitted by the loan seeker, which are appraised by ACSI for borrower's eligibility and loan feasibility. The amount of loan taken by farmers ranges between birr 4,000-5,000 for onion production at an annual interest rate of 18%. Loans to individuals are usually provided against group collateral. All loans have to be repaid within one year.

ACSI has four branches in Fogera with 48 staff and five branches in Mecha with 64 staff. Most of the staff works in the field dealing directly with farmers' agricultural production loans. Good systems have been developed for the follow-up of loan utilization and loan client relations. Most loans to farmer families are signed in the name of the wife. Women are recognized to be more diligent in dealing with financial issues. Repayment in Mecha and Fogera woredas is practically 100%.

AgroBIG has supported ACSI with a Loan Fund of 5.7 million birr. The Fund is to be used for working capital lending to agricultural cooperatives at 13% interest for the selected value chains and for wholesale lending at 11% interest to RUSACCOs in the Mecha and Fogera woredas. Generally, farmers and cooperatives prefer to borrow from the cooperative financial institutions at lower loan interest and to receive an annual dividend from the cooperative financial institutions.

Cooperative financial institutions

A large number of rural cooperative financial organizations have been established in the country to cater for the financial needs of agricultural and other cooperatives and their members. The rural cooperative savings and credit institutions in Ethiopia comprise of a total of 113 savings and credit unions and more than 15,000 rural savings and credit cooperatives (RUSACCOs). These are members' own institutions and capital for lending is collected from members' share contributions and savings.

The Cooperative Promotion Agency (CPA) is mandated to supervise and audit the operations of cooperative financial institutions according to the Cooperative Law and a large number of CPA field staff is engaged in training and supervision of these organizations and the implementation of the RUFIP programme.

There are 26 cooperative savings and credit unions each serving their designated woredas in Amhara region. They provide loans to farmers' agricultural cooperatives and other types of cooperatives that are members of the unions. This is the main lending channel to RUSACCOs for additional lending capital for loans to individual farmer members. Loan amounts are relative to the share and savings contributions of the member organizations. Loan interest is 10-12% for loan duration of one year. Repayment is nearly 100%.

At the kebele level, farmers receive loans from a total of 2,825 rural savings and credit cooperatives in the Amhara region. Lending interest is stipulated by the bylaws of the RUSACCO as agreed by the members and is currently 12%. Normally the loan duration is one year and group collateral is used for repayment security. Capital for lending by RUSACCOs is limited, which restricts farmers' opportunities to invest in agricultural production. Repayment culture in rural lending is excellent and normally 100% of the loans are repaid.

Other banking institutions lending to rural farmers and agricultural cooperatives

The National Bank of Ethiopia governs and regulates financial institutions in the country. Foreign investment in the financial sector is not allowed in Ethiopia. A large number of banks operate mainly in large towns and are increasingly widening their branch network also to the woreda capitals. Farmers' cooperatives can receive loans from these banks at commercial terms and by providing collateral for repayment security.

AgroBIG grants

AgroBIG provides co-funding to value chain actors for investments in the selected value chains, including onions, through three grant funds:

- 1) Innovation, Demonstration and Research Fund (IDRF); 85% contribution for development and demonstration of innovative approaches and support to research programmes.
- 2) Value Chain Fund (VCF); 85% contribution for small farm investments in mechanization and farmer services.
- 3) Matching Grant Fund (MGF), 50% contribution for large scale investments in post-harvest handling and processing for markets.

To benefit from these grants, applications are to be made that are screened and awarded by a committee based on their usefulness in improving the efficiency of the value chain.

Business enabling environment

The business enabling environment at the national and local level encompasses policies, administrative procedures, enacted regulations, market standards and the state of public infrastructure. In addition to these more formal factors, social norms, business culture and local expectations can be powerful aspects of the business enabling environment. Understanding these unwritten rules of society is essential to understand why value chain actors behave the way they do. These more informal factors often impact on women or people from minority groups who enter or are trying to enter the value chain as actors.

The second Growth and Transformation Plan (GTP II) is a main policy document 2015-2019 that has been adopted by the Ethiopian government. It emphasizes the significance of the agriculture sector as a major source of economic growth. The strategy strongly supports the intensified production of marketable farm products for domestic and export markets, by small holders and private agricultural investors. It also encourages a shift to production of high value crops focusing on high productivity areas and intensified commercialization.

Managing natural resources and building the capacity of farmers and government structures is also emphasized. During the GTP II period, application of improved technologies will be intensified to ensure the supply of the required quantity and quality of fertilizer, improved seeds, and small farm machineries.

There are capacity limitations at all levels that include human resources, working premises, equipment, communications, machinery, furniture and other facilities. ATVETs and FTCs require capacity building and improved facilities in order to strengthen their competencies to upgrade the skills of DAs and subject matter specialists. There is also weak research-extension-farmer linkages and lack of communication and collaboration with the private sector.

5. Cross-Cutting Issues

5.1. Gender Inequality

In Ethiopia and in the AgroBIG woredas, women are generally disadvantaged. In meetings, few women attend, and their voices are often not heard. Potato production is a laborious farming activity which needs high labour input from planting to harvesting and marketing. As indicated in Table 4, both women and men are taking part in the process of production with a varying degree of involvement. Despite the considerable contribution of women, men have the main responsibility for selling the harvested onions, reducing women's access to and control over the produce. One of the factors that have turned out to influence the adoption of new technologies is whether the farmer is female or male. Due to many socio-cultural values and norms men have freedom of mobility and participation in different meetings and consequently have greater access to information. Therefore, male heads of household seem to be more likely to adopt new varieties, technologies, cultivation practices, etc.

AgroBIG conducted a gender study at an early stage, which identified possible intervention. In particular, AgroBIG has implemented targeted interventions, and avoided standard awareness raising trainings. Specific interventions targeting women have included the training of 66 women in Fogera on agronomic practices and food preparation to help these women grow and prepare vegetables for sale at the local market. AgroBIG is also in the process of establishing a very special loan fund exclusively for women entrepreneurs. The support to family financial literacy that AgroBIG has channelled through ACSI, is another example where women have been in the focus.

5.2. Reducing Social Inequalities

Taking the local situation AgroBIG has given a strong focus on creating efficient and profitable value chains that is inclusive. At operational level the inclusion of vulnerable groups like people infected with HIV/AIDS or having disabilities is not an easy one, considering that much hard work is needed in the field. For AgroBIG some targeted interventions could be possible.

5.3. Climate Change Adaptation

Issues directly related to climate change adaptation and mitigation has not been high on the AgroBIG agenda. Soil conservation activities are for instance beyond the scope of the Programme. The activities undertaken by REILA can be seen as a support activity in that farmers, once they are secure on their land, are prepared to invest in land improvement including the planting of trees, which means being better prepared for hard times. Measures that have been taken by AgroBIG have included creating awareness of more efficient use of water in irrigation systems as well as considerations that have been identified during the Environmental Impacts Assessments that have been conducted. On the wider approach to environmental concerns, AgroBIG has taken serious measures to prevent and stop the wide and irresponsible use of chemicals that in the past have taken place in Fogera to combat the occurrence of weeds. A 3-days awareness and mitigation campaign was undertaken for 83 participants, drawn from irrigation cooperatives, farmers and DAs, chemical service providers etc. The result has been, action plan developed on the roles and responsibilities to be taken by each stakeholder, in combination with the established sprayer groups in the area created a responsible use of the chemicals. Manual well drilling is a mitigation measure for water shortages in the dry season that need to be promoted.

6. Constraints to be addressed

6.1. SWOT Analysis

In summary, based on the information obtained from primary as well as secondary sources, the Strengths (S), Weaknesses (W), Opportunities (O) and Challenges (C) as presented below have been identified; the presentation is not in order of importance.

Strengths

- Although the cultivation issues are still concentrated on production increase, gradually approaches like market orientation and value chain are getting through;
- Expansion of irrigation infrastructure in the Koga area that enables farmers to produce potato twice a year;
- Experience of seed potato production in the highland areas of ANRS;
- Existence of potato Tissue Culture (TC) laboratory located at ARARI and at ORDA, though with limited capacity (currently it is mainly serving the research work and has a capacity of supplying about 10,000 planting materials);
- BDU Integrated Seed System Development (ISSD) is anticipated to promote seed potato production in Mecha woreda;
- Intervention by partner organizations and enterprises promoting potato seed production in the highlands of Mecha Woreda (e.g. the Water and Land Resource Project, and ISSD);
- Existence of Farmer Training Centres (FTC);
- Existence of cooling facilities at the airport of Bahir Dar
- Possibility of transport by cargo planes from Bahir Dar airport to other destinations;
- Growth of Gondar and Bahir Dar towns provides a steady and year-long demand; also regionally there is a strong and steady demand;
- Ongoing infrastructure development, rural electrification and Universal Access to Rural Road Programme (UARRP) are an opportunity to strengthen trading, market information system and processing;
- Some ongoing experiments with seed potato production in the highlands of Mecha woreda;
- Transport capacity is said to be enough, however availability of cold-chain trucks is very limited (besides, transport from farm-gate to main roads may be a constraint);
- Processing opportunities remain largely unexplored but with growing urbanization and changing eating habits (of younger and medium income people in particular) there seem to be profitable market outlets for various processed products like (frozen) French fries, crisps.

Weaknesses

Farmers level

- Farmers' lack awareness of market requirements (quality, quantity, criteria like sorting/grading, consistency in supply);
- Inadequate financial planning skills;
- Dominance by local varieties which are not preferred neither with farmers nor with traders, because of bad quality, low yields, ...;
- Substantial losses due to prevalence of pests and diseases;
- Lack storage facilities;
- Farmers have been (and to a great extent still are) subsistence farmers and need assistance to transform to commercial farming; lack of market oriented production system;
- Access to working capital and credit is insufficient;
- Practices of potato cropping calendar / staggering of crop) are absent and/or not in use;
- Inefficient use of (irrigation) water;
- Poor coordination among the market actors and lack of trust;

- Transport capacity does not seem to be an issue (BoTIMD) but traders report that renting a truck is more expensive at certain periods of the year; besides, no cold-chain trucks are available;
- Transport from farm to collection point may be a constraint (usually done by donkey cart);
- Part of rural road infrastructure in rural areas may be impossible during the rainy season;
- Farmers are not geared towards production of qualities and quantities required by the (future) food processing industries.

Extension services

- Farmers dissatisfied with extension workers' services;
- Attention is still very much focused on production increase and much less on demands and requirements of the end-consumers /markets;
- Lack of knowledge of the market/consumer needs;
- Lack of good farm management and potato cultivation (agronomic practices) and (post-harvest) handling practices;
- Farmer's Training Centres are neither well equipped nor operational;
- Extension approach, communication skills and methods of DAs inadequate for the (challenging) job;
- Issue of inclusion of women, youth and vulnerable groups is given little attention;
- Released potato varieties are not known by their formal scientific names and not familiar to farmers, traders and even extension staff (DAs);

Cooperatives

- Cooperatives have limited capacity for fresh produce marketing and little knowledge of modern marketing concepts;
- Farmers' cooperatives capital is insufficient to cater for input marketing, working capital needs, administration of training to primary coops, etc.
- Farmers' cooperatives do not have adequate storage facilities like DSL, cold chain;
- Farmers' coops lack means of transportation to facilitate the activities of primary coops and transporting (ware) potatoes from farm gate to the Union storage;
- Inadequate skills on cooperative management, BDS services, storage management, accounting, sales, etc.
- Absence of market linkages with potential institutional buyers (and lack of skills to establish those);
- Coops and unions offices insufficiently equipped (shortage of tables, chairs, office supplies).

Research

- Bahir Dar Technology Multiplication & Food Science Centre has limited staff (number and qualifications) when compared with the geographic area coverage and regional mandate;
- Absence of demonstration plots (to investigate further what the exact causes are: lack of land, other,);
- Financial constraints as well as shortage of improved seed potato to demonstrate production and post-harvest handling in the Koga command area;
- Plant quarantine service is said to be insufficient / inadequate.

Opportunities

- Government's commitment to support irrigation schemes. Irrigation infrastructure covering 7,000 HA is being built and more is targeted;
- Relatively steady year-round (national) demand for potatoes;
- Availability of improved potato varieties;
- Existence of irrigation schemes, sufficient water and land resources;

- As mentioned above, there seem to be good opportunities in the field of potato processing, e.g. into French fries.

Challenges

- Attitude problem towards potatoes as a viable economic and livelihoods improving crop by extension staff, farmers and decision makers;
- Existing varieties are not widely disseminated in the Koga irrigated area as the research has given most attention to rain-fed (as, in the past, the area under irrigation was very limited);
- Shortage of improved and certified seed potato supply mainly due to the absence of seed potato multiplication service providers;
- Lack of interest of producers to produce seed potato because farmers are not prepared to pay the higher price (as they cannot be sure that the seed potatoes are of good quality because no certification exists);
- Degeneration of released potato seed varieties that have been used for a longer period of time than recommended (5 to 7 years maximum);
- Research is not timely redressing the released varieties. It was realized that potato is susceptible to immediate degeneration and requires prompt attention by the research to renew it;
- High prevalence of seed and soil borne diseases, especially Bacterial Wilt (BW) in irrigated areas like Koga;
- Up to recently the research has been paying more attention to production than to post harvest handling and potato utility;
- Upsurge of prices for inputs, in particular seed potatoes and chemical fertilizers;
- Shortage of local materials for starch extraction (like potato choppers, peeler, etc.) and / or other processing equipment;
- Although some extension manuals have been elaborated it seems that they have not widely been disseminated / are not widely in use; standardization may be an issue (to investigate further);
- Distribution of reference materials for extension staff on potato production and protection;
- Inadequate training to small holder farmers (women and men alike);
- Weight and bulkiness of potatoes makes it relatively expensive to transport;
- Lack of price and demand information i.e. Market Information System is inadequate/ does not respond to the needs;
- Increase in production may lead to flooding of market and thus substantial decrease of the price / seasonal bulk production accompanied with low price – and scarcity for the rest of the year;
- Absence of rules and regulations to regulate the involvement of brokers in the VC;
- Women are often not engaged in the VC while they do have a heavy work load in the cultivation of potatoes (and other crops for that matter);
- Procurement guidelines hamper farmer groups and unions to sell directly to institutional buyers (e.g. universities) because of requirements such as VAT registration and TIN number;
- Few post-harvest technologies (drying facilities, etc.) available in the region (and all informal and small-scale);
- Input supply, like seeds, chemicals does not meet the demand and requirements of producers;
- Prices for fertilizers and chemicals are considered high by the farmers;
- Lack of improved agricultural tools and equipment.

6.2. Agro-BIG Interventions

Based on the findings regarding the current situation, the identified bottlenecks and opportunities, some key strategic intervention areas have been formulated as presented below.

Improve poor quality seed potato, supply problem

- Strengthen seed potato supply system, (timeliness, quality, and sustainability);
- Promote cooperation between research institutes and (potential) seed potato producers /multipliers
- Quality seed potato supply through organizing seed grower groups, especially through creating linkages with seed potato growers in the highland areas of Western Amhara Region such as Gayint, Sekela and Mecha Woredas.
- Strengthening of potato Tissue Culture (TC) laboratory at ARARI including a screen house, i.e. providing necessary laboratory equipment and materials, creating linkages between TC lab and ASE, engage farmers as out growers, projection of certified potato seed, and develop market strategy for Amharic Seed Enterprise (ASE);
- Facilitate the development of location based potato quality control mechanisms with emphasis on seed potato quality;

Farmers and extension services / DAs

- Strengthening knowledge and skill on potato extension package;
- Potato extension package manual, and guidelines;
- Provide skill trainings on potato agronomic practices to woreda SMS, Extension workers and farmers at FTCs;
- Organize demonstration plots;
- Promotion of integrated, locally tailored solutions;
- Promotion of required enablers (for example, robust, simple soil diagnostic tools);
- Establishment of adequate linkage between research institutes on the one hand and farmers, DAs etc. on the other hand in order to promote adaptation and adoption of farming practices by smallholder farmers;
- Strengthen FTCs through supplying minimum / basic equipment and furniture;
- Organize field days, and experience exchange, etc.
- Strengthen home economics (kebele and farm household levels);
- Facilitate access to credit for input procurement and distribution, working capital, etc.;
- Encourage an improved responsiveness of fertilizer and chemical input suppliers;
- Awareness creation on economic importance of potato as high value crop;

Cooperative management and accounting

- Provision of skill trainings;
- Strengthen farmers' organization and management:
- Technical and material support to primary and Koga irrigation union coops, (training on coop management, storage management, accounting, marketing, etc.).

Post-harvest treatment and access to markets / responding to (potential) demand

- Improve post-harvest handling and awareness creation:
- Skill training on storage management, sorting, grading, bagging;
- Storage facility (both for seed –DLS- and ware potato);
- Lobby for private food processing plants in processing potato (crisps/chips, French fries, starch);
- Organize exchange visits to enhance ideas on processing;
- Analyse possible public-private partnerships;
- Facilitate market survey on consumer preferences / willingness and (monetary) capacity to buy 'new' processed potato products;

- Support establishment/strengthening of organized (youth) groups who can potentially engage in potato processing with small and micro enterprise (SME) offices, especially in major towns like Bahir Dar, Dangila, Merawi to begin with. Support the access of organized groups to local materials such as potato choppers, peelers, etc.;
- Bring topics to the attention of the Stakeholder Platforms;

Strengthen market information service delivery system

- Market price information collection, analysis and dissemination, market intelligence;
- ICT support;
- Strengthen market infrastructure and promotion: mapping and upgrade market sheds, clustering;
- Dissemination of promotional materials;
- Prepare market related training manuals.

Functioning of the chain

- Introduce VC concept at relevant levels: woreda bureaus, DAs, input suppliers, farmers (female and male);
- Set up mechanisms like Stakeholder Platforms to build trust among farmers and traders and to facilitate improvement of supply of services, etc.;
- Produce material and facilitate training for Stakeholder Platforms and other key actors in order to disseminate information and knowledge on VCD;
- Promote sorting and grading by producers;
- Radio broadcastings with relevant information for VC actors;
- Publication of newsletter and special editions on specific topics;
- Facilitate increase of adequate storage facilities (both for seed and ware potatoes);
- Confirm that the transport capacity is sufficient (quantity, quality, reasonable price, also at peak harvest periods); if not, discuss possible solutions; also look at transport from field to collection point;
- Increase knowledge among producers and traders of market trends and consumer needs;
- Ensure that female farmers as well as youth are implicated in the activities to be undertaken and supported by the project (membership of platforms, meetings, training, access to credit);
- Finance gender analysis of potato VC;
- Ensure attention for other cross-cutting issues like environment and gender;
- Enhance gender equality / equity in general;
- Finance study / analysis of environmental issues related to potato VC.
- Participation of traders in organised structures like SHP to come-up with win-win situations with farmers;
- Specific training according to identified needs.

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