

Agricultural Value Chains in Imereti and Racha - Lechkhumi Regions

Fish Farming

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 March 2015 to June 2015. This study is a part of regional value chain analysis for the main products of agricultural sector in Imereti and Racha - Lechkhumi 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 and Czech Development Agency project "Support for Cooperatives in Imereti, 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 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 fish farming value chain analysis following districts and fish breeds were covered:

Table 1: Municipalities related to fish farming in Imereti and Racha regions

Fish breed	Latin Name	Municipality
Rainbow Trout	Oncorhynchus mykiss	Terjola, Ambrolauri
Carp (Common Carp)	Cyprinus carpio	Zestafoni
Grass Carp	Cyprinus carpio	Terjola
Silver Carp	Hypophthalmichthys molitrix	Khoni

The field data focused on agricultural product in the Imereti and Racha regions was collected in

following stages:

March to April 2015 - gathering field data for main products

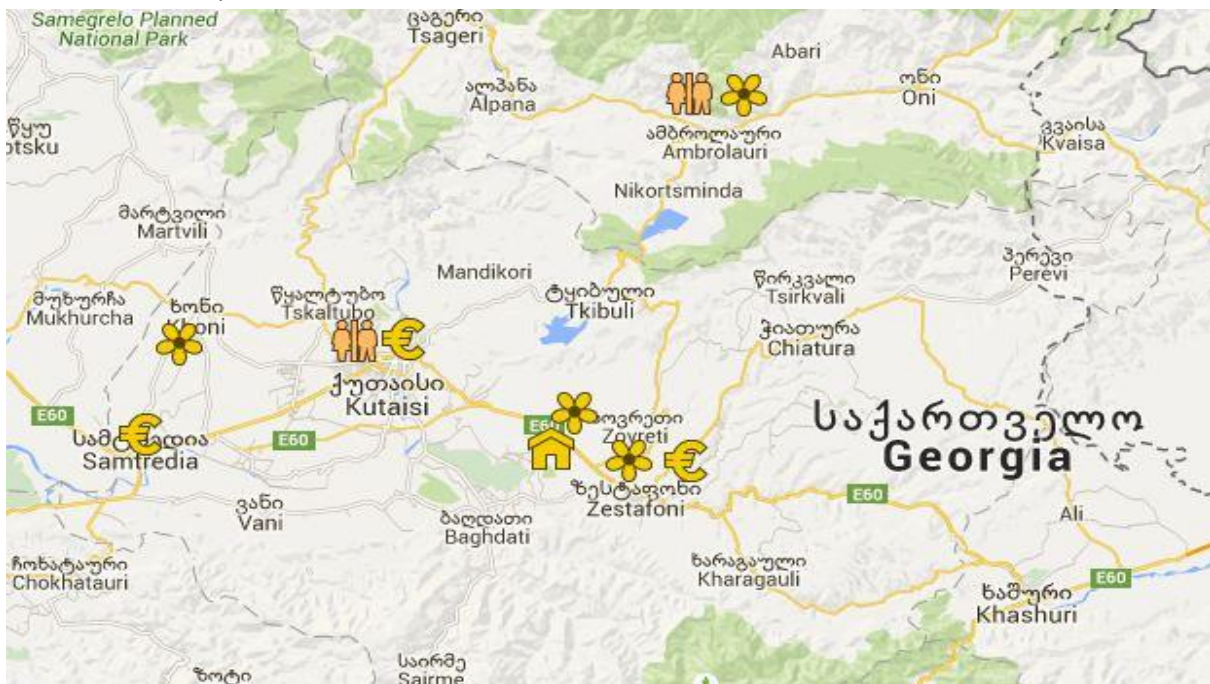
May – June 2015- finalization of reports

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 behaviour 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), middlemen, processors, sellers on a local market, exporters, together with agro-shops feed and different kinds of tools, technology, or other inputs.

Main field data collection instruments for fish farming included (spatial distribution is visualized in picture 1):

- Interviews with representatives of fish farmers
- Interviews and observations of input supplier shops
- Fish market screening

Picture 1 - Map of locations for data collection



	Inventory Stores		Fish processing farms
	Local open market		In depth interviews

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 other available related studies. Due to the lack of agricultural activity in Racha region¹, National Statistical Bureau of Georgia does not publish any specific data regarding this agricultural sector.

3 Fish farming as a sector of Georgian agriculture

Georgia has favourable conditions for the development of fish farming, notably the duration of the vegetation period of fish, an extensive hydrological and irrigation network, and diverse terrain and climate zones. Georgia² is also rich in water resources: rivers, reservoirs, lakes, ponds. However, it should be noted that modern day fish farming is associated with high costs and with long payback period to take into consideration. In addition, agricultural intensification is necessary for the development of the field, which means to increase fish production without increasing the size of the pool through the use of modern technologies and highly productive species. Research has shown that this is one of the best ways to develop fish farming as a profitable business in the region and whole country.

Generally, fish farming is not developed in the country so far. Just recently, entrepreneurs have begun to develop fish farms. Research revealed 10 different sized fish farms functioning in the regions of Imereti and Racha-Lechkhumi. Their productivity is not high and therefore does not have any significant impact in the field.

Official statistical data is not available regarding the volume of products produced as a result of fish farming. The only statistical data which is available generally related to fish is export-import dynamics, which doesn't allow distinguishing the origin of the fish – sea or farming. In 2014, nearly 36 million USD worth of fish was imported to Georgia, of which the biggest share - 87% - was accounted by frozen fish. Picture 1 illustrates the dynamics of imports in accordance with different types of preceded or frozen of fish, which shows a tendency for growth. It can be assumed that the demand for fish is increasing – but this growth comes mainly on frozen fish. Considering the fact that frozen fish is relatively cheap, it is hard to argue that the demand for live fish will be also high, in case local producers manage to increase the volume of production and be able gain competitive advantage.

The data on export fish is much more modest. Although this is not stated, it can be assumed that it reflects the details of the export of sea fishery, due to following reasons: non-of the existed in region fish farms exports the product (as for other regional, or country wide information – it not available); The only location where relevant for freezing, chilling or other processing lines exists is Black sea

¹ – there is no any fruit producing farms in Racha region

² http://www.bazieri.ge/news/sakartvelo_tveshi_80_t'ona_k'almakhs_moikhmars/2013-01-19-1054

side, which by all means proceed obtained in the sea fish. Picture 2 shows the dynamics of the export of fish, where it is shown that in 2006 fish export reached its highest level of 6.6 million USD. In 2014, the picture was only 4.1 million. At the same, it should be noted that since 2012, live fish has not been exported. Frozen fish occupies the leading place in export as well as in import.

Diagram 1 – Fish import in Georgia (ths US dollar)³

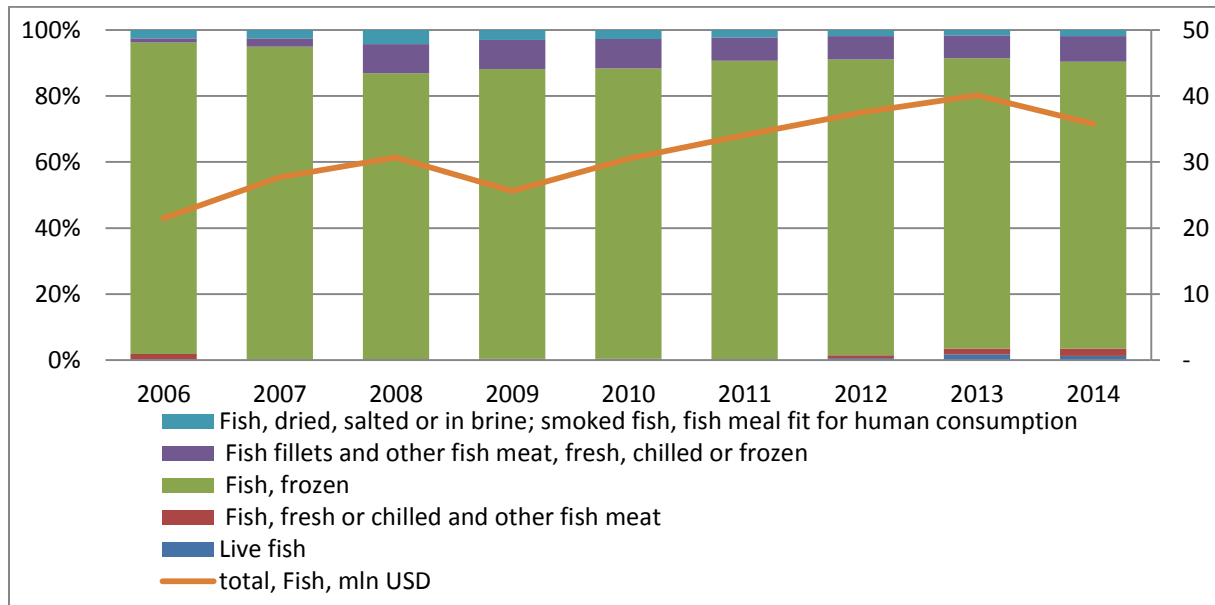
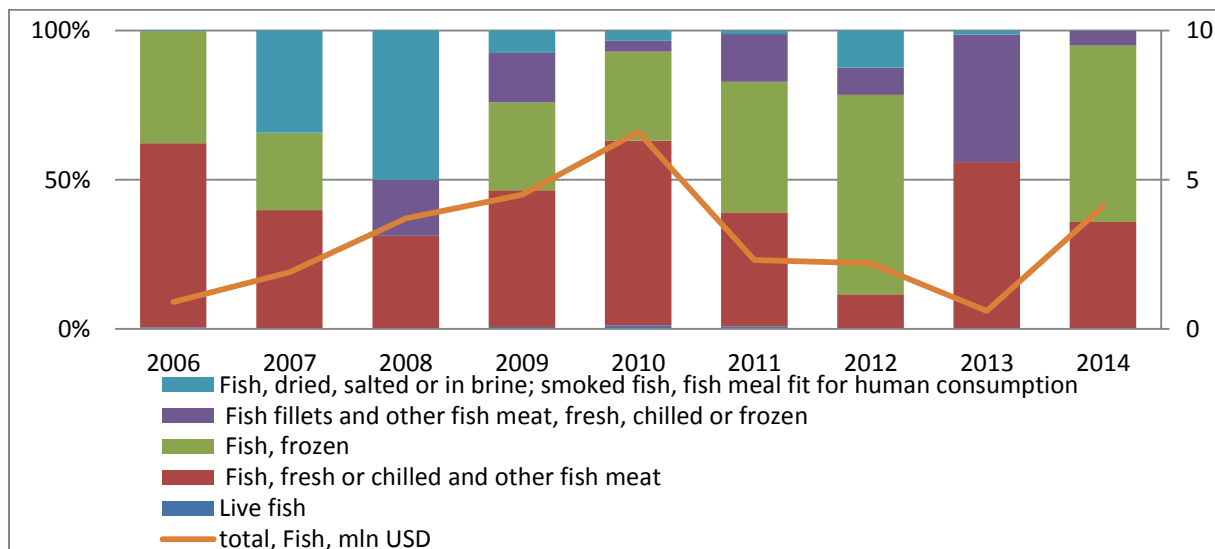


Diagram 2 – Fish export from Georgia (ths US dollar)⁴



³ National Statistics office of Georgia, http://pc-axis.geostat.ge/Selection.aspx?rxid=c8ca81e9-2824-4c5b-a46a-c80202913531&px_db=Database&px_type=PX&px_language=en&px_tableid=Database%5cAgriculture%5cFood+Balance+Sheets%2c+Supply+and+Utilization%5cTABLE_4.06.px

⁴ National Statistics office of Georgia, http://pc-axis.geostat.ge/Selection.aspx?rxid=c8ca81e9-2824-4c5b-a46a-c80202913531&px_db=Database&px_type=PX&px_language=en&px_tableid=Database%5cAgriculture%5cFood+Balance+Sheets%2c+Supply+and+Utilization%5cTABLE_4.06.px

4 Fish Farming Value Chain

4.1 Production Systems

As a result of the nature and climate, conditions of Georgia, fresh water fisheries are mainly divided into two zones: mountains and valleys. There are cold water fish farms in mountain zones and warm water types in lowlands.

The species of fish grown in warm water farms are mainly carp, silver carp, white grass carp and etc.

In the highland areas, which consist of cold water-type pools, Rainbow trout are mainly used in farms.



Picture 2 - Fish farm in the Khoni Municipality

Pool farm fishing is divided into complete and incomplete systems. In complete systems the fishes are raised in full cycles - starting from spawning (reproduction) and ending with commodity fish. In case of incomplete systems the farm takes the larvae and conducts just feeding within the farms, or is producing larvae and selling it to other farms. It should be noted that most of the fish farms in the regions of Imereti and Racha are incomplete farms. ,

The study showed that there are about ten fishing farms in the target regions out of which cold water farms are located in Racha and warm water ones in Imereti. As a result of research it was identified, that in the cold water farms they have rainbow trout, and in lowlands farmer - Carp, Grass Carp and Silver Carp. Hereby, it also should be mentioned, that there are no fish processing factories in the region and all the farms sell the product in the fresh form.

Rainbow trout (*Oncorhynchus mykiss*) is mostly found in the region of Racha, mainly in cold waters. This type of fish highly resembles river trout up until two years of age with the exception that it is not dotted red; while the adult body of the fish develops wide rainbow wide lines. Its length is about 90 cm and weighs about 6 kg. It lives in the pacific coasts of the United States (Alaska to Mexico), and was acclimated in many courtiers of Europe, Asia, Australia and Africa in the second half of the 19th century. It is a freshwater fish, which is found in cold waters but is more resistant compared to river trout - it adapts to waters of 4-30 Celsius, while the optimum temperature is about 20 degrees. It breeds from February to June in rapid flow shallow waters, and stone-sandy areas. It is a valuable commercial fish, used mostly when fresh.

The first phase of the construction of a trout pool is the selection of an appropriate space. The need to find a number of high-quality water resources should also be taken into account as well as a consideration regarding its rational use and cleaning processes. The water is suitable for fisheries if it is in line with the following parameters: oxygen saturation - more than 80%; iron content of up to 0.5 mg / l; ammonia content of up to 0.2 mg / l; Carbon content of up to 0.5 mg / l;

The study showed, that out of total production of warm water fishes in Imereti region, 40% comes on Carp, another 40% on - Grass Carp and 20% on Silver Carp. The **carp** (*Cyprinus carpio*) is a widespread freshwater fish of eutrophic waters in lakes and large rivers in Europe and Asia. Carp is native to Asia, and has been introduced to every part of the world with the exception of the Middle East and the poles. They are the third most frequently introduced species worldwide, and their history as a farmed fish dates back to Roman times. They can grow to a maximum length of 100 centimetres, a maximum weight of over 12 kilograms.

The grass carp (*Ctenopharyngodon idella*) is an herbivorous, freshwater fish species of the family Cyprinid, and the only species of the genus *Ctenopharyngodon*. It is a large cyprinid native to eastern Asia, with a native range from northern Vietnam to the Amur River on the Siberia-China border. It is cultivated in China for food, but was introduced in Europe and the United States for aquatic weed control. It is a fish of large, turbid rivers and associated floodplain lakes, with a wide degree of temperature tolerance. Grass carp will enter reproductive condition and spawn at temperatures of 20 to 30°C.

The grass carp grows very rapidly. Young fish stocked in the spring at 20 cm will reach over 45 cm by fall. The average length is about 60–100 cm. The maximum length is 1.4 m and the maximum weight 40 kg. They eat up to three times their own body weight daily.

The silver carp (*Hypophthalmichthys molitrix*) is a species of freshwater cyprinid fish, a variety of Asian carp native to China and Eastern Siberia. It is cultivated in China. Pound for pound, more silver carp are produced worldwide in aquaculture than any other species. They are usually farmed in polyculture with other Asian carp, or sometimes Indian carp or other species. It has been introduced to, or spread by connected waterways, into at least 88 countries around the world. The silver carp reaches an average length of 60-100 cm with a maximum of 140 cm and about 45 kg.

For all types of above mentioned carps' farming process is similar, at the initial stage of preparation the pond is dried, the bed is processed if necessary (if it has sand it is ploughed over), then lime is scattered for disinfection purposes. It is then filled with water and the whitebait is placed. When the fish reach a certain age they are distributed in a 'fertilizer pond'. The fish s grows most rapidly when the water temperature is at 25-30 degrees-.

Study showed that that it requires significant for farmer's investments to arrange a pool. The cost of arranging pool per hectare accounts to 15 000GEL. In addition, each pool needs two "shields", cost of which reaches 6000 GEL.

4.2 Productivity

A separate analysis of the production picture s of all major species of fishes found in the region is necessary in order to fully assess the productivity of the field, since the numbers differ depending on species. For example, in our case it is recommended, on the one hand, to consider cold water pool farms, which are mainly distributed in the Racha region, and on the other, warm water farms, which are located in Imereti.

Cold water pool farms

Rainbow trout

The optimal water temperature for Rainbow trout is 14-18 degrees. Temperatures above 25 degrees are unacceptable for trout farming even for a short period. Five to 15 liters per second of water flow, with a maximum temperature of 15-22 degrees, is needed in the period of high temperatures (the so-called "critical" period, July-September) in order to raise one ton of breeding fish.

Small-whitebait requires six meals a day, and after growing up three times. The study showed that producers sell the fish, when its weight reaches 300-400 grams, which takes about four months. In addition, the fish ponds are very small; therefore, the production capacity is also very small. Ponds are from 20 to 40 square meters of sizes, and average productivity is up to 2.5 tons of ready for sale fish per year. As farmers declared, ponds capacity is much higher and in case of sufficient financial resource they could produce twice more fish in the same ponds.

Warm water pool farms

Carp, Grass Carp and Silver carp

All of these types of carps reach maturity after about 1.5 years. Whitebait are put in the ponds in spring and can be put on sale in the fall of the next year, during which time weight of grass carp and silver carp is approximately 3-4 kg and Carp can weigh up to 1.5 kg.

Dry food for fish is produced in 10 different sizes in the form of cereal or granules. The cereals are used for young fish (fingerlings up until the age of one year), while the granules are fed to fish of over one year old. The length of the granule should not exceed the length of the fish. The amount of the cereals and granule depends on its weight.

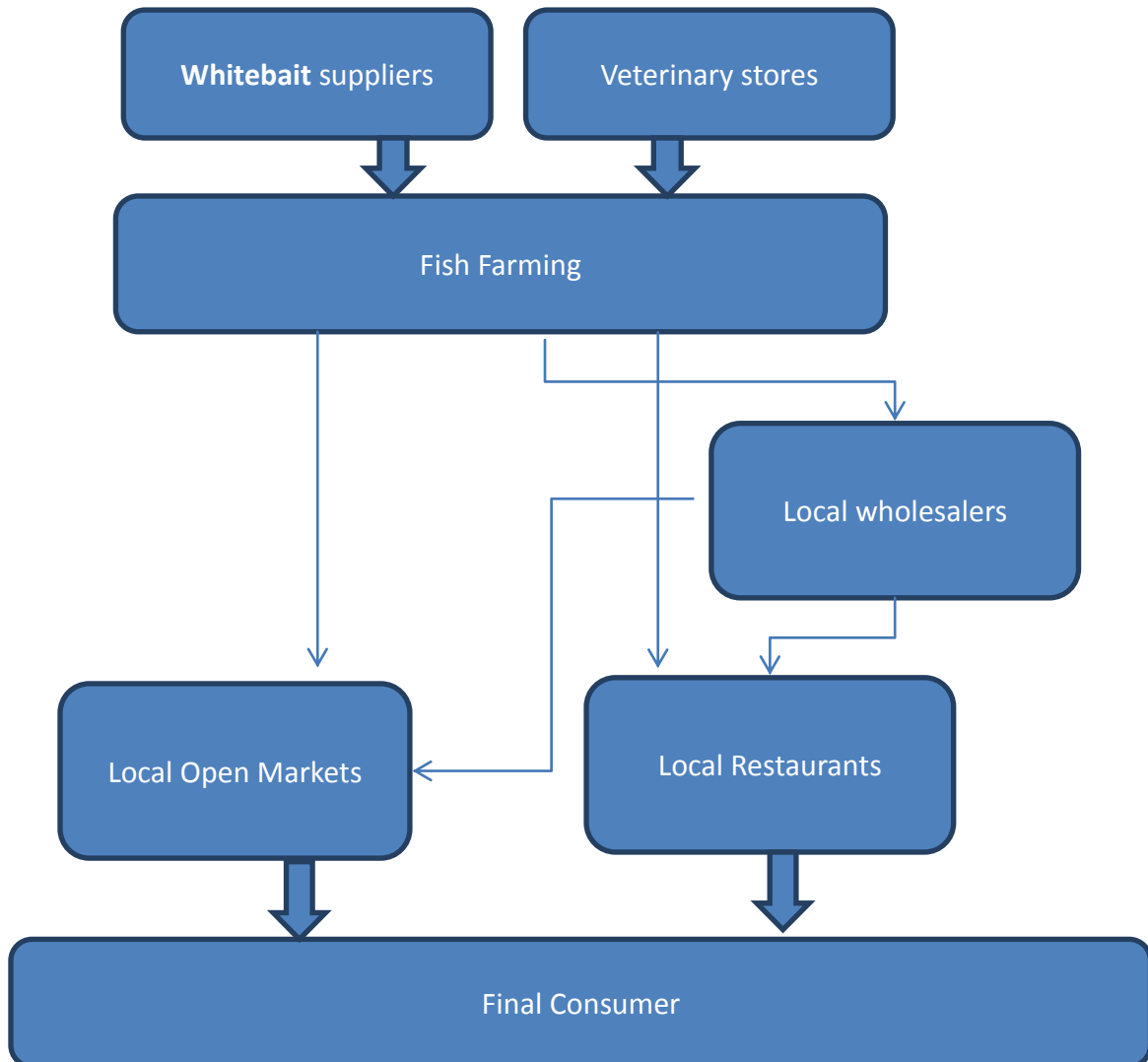
Feeding pattern is the similar for all of the types of carps. Up until one year fish require to be feed 16-17 hours a day, with one-hour intervals, until it reaches 10 grams. Fish which is over 10 gram requires to be provided with food 10 hours a day. The study found that the majority of farmers in the region own additional agricultural land where they grow corn which, together with wheat grain, is use for fish feed.

The study showed that in order to raise one kg of fish, at least 3 kg of feed is required. However, due to a lack of feed the fishes are usually fed a maximum of two kg, which is why they need more time to reach their desired weight. For instance, one whitebait needs 33 grams of feed each day which gradually increases and after one year amount to about 3 kg.

The study also showed that the pool farms in the Imereti region are of two sizes - small - no more than five hectares, and relatively large - more than five hectares. The biggest area is 22 hectares which is located in the municipality of Samtredia. However, the entrepreneurs cannot afford the full workload, for which they state a lack of working capital and high costs of food as reasons. On average they grow 1 tons of fish per hectare, whereas the actual capacity of pools is at least three times higher.

4.3 Product Chain typical for Imereti and Racha - Lechkhumi regions

Scheme 3 - Fish farming value chain in Imereti and Racha regions



Direct sales, local open market. Due to the small volume of production small scale producers sell their product directly from the farms, or the farm owners themselves take the products for sale to the local retail market. In particular, in the region of Racha fish from cold water pool farms are sold on the local market directly by producers, and only in rare cases they are sold outside the municipality (e.g. Oni, Terjola, etc.). The situation is similar in the small farms of Imereti as well. Average 25% of fish is sold via direct sales.

Local Restaurants and Stores. The study revealed that the local restaurants and stores account for 20% of total sales of fish received in farms of target regions. They mainly focus on relatively large farms, which can ensure continuity of supply throughout the year. In case of trout farms – since all of them are small, these entities have relations with several small farmers. **Wholesalers** Average 55% of product is sold through the wholesalers. Medium and large farms mostly sell their products from their farms to local wholesalers which, in turn, sell the majority of products at the local markets.

Each producer usually has communication with one or two wholesaler, who in turn have relations with a re-sellers at open market and and/or ties with a store which is provided with products according to the demand.

In addition, all producers sell the fish live as none of them has refrigerated storage facilities; also there is no fish processing factory in the target regions, where the producers would be able to process the fish.

4.4 Production Prices

Fish prices do not change significantly thought the year, excluding celebrations when the prices increase not only of fishes but of all food products. Fish price depends on its species, trout is regarded as relatively high quality fishes on the market, and it's prices are relatively higher than other ones. In spite of difference between fish species, prices of internally produced fishes are lower than of imported. Table 2 shows fish prices which is produced in Imereti and Racha regions, thus Table 3 shows prices of imported fish (mainly frozen) in Imereti and Racha regions.

Table 2 – Prices of fishes produced in Imereti and Racha regions

Product	retailing price of 1 kg (GEL)	Wholesale price of 1 kg fish (GEL)
Rainbow trout	10-12	8-9.5
Carp	5-6	3.5-4.5
Silver Carp	5-6	3.5-4.5
Grass Carp	5-6	3.5-4.5

Table 3 – Prices of frozen fish in Imereti and Racha regions

Product	retail price of 1 kg (GEL)	Wholesale price of 1 kg fish (GEL)
Flounder	9	7.5
Notatena	5	4
Salmon	11	9
Mackerel	6	4.5
Catfish	4.8	4
Stavridis	7	5.6

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

5.1 Supply of inputs

A couple of main components are necessary for the production of fishes, specifically:

Feed. The largest portion of the cost of fish production is feed. Feeding pattern is different for trout and carp types of fishes. For trout farmers use specialized feed. In Racha region all farmers use Nuntra and Protek (produced by Skretting) Average 0.5kg of feed is necessary for trout to reach 400gr weight (after which it is sold). The price of 1 kg trout feed cost from 5 to 8 GEL depending the type and consistency. Grained corn and/or grained bread are mainly used for feeding Carp, grass carp and silver carp. At least 3kg of feed is needed for these fishes to reach 1 kg weight, that costs average 1.5GEL per fish. Accordingly, feed costs for ready for sale one carp (1.5kg) is up to 2.2GEL, and per silver carp and grass carp (3 Kg) – 3GEL.

Whitebait. An essential component of costs is also the purchasing of whitebait. Whitebaits of rainbow trout costs 0.13GEL per unit. Farmers buy it in Batumi, Adjara region. Each time they usually purchase 5 000 whitebait for one pond (with average size of 20 square meters). As for whitebaits of carp, grass carp and silver carp, the farmers obtain it from specialized breeding farms, mainly from Lagodekhi. One gram costs 0.01 GEL. Whitebait is also sold in packages of 10,000 pcs for 100 GEL, out of which 10% will survive and continue to grow.

Equipment. The field of fish farming in the target regions does not require an intensive use of equipment. The basic needed equipment are various types and sized of nets, which are used for catching the fishes. The price of nets very according to their size and construction – starts from 35 GEL and may be as high as 250GEL.

Medications. Drug consumption is about 2-3% of the total cost. Farmers mainly buy them in district veterinarian pharmacies. The most frequently used medication are as followings: Airolover (tertoring lever deseases, prevention from formulating fat in stomach area), Florfish (antibiotics for different deseases, among them: red mouth, columnaris, coldwater vibriosis, gills deseases, etc) and diatri-aqua (Rainbow trout fry sendrom; Ulcer desease, Columnaris desease, etc). Each of the medications have certain method and dosage of usage. Farmers usually get relevant consultations in local agro–shops. The medications are mixed with food or water in pre-defined volume.

Labour force. Most of the farms in the study region do not use hired labour force and work on the farms themselves. Accordingly, they do not take labour into account as the production cost, which thus increases their profit margin.

5.2 Demand

There is no official statistical data available on fish production or consumption on regional or country level. The fish produced in Imereti and Racha are fully intended for local consumption. The study did not reveal a single producer, who sells the products outside the region.

Hence, it is hard to determine the volume of the fish market and demand trends.

Also, it should be kept in mind that the demand for fish generally increases during the time of fast. , fish consumption is frequent in Georgian families, but not on a day to day basis, as is the case of cattle or

chicken meat. There is just few traditional dishes of fish in Georgia. Families mainly consume it once-twice per month in fried or boiled form with some traditional sauces. One of the most popular dishes for celebrations is grilled trout in wild berry sauces.



Picture 3 - Trout Pool in Ambrolauri

5.3 Related industries

A number of large farms in Imereti lowland area own agricultural lands, and, in the form of additional activities, grow grain crops which are used for fish feeding. These farms mainly have the machinery necessary for this task.. Some large farms own grain grinding mills, which in addition to their own needs are used for other services and therefore are a source of additional income for farmers, although it is a small portion of the overall amount.

For diversification and development of farms the formation of refrigerating storage facilities would be effective, as would be the formation of a fish processing factory (freezing, drying, salting,). But until the production volume is not increased, development of processing factory cannot be considered as an option.

5.4 Competition

Competition in this field should be considered in the following two directions: first –competition between the local producers; and second - competition between local producers frozen fish importers. The second is not so relevant since the market is divided from the beginning as consumers have already made a decision beforehand regarding which type of fish they prefer: frozen or fresh. As Restaurants, they always buy fresh fish.

As for the competition between producers as stated by themselves, since the volume of their produced products is not high in total they are all able to sell their products at a stable price during the year therefore competition is scarce.

6 Strategic productivity and quality

6.1 Fish farming in relation to food safety and quality

Being a food product fish must undergo state control, for which the country has a National Food Agency. However, in reality fish production farms in the regions do not go through any such types of control; The Agency annually publishes the list of controlled units and there is no singular fish farm in the list. They are supposed to control sanitary conditions, feed quality, certain processes, existed quality control systems, etc.

However, the farmers themselves believe that their production would be able to meet quality control standards because it is produced in a clean environment, using natural food products.

Formally, the same regulations are used in this field as with other food products, although in reality they are not controlled

7 Operational productivity – processing, transportation, diseases and biological threats

7.1 Processing

The study revealed that there is no fish processing factory in Imereti and Racha. Both human and animal food may be obtained as a result of fish processing but recent research has also shown that the region's potential raw material (fish production capacity) would not be enough in the case of the existence of such an enterprise, and will not be sufficient for its profitable operation. Accordingly, investors who may wish to invest in this direction should take into consideration potential of growth of production, otherwise there will be lack in supply of raw material. It also could be an option for such factory to build the new pools and produce part of needed fish.

7.2 Transportation

Breeding trout fingerlings are mainly brought in farms from Batumi, although warm water farms obtain them from Lagodekhi. Food production for farms generally takes place locally or in a number of cases it is bought at the local agricultural market. Trout fish farms buy fish feed from Terjola and Batumi.

The small scale producers who sell their product to open market transport the fishes in medium size barrels (plastic) by their own cars, while large manufacturers sell their product directly from the farms; therefore the wholesale buyers transport the fishes in large plastic barrels by vans and take them to vendors, grocery stores, food chains, etc. These sellers on their hand have special, small size glass aquarium, where they keep the live fish.

7.3 Diseases and chemical threats

In general, there are more than 100 species of parasite recognized for freshwater fishes. These include 63 species of the simplest form of parasites, 33 parasitic worms and four crustaceans: all of which are a cause of infectious and invasive diseases in fish.

Diseases caused by parasites are very dangerous, and in some cases cause damage to the fish and farms. However, recent research has indicated that these diseases are quite rare in practice, since farmers conduct prevention measures. Mainly, they use drain the pool from time to time and use lime and special medicines (benaldecid) for disinfection, while the fish is also given preventive medication, which are sold at vet shops.

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

Fish farmers either sell their products at local markets themselves or to the wholesalers/resellers via verbal agreements. However, the amount of self selling is insignificant in Imereti and Racha regions. Resellers store a sufficient amount of live fish in plastic barrels with water for several days. Apart from business relations with the wholesalers, they have also established direct contacts with other types of trade entities, like restaurants and food stores. Representatives of such entities buy products regularly in the agreed amounts. Communication system is not formalized, they use only phone calls for negotiating and ordering. As mentioned by these farms, the agreements are not sustainable as in terms of volume, also time frame. For example, one time they may sell 10 kg of fish and next time up to 80 kg may be required by the same buyer.

9 Human resources, social capital and know-how

9.1 Know-how and access to extension services

The study found that the region's fish farms operate using the same production processes which were used years ago. At the same time, farmers are not aware of modern technology, which would increase productivity in the field, or they believe it to be inaccessible. As it turned out, they do not receive information about the innovations in the field but do not express any particular interest in such information.

There are no available extension services provided by local government or NGO sector.

9.2 Opportunities of formal education

There are practically no means of receiving formal knowledge regarding modern methods of fish farming in the regions. The University of Agriculture of Tbilisi is the only entity with a bachelor and master's degree programs.

9.3 Social capital and cooperation

The level of cooperation in the field is quite low and only limited to information regarding food, medicines, customers and other matters exchanged by personal relationships. The small amount of entrepreneurs and geographical distance contributes to a problem for the formation of cooperatives. In the case of more entrepreneurs farmers will be able to jointly purchase fingerlings, high-calorie food products, medicine, improve technology, coordinate prices and terms of delivery and conduct other activities together. In addition, they might even be able to create a joint brand and processing factory.

10 Institutions and business environment

10.1 Business environment

The interviewed entrepreneurs did not express any complaints towards the business environment. They generally did not encounter any formal or non-formal barriers; although they stated a lack of working capital, which does not allow them to fully load the farms.

Generally it can be said that the business environment of the country is liberal, the volume of taxes is low, it is simple to start a business, property rights are protected and there are no legal barriers on the market, which are played out. Therefore, the main problems are related to a lack of financial resources and proper knowledge.

10.2 Governmental Support

There are no state programs which are specifically aimed towards the development of the field of fish farming, although some general programs might have a positive impact, including the programs executed by the Ministry of Agriculture: Produce in Georgia; Preferential agro-credit; Cooperative Promotion Project, etc. There is no any training /education opportunity provided as well neither by central ministries nor by local government.

The study showed that the main direction in which entrepreneurs need state support are short- and medium-term credits for agricultural expansion and for the purchase of working capital.

11 Conclusions and Recommendations

11.1 SWOT

<p>S</p> <ul style="list-style-type: none"> ecologically clean environment and natural food products Favourable environment for fish farming Increasing demand on market 	<p>W</p> <ul style="list-style-type: none"> Low productivity Lack of modern equipment and technique Low level on Knowledge Low access to financial resources
<p>O</p> <ul style="list-style-type: none"> Increasing productivity and establishing new farms; Government policy aiming for entrepreneurship development in rural municipalities. Development of cooperation in the field 	<p>T</p> <ul style="list-style-type: none"> Diseases natural disasters (flood, landslide)

11.2 Prospective for improving and upgrading of fish farming value chain

The conducted study revealed that in our target regions fish is only produced if capital investments are not necessary for arranging new pools. Therefore, fish farms operate only on the basis of old Soviet type ones, or naturally created ponds.

Increasing of fish productivity - In order for fish farms to be profitable it is important to increase productivity. More specifically, the use modern technology to speed up production processes, the improvement of feeding, etc. **Increased access to financial resources** – the access to financial resources is vital problem in the field. Start-ups and developing businesses have almost no opportunity to receive cheap agriculture loan. There is necessity to develop agricultural loan with appropriate requirements which could be fulfilled by players in the field.

Education – Education of existing and potential entrepreneurs with tested innovations is also necessary for the development of the field. There should be some VETs and other institutions providing educational upgrade for producers.

Cooperation – despite cooperation prospective is not much demanded from farmers, in a long run period building the cooperatives will be the most efficient way for development and increasing the profitably. Especially small and medium size farmers will be able to jointly purchase fingerlings, high-calorie food products, medicine, improve technology, coordinate prices and conduct other activities together.

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