Agricultural Value Chain in Imereti and Racha regions

Corn Production

1 Introduction

The present research was carried out by the Association of Young Economists of Georgia in collaboration with Czech University of Life Sciences Prague (Faculty of Tropical Agrisciences) and People in Need from July 2014 to April 2015. This study is a part of regional value chain analysis for the main products of agricultural sector in Imereti and Racha regions.

The goal of this analysis is to provide background information and baseline data for subsequent implementation stages of the project Enhancing Small Farmers' Cooperation and Productivity in Imereti Region financed in the framework of European Neighborhood Programme for Agriculture and Rural Development in Georgia (ENPARD Georgia) - Small Farmers Co-operation component.

This research would not have been possible without funding from the ENPARD Georgia.

2 Methodology

The research team followed an approach that allowed handling several issues concurrently. Data collection was organized and methods selected in order to assess specific issues from different angles supported by a triangulation of qualitative and quantitative methods. After the identification of the 8 local products with the highest development potential (based on local expert and government officials interviews), we carried out a more detailed survey thematically focused around each selected product. For corn value chain analysis following districts were covered:

- Khoni
- Terjola
- Baghdati
- Zestafoni

The field data focused on agricultural product in the Imereti Region was collected in following stages:

March to June 2014 - gathering field data for main products
July 2014 – April 2015- finalization of reports

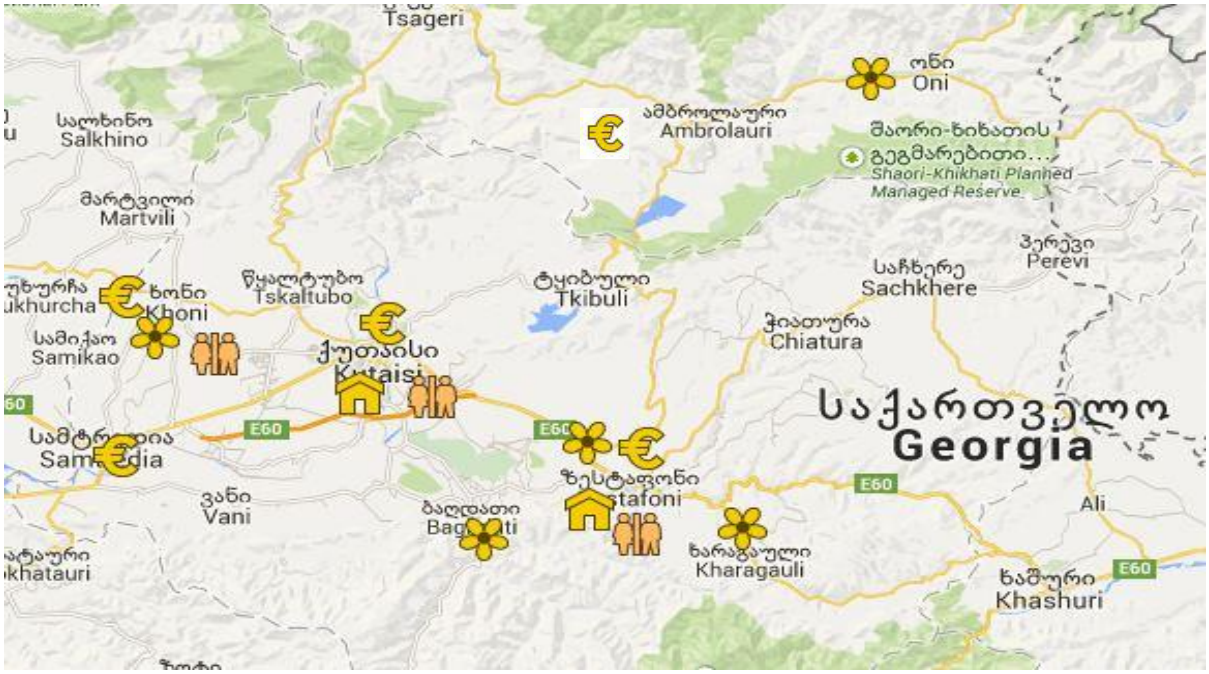
For the analysis mainly qualitative research based on key-informants and conveniently selected group of farmers is used, which is designed to reveal a target group's range of behavior and the perceptions that drive it with reference to specific topics or issues. As a main qualitative research method is used method of semi-structured in-depth interview. Interviews were conducted with small number of key informants who must have first-hand knowledge about examined issue. Each interview took from 1.5 to 2 hours. Diversity of key informants was important to cover whole value chain from suppliers to the local market. It means to identify and interview different-sized farmers (from small subsistence to commercials),

collectors, middlemen, processors, sellers on a local market, exporters, together with agro-shops selling seeds or seedlings and different kinds of tools, technology, pesticides, herbicides, fertilizers or other inputs.

Main field data collection instruments for corn production included (spatial distribution is visualized in Figure 1):

Focus group discussions with corn farmers
Interviews with representatives of corn farmers
Interviews and observations of input supplier shops
Corn market screening

Picture 1 - Map of locations for data collection in Imereti



However, it should be taken into consideration that qualitative research is only part of the project that generally reflects the most widespread information. The secondary quantitative and qualitative data is based on the unity of consolidated researches including official statistical data

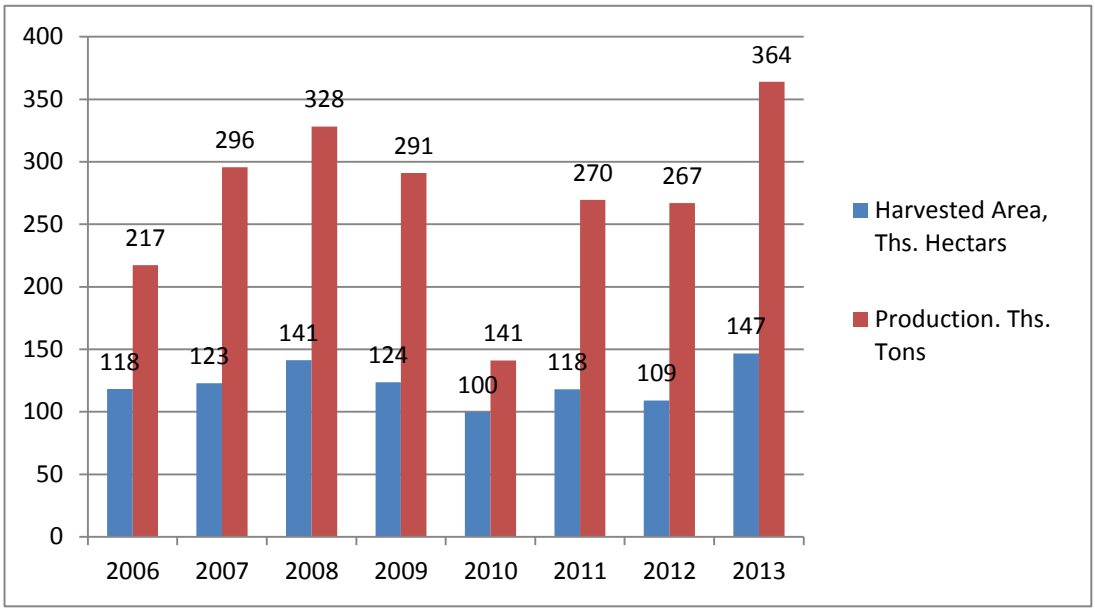
But still, it is necessary to bear in mind, that the qualitative research is only partially representative and captures mainly general and the most frequent information. The secondary quantitative and qualitative data relies heavily on an examination of existing, accumulated research, combining official government data with studies conducted by international organizations such as FAO, EU, etc.

Due to the lack of agricultural activity in Racha regions, National Statistical Bureau of Georgia does not publish any specific data regarding this agricultural sector.

3 Corn production as a sector of Georgian agriculture

Corn is one of the most commonly grown granular crops in the world. In terms of scale of production and size of area on which it is sown, only wheat is greater. The biggest cultivators of corn are Argentina, United Kingdom and from countries geographically near to Georgia such as the Russian Federation and Ukraine. According to the official statistical data from 2006-2014 years, in Georgia the amount of land occupied with corn growing had grown from 118 thousand hectares to 147 thousand hectares. Diagram 1 shows the trend for harvested area and production volume of corn in Georgia. Corn production geography in Georgia encompasses western as well eastern parts of the country. However, western Georgia is the obvious leader in terms of volume of harvest areas and amount of sown territory.

Diagram 1 - Harvested area and production of corn in Georgia[1],



In the target regions (Racha, Imereti) corn is mainly cultivated in plain territories near the rivers Khvirala and Rioni, where even during the hot summers soil contains enough humidity for corn cultivation. Hereby, it should be emphasized that due to its very low production rate official information for Racha Lechkumi region is not available. In 2013, the greatest part out of total harvested in the country corn (27%, 100 thousand tones) comes on Imereti region, than comes Samegrelo zemo-svaneti with its 25%. Diagram 2 shows the distribution of corn production by regions of Georgia and diagram 3 - distribution of harvested areas. Imereti has the greatest - 30% share in corn sown area and it amounts to 44 thousand hectares. Obviously, this region is a leader in corn production, with greatest improvement potential.

[1] National statistics office of Georgia, http://geostat.ge/

Diagram 2 - Regional share in corn production, 2013.[2]

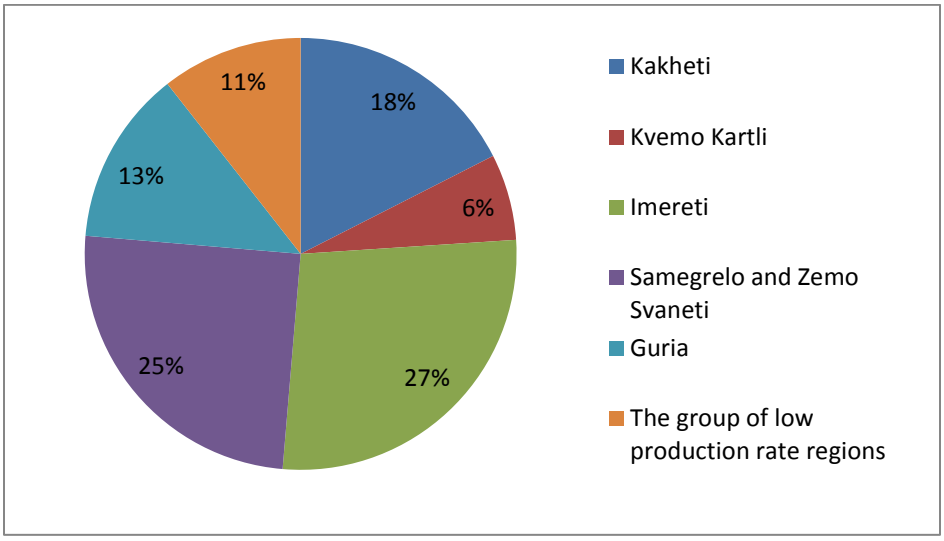
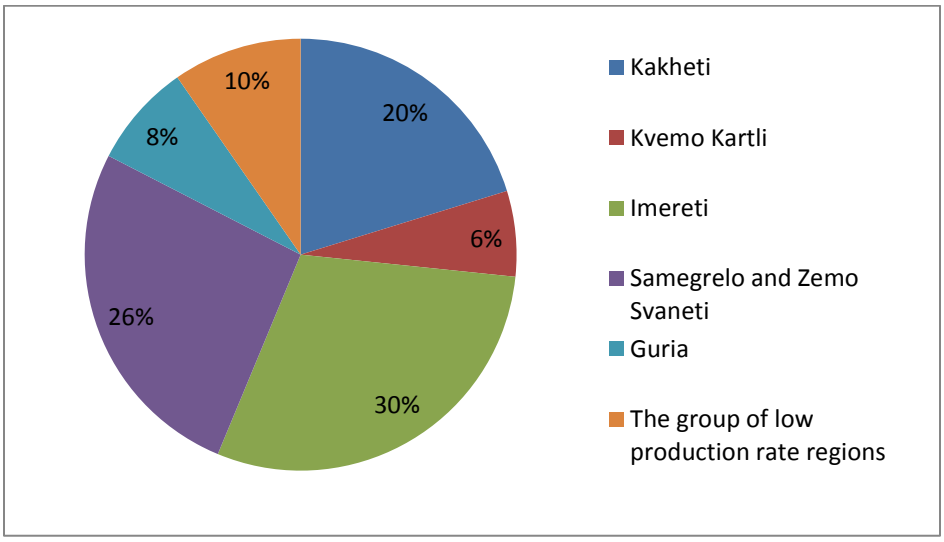


Diagram 3 - Regional distribution of corn harvested areas, 2013[3]



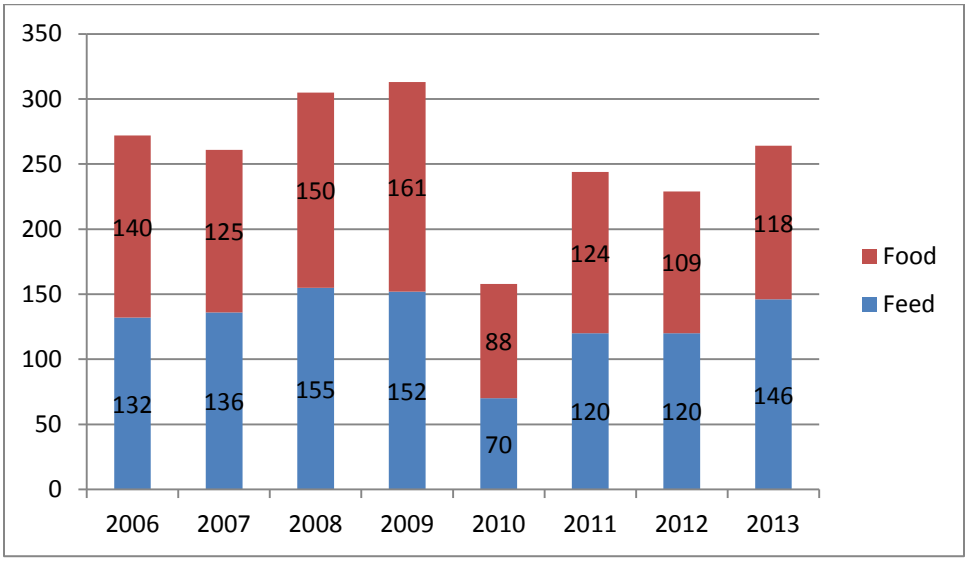
Corn was one of the most common products among the Soviet collective enterprises. It was imported from the North American continent to Georgia centuries ago and through the process of hybridization, local Georgian types of corn have been cultivated. Georgian corn is characterized by high productivity and nutritional value. However, because the majority of corn producing farmers possess small-sized lands and the majority of cultivated corn is destined for family consumption, farmers do not use modern technologies and techniques in the process of corn cultivation and they do not use the best types of corn (with highest productivity potential). As a consequence, average production per 1 hectare is very

[2] National statistics office of Georgia, http://geostat.ge/
[3] National statistics office of Georgia, http://geostat.ge/

low. For Imereti region it is 2.3 tons per hectare (Country average is 2.5 tones). The same indicator for some other countries is as follows: United States – 11 tones, Turkey, 9 Tones, Ukraine – 6 tones, etc. Conducted study showed that there are singular, relatively big-sized enterprises, which unite more than 10 hectares of land and are have relatively by high productivity.

According to official statistical data, Georgia's Self-sufficiency ratio for corn in high for recent years, in 2008 and 2012 it reached 100%, as for 2013 ratio was 96%. Corn is one hand very popular part of culinary and on other hand it is crucial in terms of feed. Diagram 4 illustrates the trend of corn consumption for food and feed purposes. As for food consumption, in 2013 annual consumption rate was 24kg per person.

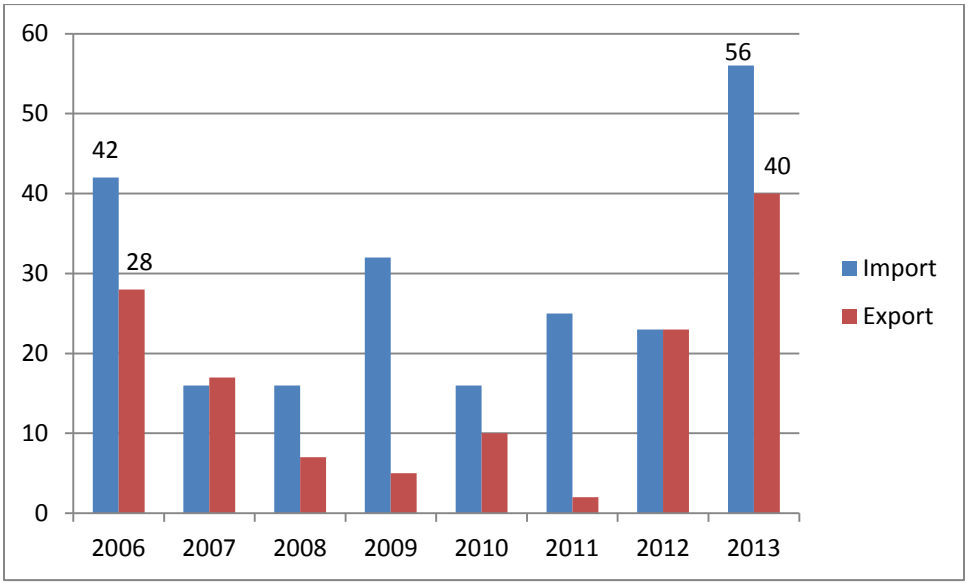
Diagram 4 – Consumption of Corn for feed and food, thousand tones[4]



Corn export and import indicators are quit low. In 2013 both indicator reached their maximum value and amounted to 40 thousand tones for export and 56 thousand tones for Import. Diagram 5 shows that import volume was always higher than export data. The only exception was 2012, when the export and import was absolutely similar and amounted 23 thousand tons of corn. By all means there is certain potential for product export, but at the moment the existed data and actual situation in the sector does not allow significantly access foreign markets, first of all due to insufficient amount of product.

[4] National statistics office of Georgia, http://geostat.ge/

Diagram 5 – Corn export and import, thousand tones[5]



Development and, therefore, increase in production of corn in the country is important for other sectors of agriculture. For example, for the development of livestock and poultry, and it is also important in terms of increasing the state's export capacity. It is well recognized that the price of corn on international markets, including Georgia's neighboring countries Azerbaijan and Armenia is high. On the other hand, research conducted by AYEG in other agricultural sectors, including milk production, catering and poultry, shows that low productivity in the mentioned sectors results from, first of all, insufficient food including the lack of needed crops.

This study demonstrated that during the last 2-3 years, corn production has been gradually developing. This is partly due to the increased attention of the government in the sector, accumulation of seeds of selected types of corn in the country, the construction of corn drying and storage modern facilities. However, despite these improvements, the sector has much higher development potential and so far only a minor part of this potential is being utilized.

[5] National statistics office of Georgia, http://geostat.ge/

4 Corn production Value Chain

4.1 Production Systems

There are three types of farmers identified the target regions:

- Family holdings - (with up to 1 hectare of land), that produce corn mainly for their own consumption and sell it to local markets in limited quantity (no more than 10%).
- Medium-sized family farms - with from 1 to 10 hectares of land.
- Large-size farming enterprises which own more than 10 hectares of land.

In Imereti and Racha regions, as well as in the rest of Georgia as a result of land reform conducted during the 1990s, ownership of agricultural lands has been given to every rural household. In the targeted regions, each farming family received 1.1 hectares of land, which is mainly used for the cultivation of corn, wheat, grapes, vegetables and other agrarian products.

The study demonstrated that up to 70% of family owned land is used for corn production. However, most of the corn harvest is used for own consumption. This also means that farmers feed poultry and livestock. Only a small part of the corn yield is sold at market.

There are around 30 medium-sized family farms in the targeted regions that own from 1 to 10 hectares of land using it for corn cultivation. At the same time, they, as a rule, also hold livestock (cattle breeding and pig farming), or poultry farms and use the corn harvest to feed their animals instead of trading it at market.

There are approximately 15 large corn producing enterprises in Imereti region that sell 100% of their corn harvest at market. Those farms are located in Zestaphoni, Bagdadgi, Terjola and Khoni municipalities. The majority of them own agricultural machineries and are using German, French and American hybridized types of corn seeds to earn a high quality harvest.

Corn is distinguished by its specific requirements in terms of quality of land. It is cultivated and grows well on a soil rich with organic substances and has a good access of water and air. The best lands for corn cultivation are considered to be those with black soil. Where fertilizers are applied, clay as well as sand soils give good harvests. Such soil is characteristic to Kolkheti valley of Imereti region, located near large rivers. In Imereti region, 72101 hectares of land are cultivated, 85% of which according to expert opinions are used for corn cultivation.

Preparation of soil for the sowing of corn starts in autumn, with ploughing at an approximate height of 30 cm. Soil is also prepared in spring, at a time when weeds are starting to grow. Pluming is done at a height of 8-10 sm. with a specially designed cultivator. Those processes are followed by the planting of seeds into the soil approximately 8-10 sm. deep. The study showed that ploughing of 1 hectare of soil with the above described technique costs 140 GEL. The cost of the first cultivation (farmers call it re-plough) and planting of seeds in total equals 140 GEL. The cultivation of corn plants – 55 GEL (needs to be done twice, which in total costs 110 GEL). Both in Racha and Imereti, majority of small and medium

size family farms use bulls and sometimes horses for cultivation of lands. As for large one – they use own machinery and /or rent additional units in case of such necessity.

In order to saw 1 hectare of land, 18-20 kilograms of seeds are needed and the price for one kilogram of seeds varies from 17 to 20 GEL. However, the majority of family farms cover 70% of lands with seeds cultivated by them.

The corn harvest significantly increases as a result of the usage of organic fertilizers. In targeted regions, the corn harvest cannot develop without the usage of such fertilizers, or is developed in such small quantities that are not rentable. Manure which is added to the soil in autumn during its sowing is considered as the major natural fertilizer. Manure from poultry can also be used as a natural fertilizer. Soil enriched by natural fertilizers maintains good quality not only for one, but for 2-3 years.

Picture 2. Corn field in Imereti, summer period

Mineral fertilizers are also used to increase corn productivity, especially nitrogen and potassium. Corn uses those minerals in equal amounts, and also phosphor, bit in half amount. Approximately 15-180 kg of nitrogen, 150-200 kg of potassium and 60-70 kg of phosphor is needed for the fertilization of 1 hectare of land. However, family farms can allow using fewer fertilizers due to limited finances. This leads to reduced corn productivity. On the local market, the price of fertilizer composed of 1 kg of nitrogen and potassium respectively is approximately 0.9 GEL and 1.3-1.5GEL for phosphor added fertilizer.

The corn harvest significantly increases as a result of the so-called stage-by-stage “feeding” of soil by fertilizers. The application of ammonium nitrate during the seeding period should equal 30% of the entire norm, and then another 30% should be applied when the plant reaches a height of 40-50 cm. and 40% when the plant starts to ripen. At the same time it should be noted that, in order to yield a big amount from the corn harvest, the best result is reached with the combination, not separate application, of organic and mineral fertilizers.

In autumn, family farms harvest corn by hand. Medium and large-sized farms use a special machine for harvesting corn the application of which costs 250 GEL per hectare. The machine directly collects corn seeds, but loses hay.

Family farms store corn in their own, specially designed storages. Medium and large-sized farming

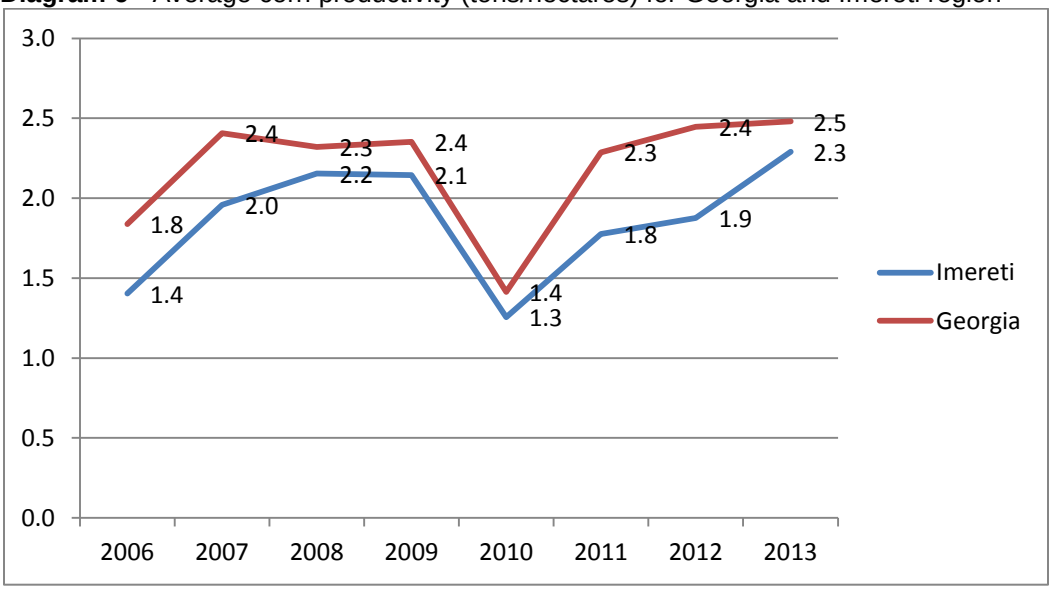
enterprises either sell their harvest immediately or store it in a special place located in Abasha municipality and gradually sell it during the entire year.

In family farms, work is done by family members themselves. They do not use a hired working force. Medium and large-sized farming enterprises hire a workforce for the performance of various operations. It should be noted that the appearance of modern technology in the region gradually decreases the need for work by hand.

4.2 Productivity

The productivity in corn production is quite low compared to the existing potential. Diagram #6 shows, that according to official statistics average corn productivity indictor for the whole country has been always higher than in Imereti region. But as the same time, conducted study demonstrated that, singular farms (mainly large scale ones) have a much higher productivity. Poor harvest is usually characteristic of small-sized family farms that own less than 1 hectare of land. This is explained by several factors: farmers lack the ability to cultivate land properly; they do not use special seeds; they do not feed plants properly; they do not use special substances to fight against weeds. As a result, average productivity within the small farmers do not exceed 3 tones per hectare.

Diagram 6 - Average corn productivity (tons/hectares) for Georgia and Imereti region[6]



Medium and large-sized farming enterprises that cultivate corn on more than 2 hectares use hybridized seeds (imported from various countries) and receive harvest of 8-12 tons per hectare in case they follow all basic plant caring norms. Despite the fact that corn does not require high humidity, if it is watered during the summer droughts its productivity grows substantially. Some of large farmers in Imereti region plan to install watering systems. But, it should also be mentioned, that at this stage none of the farmers in the region water their corn. The conducted study revealed that in the target regions there are up to 30 medium size and 15 large farms. The main types of hybridizes seeds they use and relevant average

[6] National statistics office of Georgia, http://geostat.ge/

productivity is as follows:

- Yellow, with 90 days of vegetation, hybrid (PR38R92) –8 tons/heater ;
- Yellow, 110 days of vegetation, hybrid (PR35P12) –10 tons/heater;
- White, 130 days of vegetation, hybrid (PR32B10) - 11-12 tons/heater.

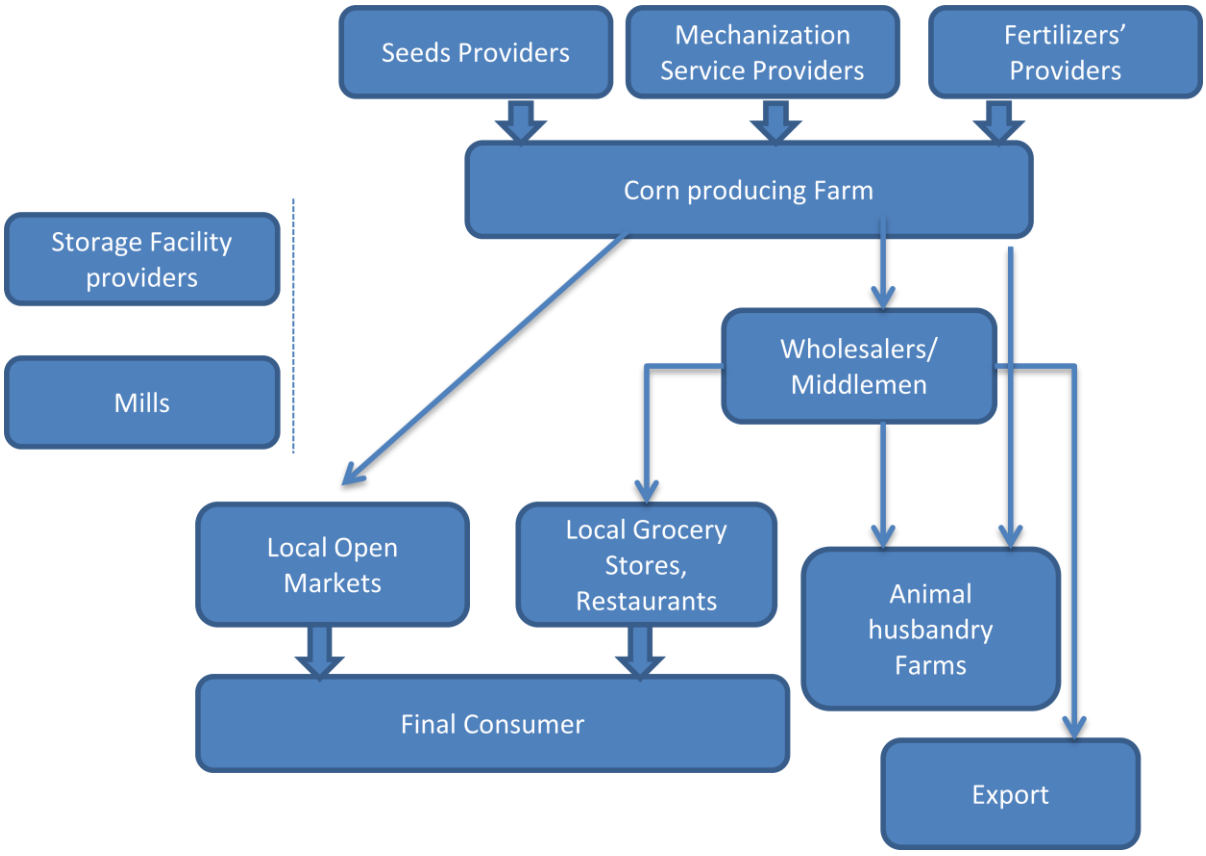
Seeds of hybrid corn have high quality. However, harvested corn is not used for seeding purposes. Therefore, farmer should buy seeds if he/she decides to cultivate corn. Development of hybridized seeds is a difficult process and it cannot be performed by small scale farmer him/herself.

While studding the relatively developed large scale farmers performance, it was identified that if the farmer cultivates more than 10 hectares of land and follows major technological processes, the total costs per one kg of corn amounts to 0.20 -0.22 GEL. The cost per kg is mainly defined by the amount of harvest, and whether the farmer owns at least part of the necessary technical equipment. As the farmers indicate, renting technical equipment from farmer's service centers is quite expensive and it is much profitable for them to use own machines.

In order to increase productivity in the sector it is important to ensure the application of the following components: usage of the highly productive seeds, availability of fertile land appropriate for corn cultivation and adequate care of plants.

4.3 Corn production value chain typical for Imereti region

Scheme 1. Corn Production value chain map for Imereti region



- **Corn Producing Farms**. As mentioned above, family farms consume the majority of cultivated corn they yield and they sell a surplus (but not more than 10% of the total harvest) to local markets themselves, or to wholesalers. Some medium-sized farms, which mainly grow poultry or raise livestock, use corn harvest as feed. Other farms, including large-sized farms, sell corn immediately at wholesale price, or dry and store corn before selling the harvest gradually throughout the year, taking advantage of higher prices at certain times. In target region there are approximately 30 medium and 15 large corn producing farms.

- **Animal Husbandry Farms – they consume approximately 60% of harvested corn as a feed.** Large-sized livestock or poultry farms as a rule try to develop their corn stock in autumn depending on their financial and storage capacities. From autumn, the price of harvested corn increases by 30% and sometimes 50% later in the year. They either buy corn directly from large producers or through wholesalers and middlemen in big volumes. Hereby it also should be mentioned that these animal husbandry farms also buy imported corn (mainly of Ukrainian origin), that is available on the local market and its price is normally 10-15% cheaper in comparison to local produce. However, according to local consumers its nutritional value is much lower than that of Georgian corn.

- **Export Sales.** Very low, maximum of 5% of harvested corn is exported in mainly Armenia and Azerbaijan. The farmers, even large ones do not export themselves. Usually wholesaler or middlemen collect needed volume of corn harvested in Imereti and mainly Samegrelo regions and export them to their partners in neighboring counties. Key buying point is Storing facility in Abasha municipality.

- **Final consumers on local markets, groceries and restaurants.** Since corn, namely brad made out of corn flour is in almost daily consumed by the households, and are usually always highly demanded in the restaurants, major demand is on corn flour. Rural population harvest, mill and corn themselves for consumption, urban population either buy corn and take it to mills by themselves, or buy directly the corn floor. On their hand there is available on local markets both options, corn and corn floor. Usually local resellers take the floor in the mill they prefer and later sell the corn floor. Restaurants also in majority of cases buy corn and make the floor in needed amounts. As for receiving high quality corn floor it is essential to mill sufficiently dried seeds, also it is much better to stock corn seeds, rather than floor (since it is perishable), open market reseller and restaurant mainly buy corn from wholesalers.

- **Storage Facility -** there is just one storage facility available for regional large size farmer, which is located in other region - Samegrelo in Abasha municipality. This facility allows not only storing service, but also ensures proper drying process, which is crucial for keeping the quality of corn.

- **Mills -** there are at least one mill in almost all villages, also there are several in the cities. These mills serve individuals, who take corn for own consumption, also resellers, groceries and restaurants. Generally there is sufficient number of mills in the region and their capacity meet the existed demand.

4.4 Product Price

Price on corn and consequently corn floor is fluctuating seasonally. The price is at its minimum on autumn, during the harvesting time and gradually increases before next harvesting. It also should be mentioned that wholesale and retail prices in the region is quite similar to the County's average. Table 1 describes average prices in peak and dip times. As shown, corn price may increase even by 50% prior to next harvest period.

Table 1- Product wholesale prices in high and low seasons

Product Type	Average Minimal Price, GEL/KG	Average Maximal Price, GEL/KG
Local Corn	0.45	0.8
Imported Corn *	0.35	0.45
Corn flour	1.1	2.5
Hay (GEL/PACK)	0.5	0.6

**imported corn mainly is of secondary quality (thin seeds) and it can only be used as a feed for poultry and livestock*

In addition, average price depends a lot on the harvest volume of the certain year, which on its hand is defined by the weather conditions and seed quality used.

5 Competitiveness diamond – input conditions, demand conditions, related industries, context

5.1 Input conditions

For the production of a product several key components are essential, specifically:

Seeds. Quality seeds are an important element determining the quality and quantity of the received harvest. According to farmers, it is desirable for the State to control the quality of hybrid seeds, as farmers themselves cannot do so. Consequently, especially during the first years of importing hybrid seeds, farmers suffered financial losses due to the poor quality of seeds and their inadequacy for local conditions. It should be noted that there are no special seed cultivation industries in Georgia. Those that once existed have been closed for several years and therefore seeds are exclusively imported from abroad. The main countries from where seeds are imported to Georgia are the following: United States of America, Germany and France. In total, 500-550 tons of seeds are imported to the country on an annual basis.

Picture 3. Agricultural Shop in Zestaphoni

Fertilizers and poisoning chemicals. Various chemicals are used to combat against the American white butterfly. There are a number of means available on the local market for dealing with this pesr but the

most commonly used substance is the German produced liquid - “Pirphos”. One liter costs 30 GEL and it is sufficient for 1.5 hectares of land. In corn cultivated lands, weeds are fought with German drugs “Piopauer” and “Maister”. One liter of either product costs 95 GEL and it is applied to 300 liters of water and used for 11 hectares of land. Agricultural chemical drugs are produced locally and abroad. In the country, agricultural chemical drags are developed in Rustavi in a chemical factory. One pack of 50 kg of nitrogen fertilizer produced either locally or abroad costs 45 GEL. The study showed that the majority of farmers, approximately 65%, use domestically produced substances. The other 35% use imported agricultural chemicals which can be bought in agricultural shops that are located in municipal centers as well as in big rural communities.

Machinery. Family farms conduct corn cultivation related activities by hand (taking care of land, harvest etc.) or use live animals such as bulls and horses (for example for the cultivation of corn in lines, transportation of harvest etc.). Medium and large-sized farming enterprises use modern technology, some of which is owned and some of which is hired from farmers’ mechanization centers. However, farmers also often complain about the delay in provision of services by the latter centers, as such delays usually have a negative effect on the harvest. Some farmers also complain of high prices of the mentioned services.

Picture 4. Mechanization center, Zetaphoni

5.2 Demand

In 2013, annual utilization of corn in Georgia equaled (including the stocks of previous year) 503,000 tons, out of which 5,000 tons were as seeds, 146,000 tons for feeding animals, and 118,000 tons for human consumption. In the same year, 56,000 tons of corn was imported in the country and 40,000 tons exported. According to the official state statistics for 2013, the self-sufficiency ration for corn was 96%, which remains stable high during recent years. Table 2 describes the corn balance sheet for 2006-2013 years.

Table 2. Corn Balance Sheet (1000 tons)[7],

	2006	2007	2008	2009	2010	2011	2012	2013
Opening stocks	92	31	48	60	46	26	60	83
Domestic production	**217**	**296**	**328**	**291**	**141**	**270**	**267**	**364**
Import	42	16	16	32	16	25	23	56
Total supply/ Utilization	**351**	**343**	**392**	**383**	**203**	**321**	**350**	**503**
Seed	4	4	5	5	4	5	4	5
Feed	132	136	155	152	70	120	120	146
Food	140	125	150	161	88	124	109	118
Waste	16	13	15	14	5	10	11	15
Export	28	17	7	5	10	2	23	40
Closing stocks	31	48	60	46	26	60	83	179
Self-sufficiency ratio, %	94	100	97	92	96	92	100	96

Majority of corn destined for human consumption is used for the production of corn flour, the rest is used for coarse-ground flour and other related products. From corn flour families bake at home Corn bread, which shall be served warm. Corn bread is almost daily part of Georgian traditional cousin, especially in western Georgia. The boiled young whole corn ears are also popular in summer time. But it is not consumed as a side dish, but rather then desert.

It should be noted that, in future, the demand for corn will significantly depend on the development of livestock and poultry in the country, as well as gaining new markets for exporting this product.

5.3 Related industries

There are corn crumbling mills all over the targeted regions that make corn flour for human consumption as well food material for poultry and livestock. The procession of corn into flour for human consumption costs 0.05-0.1 GEL and processing it into material for animal consumption costs 0.02-0.04 GEL. In Imereti and Racha regions there are at least one, in some cases 3-4 mills per village. As usually, corn farmers do not own such mills.

Corn production is directly linked to the

Picture 5. Granary center in Abasha municipality

[7] National statistics office of Georgia, http://geosta

availability of a granary. Such a facility in western Georgia is only located in Abasha Municipality of Samegrelo region, which can accumulate 25,000-30,000 tons of cereals including corn and it was built in 2010. Once the product is delivered, it is first dried, cleaned and then stored. Storage facilities have the capacity to dry any type of cereals, including wheat, barley and corn and it is equipped with driers and storage machines produced in Italy and Argentina. The price for the service is as follows: drying, airing and storing for one month of 1 kg of corn equals 0.07 GEL, and 0.05 GEL for every subsequent month.

Such storage is not profitable if it is not fully utilized. The State owns that enterprise, but plans to auction and sell it. In order to break even the enterprise should at least store an average of 3,000-4,000 per year.

For corn producing farmers It is almost impossible to own such corn storage facilities, even with smaller capacity, unless they cooperate at least on this regard. None of singular large farm can allow building and later operating this kind facility for just own consummation.

5.4Competition

The competition on the corn market in Georgia is not significant. Selling of the cultivated production takes place during the entire year at a price determined by the market, which significantly exceeds production cost. Demand for corn determines any increase in its price, usually by 30-50% in spring and summer, in comparison to autumn.

Imported corn is relatively cheap; however, according to local producers its quality (nutritional value) is significantly lower than the local corn and, therefore, is not competitive. This is also reflected in the share it has gained on local markets.

6 Strategic productivity and quality

6.1 food safety and quality

The State in Georgia is not conducting any operations targeting food safety and quality control in terms of corn production and its processing. Farmers claim that their products are cultivated in an ecologically clean environment, that they do not use chemical means above the permitted level and that their products are of the highest quality and of high nutritional value. Nerveless, it is impossible to argue about the level of safety and quality, since there is no any reliable data on that regard.

7 Operational productivity– processing, movement, diseases, biological threats

7.1 Processing

There are two main methods of corn processing: one for human consumption and the other for poultry and livestock consumption. As described above, corn is processed to develop products for human consumption including corn flour, which is used to prepare corn bread (Mchadi) or Gomi. As a rule, corn flour is not packed preliminarily but is delivered to the market in its natural form in big textile bags.

Corn destined for poultry and livestock food is fragmented into several pieces and mixed in with a certain proportion of other ingredients, for example, fragmented wheat and soya depending on what the product is intended to be used for.

7.2 Transportation and movement

Transportation in the given field is needed in two cases – transporting the harvest from fields and delivering the product to the market. Corn fields of small farms are usually located in close proximity to the living spaces and, those lands are not bigger than 1.1 hectares. Therefore, owners of family farms do not need mechanical technology to transport the harvest but instead use domestic animals (mainly bulls, horses) for such purposes. In certain cases, they rent tractor trailers and trucks. When it comes to the need to transport corn itself or corn flour to the market, farmers use their own cars or public transportation.

Medium and large-sized farm entrepreneurs use high-capacity automobiles (transportation capacity up to 25 tons) for harvest transportation. The cost of one-way transportation of corn from storage for a distance of 15-25 km reaches 200-250 GEL.

7.3 Diseases and chemical threats

Corn is less susceptible to diseases in Racha and upper Imereti regions. However, the most common types are Farvana, Khvatari and the white American butterfly. Several treatments are used to fight them, including the most popular liquid drug “Pirofhos” produced in Germany

8 Supply chain Management – flow of goods and information in the chain

Small family farms have no access to any type of distribution network. As the study demonstrated, family farms themselves deliver a surplus of corn production (if they have one) to local agricultural markets or sell directly from family to farmers from neighboring villages.

Owners of medium and large-sized farms contact big poultry or livestock farms and, where there are successfully concluded negotiations, sell the harvest directly from the farm’s territory. But as usually

this is verbal agreement and is based on reputation and cooperation experience between these farms. They might also transport products to the Abasha based storage from where interested buyers can purchase corn once the price is negotiated with the owner.

Small farmers share the information between each other. Also they receive basic consultations and instructions from agro-shops.

9. Human resources, social capital and know-how

9.1 Know-how and access to extension services

Family farms that produce corn accumulate knowledge mainly through established traditions which are updated and shared through personal relationships between farmers. However, periodically trainings and seminars in the area of corn cultivation targeting the exchange of information on new developments in the field are organized in municipal and regional centers by farmer's service centers and donor organizations.

In addition, informative materials are published from time to time. It should be noted that family farm owners do not have access to such opportunities. However, according to the study they are not interested in getting such knowledge or information as they think they have accumulated sufficient knowledge of the field already. Such an approach greatly contributes to the current low productivity.

9.2 Opportunities of formal education

The possibility of being educated in the area of corn production is provided by the Agricultural University in Tbilisi in a four-year program in agriculture at BA level. The graduates of the program are granted a BA diploma. No such opportunities of obtaining formal education in the regions of Georgia exist.

9.3 Social capital and cooperation

The level of cooperation in the field is extremely low. There are no official cooperatives functioning in the region that target corn cultivation and/or its realization. However, there are informal relationships between individual farmers in the frames of which they share information on chemicals, consumers and other relevant issues with each other. In singular cases they jointly purchase seeds, fertilizers and chemicals. They can also jointly rent mechanical equipment and such actions help farmer to save their resources.

The study demonstrated that small-sized family farms have a low level of trust and interest in uniting into cooperatives. Furthermore, there are no successful examples of such cooperatives. Some owners of medium and large-sized farms think cooperation is desirable and they have some level of readiness to be engaged in such an opportunity, but at the same time no one takes leadership to initiate the

cooperation.

10 Institutions and business environment

10.1 Business environment

The business environment in Georgia, among them for corn production is favorable, as there is no any legal or bureaucratic barrier to start a business. The taxation system is quite liberal according to which primary agricultural production, including corn production, is free from taxation. The insufficient agri machinery means in the country – one of the biggest challenge of latest years - has also been started to be solved to a certain extent. State established mechanization centers contain the necessary techniques and equipment and their services are being developed. The State has also started bulling the storages, that also was the industry's biggest problem.

The domestic market is entirely self-regulatory and there are no formal or informal barriers that hinder its operation.

10.2 Governmental Support

The study demonstrated that the main areas in which corn producing farmers require state assistance are the following:

Increase of accessibility to modern mechanization means - either through purchase with the availability of long-term, preferential credits, or through leasing while using the same credit conditions;

Quality control of corn seeds, poisoning chemicals and fertilizers. The study showed that corn producing farmers in some cases are dissatisfied with the quality of corn seeds, poisoning chemicals and fertilizers as in some years they have suffered a loss in harvest due to poor quality of mentioned products. As farmers have no chance of checking the quality of seeds, chemicals and fertilizers, they expect the State to perform the latter duty and ensure quality control of the mentioned products;

11 Conclusions and Recommendations

11.1 SWOT

S	W
Long tradition of corn cultivation Favorable soil for corn cultivation State policy supporting development of local production Existence of corn storage facility	Low productivity and high price at family farms Low access to finance Lack of modern knowledge
O	**T**
Introduction of modern technologies Prospects for developing cooperation Possibility of entering new foreign markets Introduction of new, high productivity seeds	Risk for prices to fall Import of low quality seeds

11.2 Prospective for improving and upgrading corn products value chain

Support in introducing new, high productivity seeds (including those resistant to drought). The latter will help farmers to increase their harvests on an annual basis and reduce dependency on climate conditions;

Rehabilitation of irrigation systems will increase the area of cultivated land and improve the productivity on f already cultivated land;

Increase of access to mechanical means and equipment. Though mechanization centers exist, the quality of their services is insufficient because of the lack of a sufficient number of equipment. Therefore, farmers are not served punctually, therefore disabling them to observe agricultural deadlines;

Initiating Cooperation. As most existing corn cultivating farms are of a small size, it is important to develop cooperation among them. Farmers are individually unable to purchase expensive modern techniques and technologies which are important for the increase of land productivity. One of the effective ways of solving this problem is the possible increase of the sizes of farms. In addition medium and large farms have general desire to have a cooperative, but they lack in taking initiative and are basically waiting for someone else to take the leadership.

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