



The European Union
for Georgia



VALUE CHAIN ANALYSIS OF BROCCOLI IN KVEMO KARTLI



Value Chain Analysis of Broccoli

In Kvemo Kartli

The project „**Regional Civil Society Organizations Supporting Free Trade with Europe**” is funded by European Union and implemented by *People in Need*

This publication has been produced with the assistance of the European Union. Its contents are the sole responsibility of People in Need and PMC Research Centre and do not necessarily reflect the views of the European Union.

Tbilisi, 2018

Researcher: **Salome Gelashvili**

The following civil society organizations actively participated in the research process:

- **Tetrtskaro Local Action Group;**
- **„Ertoba“;**
- **„Democratic Women Society of Marneuli“.**

Table of Contents

Executive Summary.....	7
1. Introduction	9
2. The Aim of the Study.....	10
3. General Issues Regarding the Trade with the European Union.....	11
4. Methodology of Research	12
4.1 Desk Research and Fieldwork	13
4.2 Research Limitations.....	14
5. General Overview of the Broccoli Sector in Georgia and Globally	15
5.1 Global Broccoli Sector	15
5.2 Overview of the Broccoli Sector in Georgia	18
6. Scope of Research.....	23
6.1 Brief Overview of the Kvemo Kartli Region.....	23
7. Broccoli Characteristics, Cultivars and Products.....	25
8. Broccoli Value Chain Participants	27
9. Illustration of the Broccoli Value Chain	29
9.1 The Broccoli Value Chain Grid Map	29
9.2 Description of the Main Stages.....	30
9.3 External Factors Affecting the Broccoli Value Chain.....	32
9.4 Cost and Revenue Analysis	35
9.5 Value Flow Chart	37
9.6 Main Players and Relationships between Them.....	39
9.6.1 Horizontal Relationships in the Value Chain.....	39
9.6.2 Vertical Relationships in the Value Chain	40
10. Broccoli Export to the European Union	41
11. SWOT Analysis of the Broccoli Sector	45
12. Potential of the Broccoli Sector	47
13. Discussion and Recommendations	48
Bibliography	50

List of Tables

Table 1. List of individual interviews.....	13
Table 2. Focus group features.....	14
Table 3. Largest exporters of fresh or frozen cauliflower and broccoli.....	18
Table 4. Largest importers of fresh or frozen cauliflower and broccoli.....	18
Table 5. The region's share in the production of meat and animal products, 2016.....	24
Table 6. Number of enterprises and their areas of activity, 2014.....	24
Table 7. Broccoli products.....	26
Table 8. Refrigeration and storage facilities in Kvemo Kartli.....	28
Table 9. Agrotechnical schedule of broccoli cultivation.....	31
Table 10. Terms of Agricultural Insurance.....	34
Table 11. Farmers' expenses.....	35
Table 12. Export-related expenses.....	37
Table 13. Horizontal relations within the chain.....	39
Table 14. Vertical relationships within the chain.....	40
Table 15. Trading partners in the European Union.....	42
Table 16. SWOT Analysis.....	46

Figures

Figure 1. Global production.....	15
Figure 2. Global sown area.....	16
Figure 3. Largest global producers.....	16
Figure 4. Productivity.....	17
Figure 5. Producer prices.....	17
Figure 6. Production level in Georgia.....	18
Figure 7. Georgian import and export by value.....	19
Figure 8. Export markets.....	20
Figure 9. Import Countries.....	21
Figure 10. Price of broccoli.....	22
Figure 11. Largest importers in the European Union, 2017.....	42
Figure 12. Producer prices in the European Union.....	43
Figure 13. Producer prices in various countries.....	43

Drawings

Drawing 1. Broccoli Value Chain.....	29
Drawing 2. Main Stages.....	30
Drawing 3. Added value for each link of the value chain.....	38

Acronyms

DCFTA	Deep and Comprehensive Free Trade Area Agreement
EDA	Export Development Association
FAO	Food and Agriculture Organisation of the United Nations
FAOSTAT	UN Food and Agriculture Organisation Statistics
REAP	Restoring Efficiency to Agriculture Production
USAID	United States Agency for International Development
GeoStat	National Statistics Office of Georgia
GSP	Generalized System of Preferences

Executive Summary

Georgian soil and climate are favourable for broccoli production. Although horticulture in Kvemo Kartli (Lower Kartli) is mainly represented by potatoes, grains and vegetables, the region also produces broccoli, and there are even villages where commercial production of this plant constitutes the main source of income for farmers.

The main goal of this study is to conduct a value chain analysis of broccoli in the Kvemo Kartli region and explore the product's export potential on the European Union market. To this end, research conducted for this study includes desk research, 22 individual interviews and 5 focus group meetings.

Statistics show that the global production of broccoli and cauliflower is on the increase. Thus, more than 25 million tonnes of broccoli were produced in 2016. The largest producers of broccoli and cauliflower are China and India.

Production levels of broccoli and cauliflower in Georgia are inconsistent. Over the past several years, production has been lower than in 2011-2012. In spite of the production levels, broccoli is exported to neighbouring countries (Azerbaijan, Armenia) in low quantities. As with many other products, broccoli imports significantly exceed the exports.

The price of Kvemo Kartli -produced broccoli is quite low compared to other regions and to imported broccoli. This should help the competitiveness of the Kvemo Kartli product. However, stable production of broccoli cannot currently be achieved in Kvemo Kartli throughout the year, which substantially reduces competitiveness.

Broccoli is represented on the Georgian market in the form of the following four products: broccoli heads, broccoli puree (for children), broccoli microgreens and organic broccoli juice.

The main participants in the broccoli value chain are:

- Suppliers (distributors, stores) of seeds, plant protection products, fertilizers, etc.;
- Broccoli producing farmers;
- Intermediaries and storage/refrigeration facilities;
- Exporters and importers;
- Market retailers;
- Retail stores (supermarkets, pharmacies);
- Processors;
- Local and foreign consumers.

There is a noticeable shortage of contractual relationships between the main participants in the chain. Auxiliary participants include farmer service centres, the Food Safety Agency, international NGOs and projects funded by them, associations (e.g. Export Development Association), educational institutions, financial institutions, insurance and transport companies.

With regards to costs and revenues, the profit margin for broccoli on the local market is 76%, but is reduced to 40% in the case of exports in the light of the current low productivity.

The study shows that broccoli is a high profit margin vegetable that currently has a lower export potential than a potential to substitute imports. This is due to the following factors:

- Broccoli imports substantially exceed its exports;
- Compared to other vegetables, the price (and the profit margin) of broccoli on the local market is high, and there is demand for it throughout the year;

- Against the background of Georgia's economic development, it is expected that an increase in the population's income will lead to a growth in demand for improved nutrition (diversified diet).

Export-related difficulties are caused by the following factors:

- European countries are among the world's largest producers of broccoli;
- High levels of production in the European Union account for relatively low prices that Georgian broccoli struggles to compete with (taking the transportation and certification costs into account);
- Low productivity in Georgia increases transportation and certification costs per unit of product.

Development of the broccoli sector and its export potential requires combined efforts by farmers, as well as public, private and non-governmental sectors. These efforts must be aimed at implementing modern technologies to increase productivity; implementing exemplary food production practices; developing refrigeration, storage and processing facilities; and increasing awareness about the health benefits of broccoli among the population.

1. Introduction

Agriculture holds a significant position within the Georgian economy. It is particularly important for regional development, as the majority of the rural population is employed in the field of agriculture (42% of the national labour force is listed as being self-employed in rural areas).

The main goal of this study is to conduct a value chain analysis of broccoli in Kvemo Kartli, which involves studying this sector in detail and determining its future development prospects. The study focuses its attention on the opportunities and difficulties derived from the Deep and Comprehensive Free Trade Area (DCFTA) Agreement for this sector.

Georgian soil and climate are favourable for broccoli production. Although broccoli is currently not regarded as a widely used agricultural product in Georgia, and there is a lack of statistical information about the volume of production in the country, demand for broccoli is growing both in Georgia and across the world, as evidenced by increased global production and land coverage. The average annual production growth is 2.9%, while the average land coverage growth rate is 2.6%¹.

Although horticulture in Kvemo Kartli is mainly represented by potatoes, grains and vegetables, the region also produces broccoli, and research revealed that there are even villages where commercial production of this plant constitutes the main source of income for farmers. Broccoli is often produced together with cauliflower, and the statistical information presented in this study represents aggregated data for broccoli and cauliflower.²

¹ Growth rate based on Food and Agriculture Organisation (FAO) data for 2010-2016.

² No separate statistical information is gathered about broccoli by either GeoStat or FAO.

2. The Aim of the Study

The main goal of this study is to analyse the value chain for broccoli in Kvemo Kartli together with civil society organisations, and to explore the product's export potential on the European Union market.

The chief priority is to determine the existing capabilities within the chain, in order to maximise the added value. The analysis aims to determine how to make the broccoli production process more effective, sustainable and profitable on the national and international markets.

More specifically, the analysis aims to:

- Study the broccoli production process;
- Identify the participants in the broccoli value chain;
- Determine the links between the participants;
- Analyse the costs and the revenues;
- Determine the potential of broccoli on the European Union market;
- Determine the strengths, weaknesses, opportunities and threats associated with the production and sales of broccoli (SWOT analysis);
- Devise recommendations for the development of the broccoli sector.

The main goal of the analysis is to determine the prospects for broccoli production, in order to ultimately maximise the creation of added value within the chain and make broccoli production profitable for the farmers in the region. Furthermore, this study aims to strengthen the local civil societies, in order to ensure that they can conduct such research independently in the future.

3. General Issues Regarding the Trade with the European Union

In 2014, the European Union signed a Deep and Comprehensive Free Trade Area (DCFTA) Agreement with Moldova, Georgia and Ukraine. The agreement came into force in June 2016, and the aforementioned countries were granted a transitional period of 10 years in which to establish a free trade regime.

Advantageous trade agreements have been signed by Georgia in the past. It is a member of the World Trade Organisation, and benefits from trading with the other member states. Furthermore, Georgia has a free trade regime with the CIS countries (Ukraine, Azerbaijan, Armenia, Russia, Moldova, Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan); a free trade regime with Turkey; a GSP agreement with the United States, Switzerland, Norway, Canada and Japan; and a so-called GSP Plus³ agreement with the European Union. However, DCFTA differs from the other agreements, as it aims not only to deepen the trade relations between Georgia and the EU, but to bring Georgia closer to the European standards and harmonise the country's legislation with that of the EU.

DCFTA consists of fifteen chapters⁴, but in the process of devising its recommendations, the European Commission identified four priority areas: technical trade barriers, sanitary and phytosanitary measures (food safety), intellectual property rights and competition, of which the first two are particularly relevant for this study. These priority areas will be discussed in greater detail in Chapter 9.

³ The European Union's new system of preferences, GSP Plus, allows Georgian manufacturers to export up to 7000 different products to the EU without paying customs duties. Up to 3600 Georgian-made products are subject to discounted tariff payments under the same programme.

⁴ Deep and Comprehensive Free Trade Area Agreement (DCFTA), 2018 – <http://www.dcfta.gov.ge/ge/agreement>

4. Methodology of Research

The following main methods have been used during research:

- Desk research: analysis of articles, reports, statistics, etc.;
- Fieldwork: focus groups involving broccoli producers, as well as individual interviews with farmers, suppliers and representatives of information/consultation centres, NGOs and the private sector.

A total of 22 individual interviews and 5 focus group meetings took place.

The following qualitative value chain tools have been used in this study:

- Identification of priorities during the selection of the value chain.
- Illustration of the value chain.
- Analysis of the management, coordination and control mechanisms, which involves analysing the formal and informal institutions, regulations and standards associated with the broccoli sector.
- Analysis of the opportunities to modernise the chain.

An analysis of costs and revenues – determination of the added value created on each step of the value chain for each participant – was conducted as well.

Representatives of the Kvemo Kartli civil society took an active part in the research process. They actively participated in the process of selecting the product for research, as well as in the subsequent field works.

Selecting the Product for Research

Selection of the product (crop) for research was carried out through discussions with civil society organisation representatives, experts, local action groups and individual farmers. The meetings focused on the products produced in Kvemo Kartli, such as honey, blackberries, animal products, potatoes, onions, garlic, tomatoes, cabbage, strawberries, carrots and beetroot. Once the list of products relevant to the region was composed, the following two groups of items were excluded:

1. Products that are not currently allowed on the EU market – most animal products (apart from wool, honey and fish)
2. Products that have already been researched (honey, onions, potatoes, tomatoes).

By excluding the aforementioned categories, the list was reduced to the following six products: blackberries, garlic, cabbage, strawberries, carrots and beetroot. The products were assessed based on the following criteria:

- Export potential on the European Union market;
- Potential to substitute imports;
- Potential to create added value;
- Relevance to the region – suitable soil and climate conditions, production experience.

The products were assessed on a scale of 1 to 5 for each criterium, whereby 5 denoted a strong level of satisfaction of the criterium, while 1 denoted a weak level of satisfaction.

Due to the fact that the product's potential on the EU market is the focus of this study, the crop's export potential was afforded the most weight (0.35), followed by the potential to substitute imports (0.25), the potential to create added value and relevance to the region (0.2 each). The weights were

used for weighing and adding the points allocated to each product. Based on this principle, cabbage (more specifically, broccoli) was selected as the product for research.

4.1 Desk Research and Fieldwork

Desk research included sourcing and analysing the existing literature (reports, articles, statistics). The following forms of data were collected:

- Characteristics and origins of broccoli;
- Production at international level⁵;
- Prices;
- Main characteristics (major crops, economic characteristics) of the Kvemo Kartli region;
- Trade statistics (volume of export/import, costs, partner countries);
- Characteristics of the EU market⁶.

Having selected the subject of research, individual interviews were conducted with broccoli-producing farmers, as well as representatives of the public, private and non-governmental sectors. The first individual interview took place on 6 October 2017, while most of the other interviews were conducted in January 2018. The groups of respondents are listed in the table below:



Table 1. List of individual interviews

#	Respondent Group	Number of Interviews	Method
1	Suppliers of Raw Materials (Agricultural Supply Stores)	3	Direct
2	Farmers	9	Direct
3	Refrigeration and/or Export	2	Direct
4	Processors	1	Telephone
5	Experts	1	Direct
6	Export Development Association	1	Telephone
7	Information/Consultation Centre	3	Direct
8	Transport Company	1	Direct
9	Food Safety Consultation Company	1	Telephone

Note: Both refrigeration facilities are also conducting exports

As for the focus groups, their meetings took place between October 2017 and February 2018. The groups included between 4 and 7 participants and were mixed in terms of gender and ethnicity. The participants usually represented a single village in one of the municipalities, although in some cases, a number of villages were represented in a single focus group, as seen in the table below:

⁵ Production data unavailable for Georgia.

⁶ EU Trade Helpdesk, 2018 – <http://trade.ec.europa.eu/tradehelp/>

Table 2. Focus group features

Focus Group #	Number of Participants	Municipality	Villages
Focus Group 1 (Test)	4	Marneuli	Kizilajlo
Focus Group 2	6	Marneuli	Shulaveri
Focus Group 3	8	Tsalka	Sakdrioni, Sameba, Gantiadi, Gumbati, Darakovi, Tsalka
Focus Group 4	6	Marneuli	Kizilajlo
Focus Group 5	6	Tsalka	Gantiadi, Tsalka

4.2 Research Limitations

The study has several limitations:

- The relatively low number of individual interviews and focus group meetings does not permit generalisation of the collected data. The low number of interviews and meetings was conditioned by the fact that broccoli is not a major crop in the region, and there are few producers.
- Shortage of statistics about the production and consumption of broccoli across the country. Data is only available in aggregated form (for headed cabbage, cauliflower and broccoli).
- Lack of experience in exporting broccoli to the EU. Since most broccoli exports from Kvemo Kartli go to Armenia rather than the EU, data about exports to the EU (transportation, certification) are not available at regional level. This makes it difficult to assess the potential for exporting broccoli to the European Union.

5. General Overview of the Broccoli Sector in Georgia and Globally

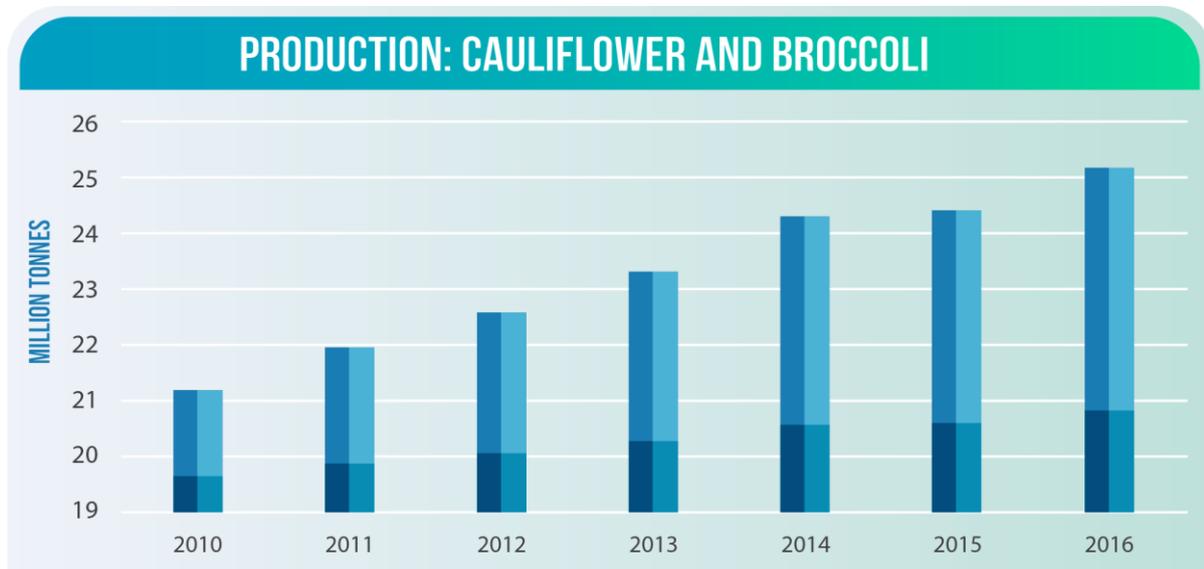
Broccoli originates in Southern Italy. According to the latest data, it was obtained by the way of selection as early as in the 5th century BC. Today, broccoli is found widely in France, Canada, the United States, Japan and other countries.⁷

Broccoli has a higher nutritional value than cauliflower, containing numerous vitamins, minerals and microelements. It is therefore recommended to include broccoli in the diet. Its flowering heads and sprouts are the main edible parts.⁸

5.1 Global Broccoli Sector

According to the statistics, global production of broccoli and cauliflower is growing. Thus, more than 25 million tonnes of broccoli were produced globally in 2016 (see Figure 1).

Figure 1. Global production



Source: FAOSTAT, 2018

The sown area is also growing, having reached just under 1.35 million hectares in 2016.

⁷ <http://agrokavkaz.ge/dargebi/mebostneoba/brokoli-brokolis-movla-moqhvanis-teqnologia.html>

⁸ <http://agrokavkaz.ge/dargebi/mebostneoba/brokoli-brokolis-movla-moqhvanis-teqnologia.html>

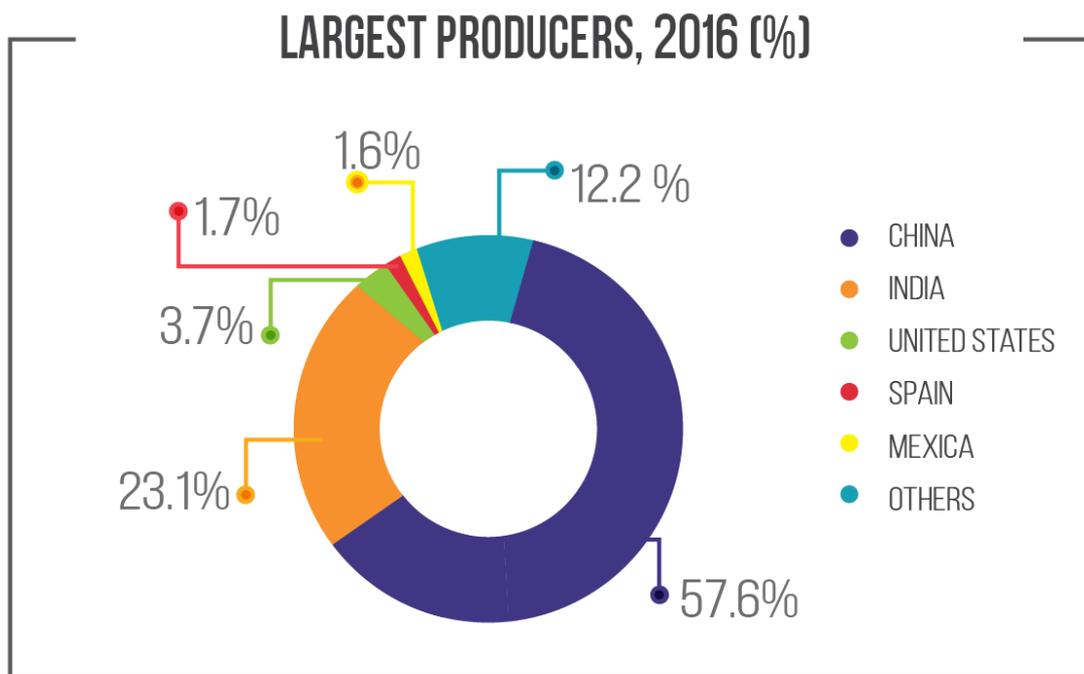
Figure 2. Global sown area



Source: FAOSTAT, 2018

The largest producers of broccoli and cauliflower are China and India, accounting for more than 80% of the global production between them. The list of top 5 global producers also includes the United States, Spain and Mexico. Notably, one of the largest producers is a European Union country (see Figure 3).

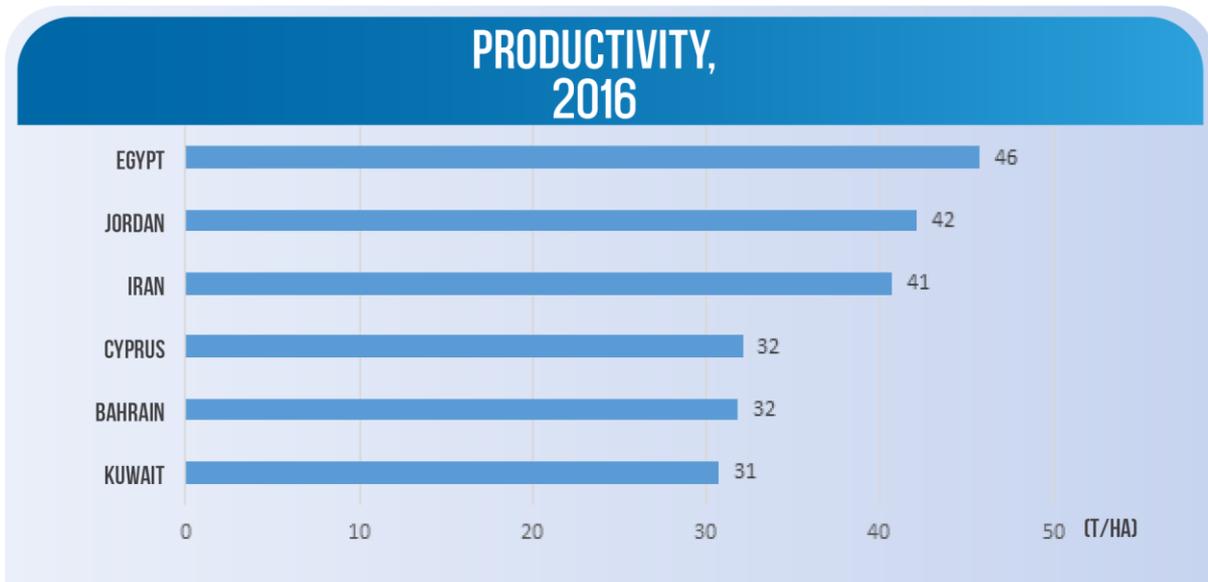
Figure 3. Largest global producers



Source: FAOSTAT, 2018

Egypt is the leading country with regards to productivity (46 tonnes/ha), followed by Jordan (42 tonnes/ha) and Iran (41 tonnes/ha). The top 5 countries also include Cyprus and Bahrain.

Figure 4. Productivity



Source: FAOSTAT, 2018

Based on the data, the average global producer price has been quite stable, amounting to \$700-800 per tonne over the last 6 years.

Figure 5. Producer prices



Source: FAOSTAT, 2018

With regards to international trade, the largest exporters in terms of both value and volume are Spain, Mexico, the United States, France and Italy. Once again, we must note the presence of three EU countries in the top 5, indicating the strength of the field within the EU.

Table 3. Largest exporters of fresh or frozen cauliflower and broccoli

	Country	2013	2014	2015	2016	2017
Export by volume (tonnes)						
1	Spain	297,049	360,874	368,159	368,615	359,231
2	Mexico	171,703	179,459	233,843	245,023	272,035
3	United States	129,478	124,431	103,235	153,481	122,372
4	France	158,486	141,393	143,395	95,768	145,861
5	Italy	66,139	63,751	66,811	89,283	83,114

Source: trademap.org, 2018

The international trade database includes 24 importer countries. The top 5 countries in terms of import value and volume are presented in the table below.

Table 4. Largest importers of fresh or frozen cauliflower and broccoli

	Country	2013	2014	2015	2016	2017
Import by volume (tonnes)						
1	United Kingdom	182,584	151,743	161,158	154,083	123,849
2	Canada	85,018	77,994	75,221	98,541	104,889
3	Germany	67,359	73,714	73,837	64,028	79,086
4	Malaysia	56,579	60,456	60,625	57,076	60,719
5	France	49,925	47,995	50,450	55,823	52,712

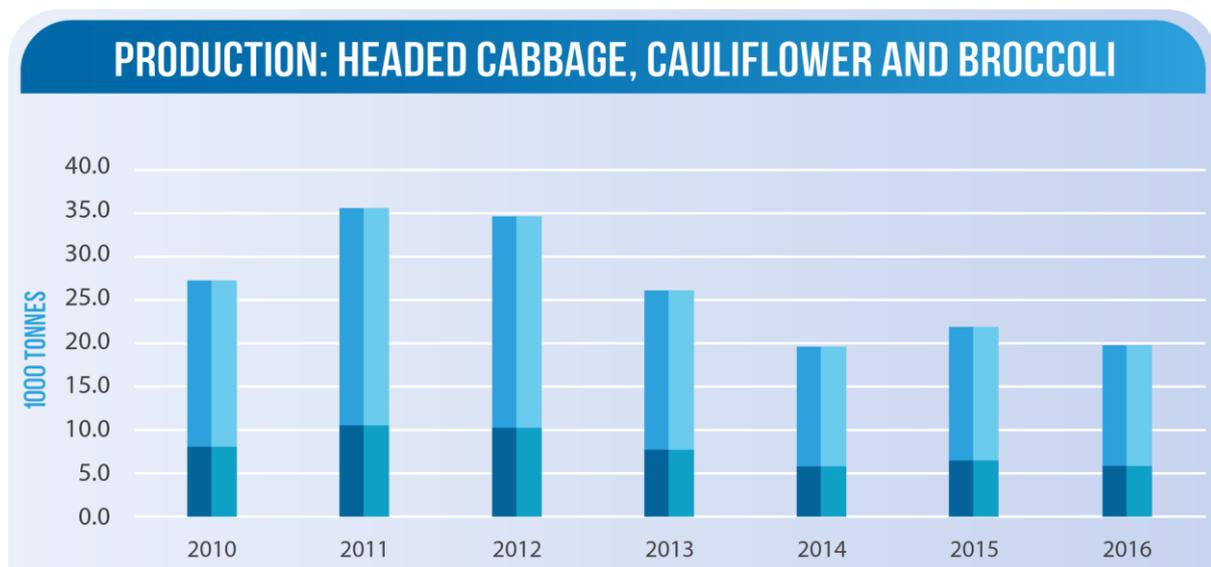
Source: trademap.org, 2018

It is notable that 13 out of 24 countries (54%) are European Union members. For specific information about the EU market, see Chapter 9 of the report.

5.2 Overview of the Broccoli Sector in Georgia

No separate data is available for broccoli production in Georgia. The following is the aggregated data for headed cabbage, cauliflower and broccoli:

Figure 6. Production level in Georgia



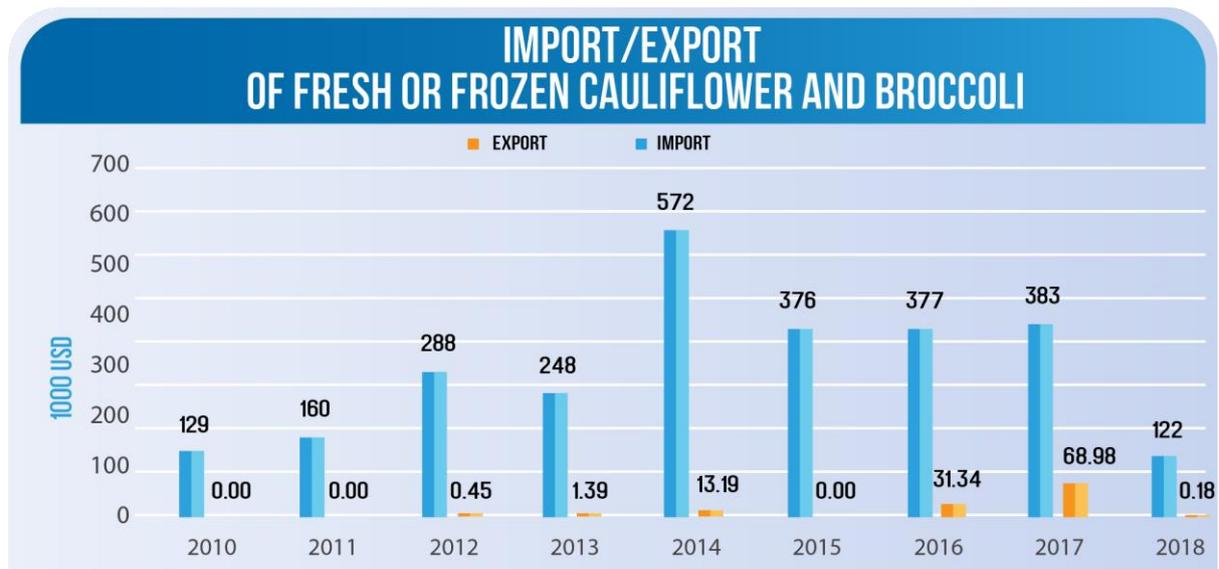
Source: GeoStat, 2018

Although global production is consistently growing, the same is not the case in Georgia. As the graph shows, production levels are quite inconsistent, and over the past several years, production has been lower than in 2011-2012. It is difficult to say what caused this decrease.

Due to the shortage of statistics, we have no information about broccoli production by region. It is therefore impossible to identify the largest broccoli-producing regions in the country.

With regards to international trade, the import of cauliflower and broccoli in Georgia considerably exceeds the export, which usually takes place between December and March. In 2017, however, exports were also conducted between August and November.

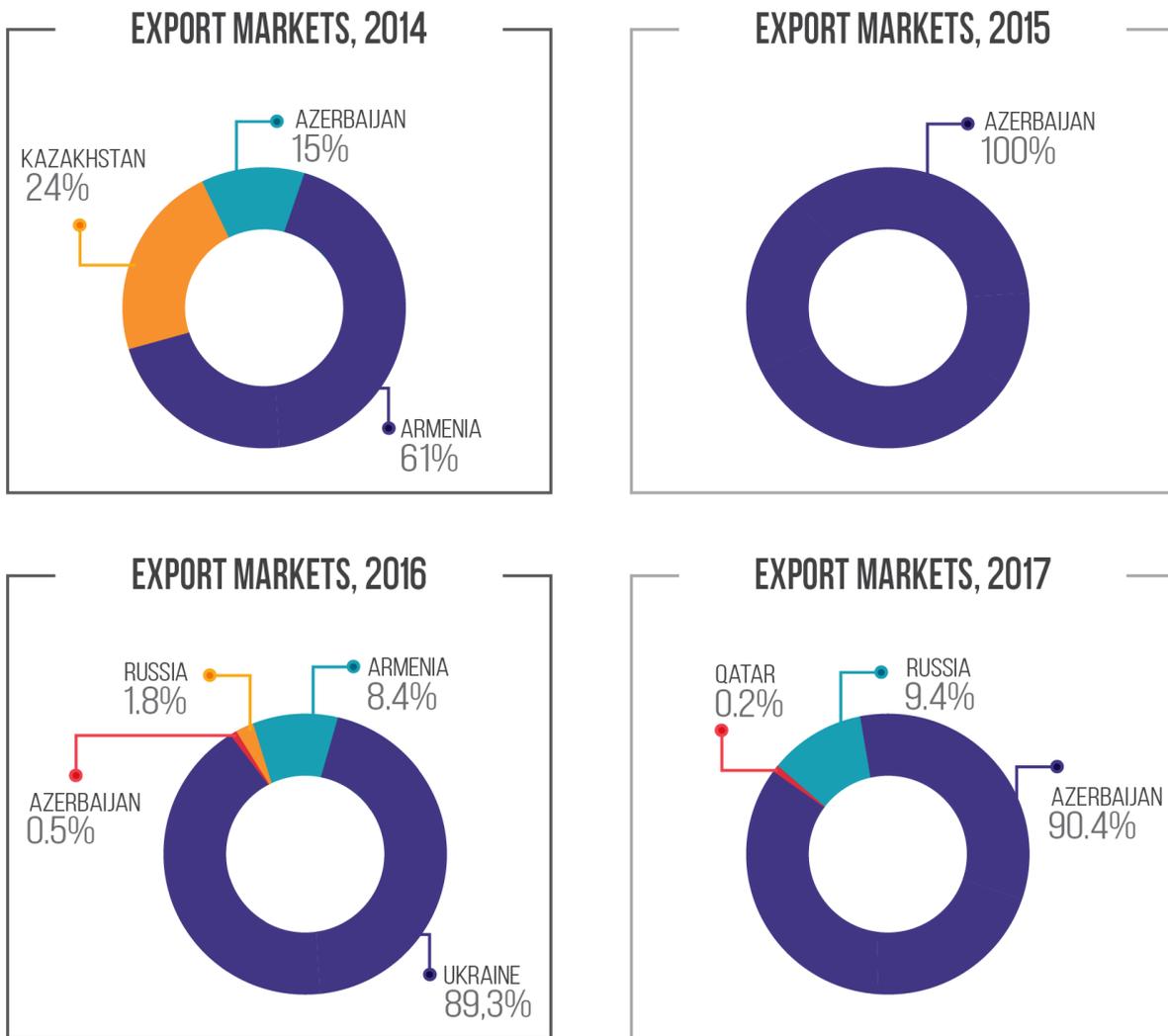
Figure 7. Georgian import and export by value



Source: GeoStat, 2018

Georgian broccoli is mainly exported to neighbouring countries. During the last 4 years, the main export market was Azerbaijan. Notably, the majority of the exported broccoli in 2014 went to Armenia (61%), and in 2016 to Ukraine (89%).

Figure 8. Export markets

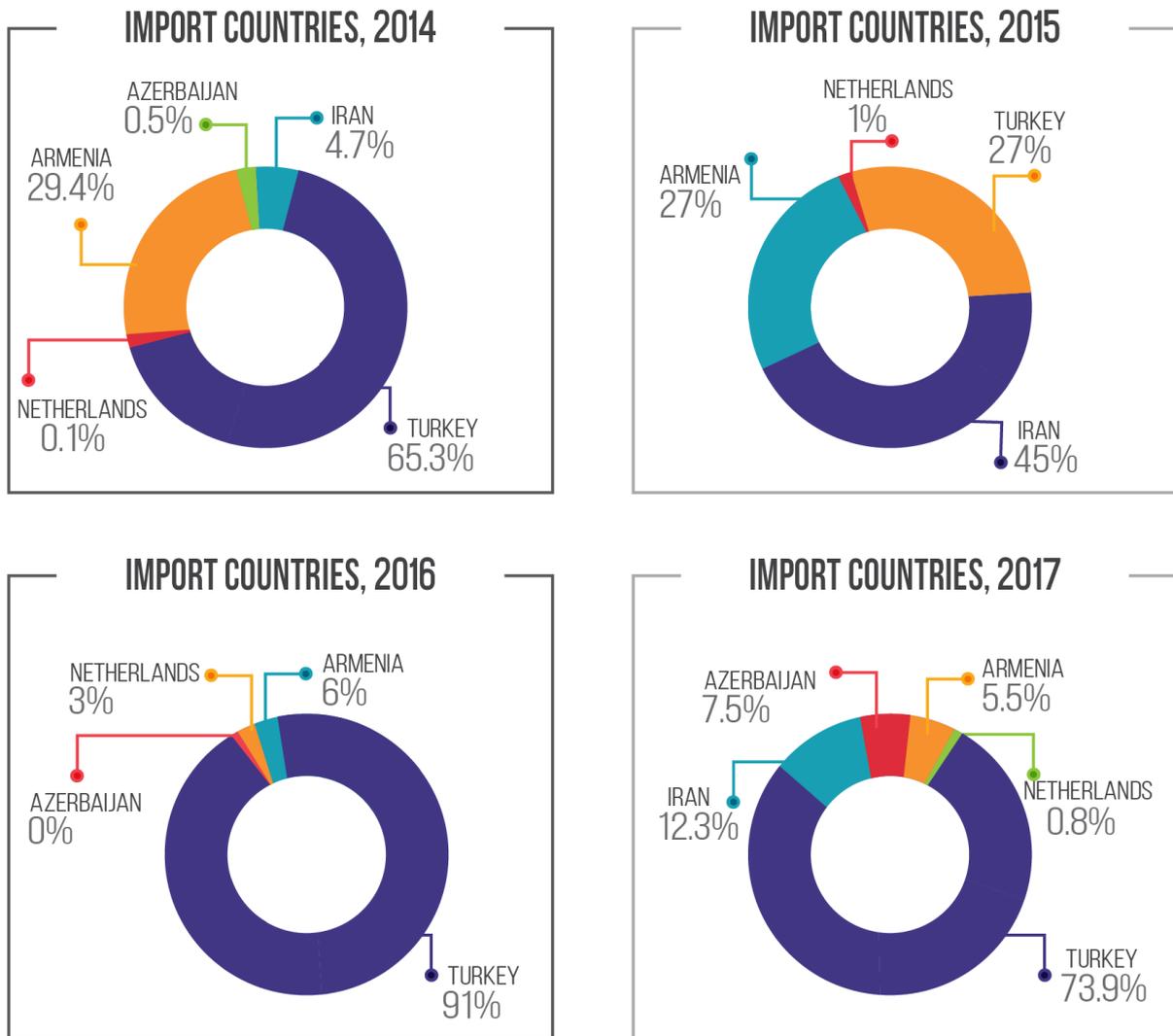


Source: trademap.org, 2018

Georgia imports much of its broccoli, as well as many other products, from Turkey. Over the last 4 years, the only exception was 2015, when most of the broccoli and cauliflower imports came from Iran (45%).

Notably, the portfolio of import countries was more diverse in 2017 than in previous years.

Figure 9. Import Countries

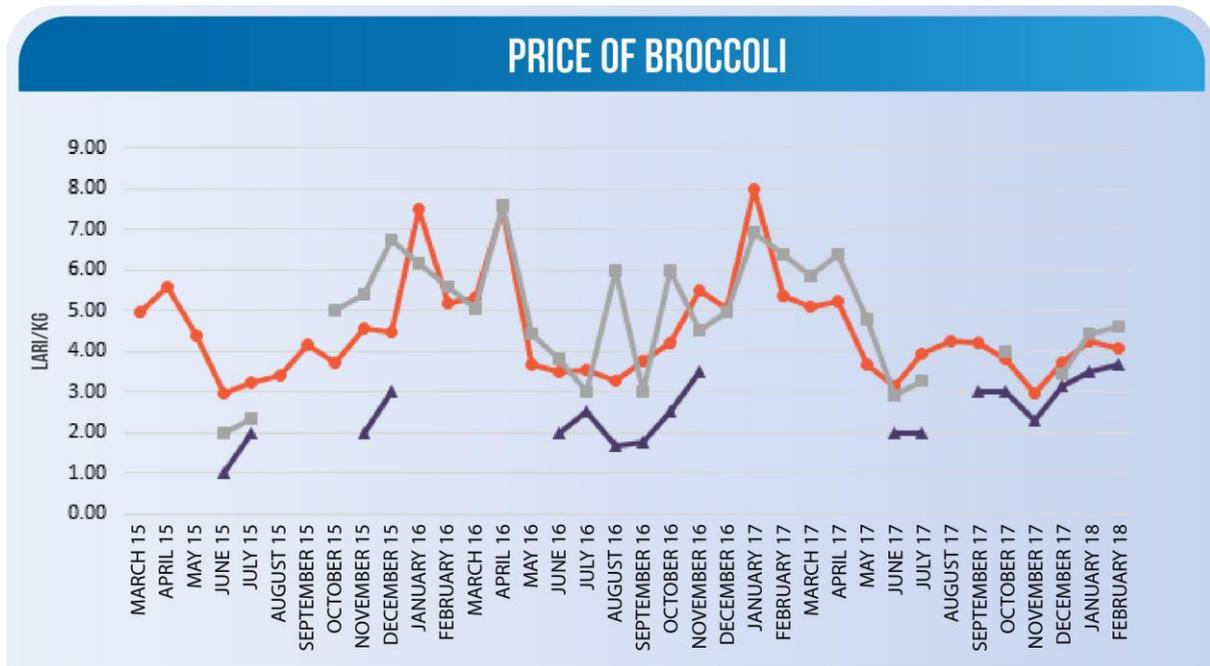


Source: trademap.org, 2018

The price of local broccoli in Kvemo Kartli compared to the fixed price of imported and local broccoli in the rest of Georgia is shown below⁹.

⁹ The database does not show the data for imported broccoli in Kvemo Kartli. Therefore, only the price for local broccoli is shown in Figure 10.

Figure 10. Price of broccoli



Source: Ministry of Environmental Protection and Agriculture Database, 2018

As seen in Figure 10 above, the price of Kvemo Kartli -produced broccoli is lower than the price of imports and broccoli produced in other regions of Georgia. This should help the competitiveness of the Kvemo Kartli product. However, stable production of broccoli cannot currently be achieved in Kvemo Kartli throughout the year, which substantially reduces competitiveness.

Furthermore, broccoli is more expensive than many other vegetables, which makes it an attractive product for farmers. Thus, while the average price of potatoes was ₾1.1/kg in 2017, the price of broccoli was ₾4.8/kg. Broccoli is also more expensive than headed cabbage, carrots, beetroot, cucumbers and other vegetables.

6. Scope of Research

6.1 Brief Overview of the Kvemo Kartli Region

The area of Kvemo Kartli is 6527.6 km², which is 9.3% of the country's total area. Up to 350,000 ha of the region's territory consists of land that is suitable for agriculture, 143,200 ha are covered by forests, while the remaining territory consists of non-agricultural land that includes various buildings.

The region consists of 7 municipalities: Marneuli, Gardabani, Bolnisi, Dmanisi, Tetrtskaro, Tsalka, and the city of Rustavi.



Kvemo Kartli is home to 11.4% of the Georgian population. Up to 40% of the region's population lives in urban areas, while 60% lives in rural areas. The region is ethnically diverse: 44.7% of the population are ethnic Georgians, 45.1% Azerbaijanis, 6.4% Armenians, and 3.8% members of other ethnicities (Russians, Ossetians, Greeks, Ukrainians, Kurds, etc.).

The unemployment level is 9.4%. According to the local information/consultation centre, more than 70% are employed in agriculture (see the Kvemo Kartli Regional Development Strategy 2014-2021).

Kvemo Kartli is one of the country's leading agricultural regions, with both horticulture and livestock being developed here. The average area of agricultural land per farmer in Kvemo Kartli is 1.2 ha.

Major vegetable crops produced in the region are potatoes, tomatoes, onions, cucumbers, cabbage, carrots, beetroot, peppers, garlic, aubergines and various greens. The region has some of Georgia's most fertile types of soil (gray-brown, brown, meadow-brown, black). The existing climate and soil conditions allow each plot to be harvested several times during the year.

The climate and nature of Kvemo Kartli allow vegetables and garden produce to be harvested early. Therefore, the region accounted for 37% of the country's vegetables in 2016¹⁰. With regards to grains and podded plants, Kvemo Kartli's share in total production in 2016 was 5% for wheat, 6% for barley, and 5% for beans¹¹.

Kvemo Kartli is the leading region in Georgia with regards to aviculture, being home to 11 large enterprises equipped with modern technologies, as well as 107 farming enterprises¹². Consequently, the region accounted for 65% of the country's poultry production in 2016. Kvemo Kartli also contributes a high share of animal products, especially eggs (38%) and wool (25%).

¹⁰ National Statistics Office of Georgia, 2018

¹¹ National Statistics Office of Georgia, 2018

¹² Ministry of Environment Protection and Agriculture, 2014

Table 5. The region's share in the production of meat and animal products, 2016

Product	Beef (%)	Pork (%)	Lamb and Goat Meat (%)	Poultry (%)	Eggs (%)	Wool (%)
The region's share in the country's total production	10	20	15	65	38	25

Source: GeoStat, 2018

Processing Sector

The region also has a developed processing sector, accounting for 54 various enterprises. These include 7 nurseries producing 630,000 saplings each year (approximately 59% of the existing potential). Furthermore, as livestock production/animal husbandry is an important part of the region's agriculture, there are numerous milk processing (20) and poultry production (11) enterprises operating in the region.

Table 6. Number of enterprises and their areas of activity, 2014.

Area of Activity	Kvemo Kartli
Nurseries	7
Milk Processing	20
Grain Processing	5
Pork Production	4
Slaughterhouses	4
Poultry Production	11
Distilleries	1
Fruit/Vegetable Processing	2
Total	54

Source: Ministry of Agriculture, 2018

7. Broccoli Characteristics, Cultivars and Products

Broccoli is a plant that needs light and moisture. It has a high yield in heavy, fertile and wet soil conditions. Light and medium clay soils are also good for growing broccoli. With the exception of sandy and swampy soils, broccoli can be grown under almost any soil conditions.

Broccoli growth requires soil moisture content of 70% and humidity level of 85%. It is more resistant to hot and freezing conditions than cauliflower. It can withstand temperatures as low as -4 to -7 °C. The ideal temperature range for broccoli growth is 16 to 20 °C.

Suitable catch-crops for broccoli include beans, potatoes, cucumbers, tomatoes, beetroot and onions. It should not be grown after other members of the cabbage family. It is also recommended that broccoli is planted in its old spot after 4-5 years.¹³

There are three common types of broccoli:

- Classic (Calabrese)
- Purple
- Sprouting

There are also numerous types of hybrid broccoli, the most popular of which include Paraiso, Gemini, Constellation, Blue Wind, Tahoe RZ, Emerald Crown, Centennial, Marathon and Imperial.¹⁴

Based on expert opinion obtained during fieldwork, it is recommended that the following hybrids be used in Georgia:

- Lord – autumn (late-season);
- Milady – spring (early-season);
- Green Comet – spring (mid-season), resistant to drought and cabbage ash;
- Samurai, Pirate – spring (early-season), dust-resistant.
- Agassi F1 – (mid-season) vegetation period: 65-75 days after replanting. Can be stored for a lengthy period of time;
- Lord F1 – (early-season). Vegetation period: 60-65 days between replanting and harvesting. High-yielding.
- Monterey F1 – (late-season hybrid). Vegetation period: 170-175 days between replanting and harvesting. Resistant to bacteriosis.

Broccoli in Georgia is present in the following forms:

¹³ <http://agrokavkaz.ge/dargebi/mebostneoba/brokoli-brokolis-movla-moqhvanis-teqnologia.html>

¹⁴ <http://www.growingproduce.com/vegetables/12-top-performing-broccoli-varieties/#Tinsel/66706/2>

Table 7. Broccoli products

Product Type	Description
Broccoli Heads	This is the form in which broccoli is most commonly used by Georgian consumers. Broccoli is produced in relatively low quantities in Georgia. Most of it is imported.
Broccoli Greens (Microgreens)	Microgreens are very common in numerous countries, such as Italy, Spain, and particularly the United States. Microgreens are young vegetables that have the form of small greens. They are grown in greenhouses using the hydroponic method. Since 2016, one such greenhouse has been operating in Georgia under the name Micro Green, producing micro vegetables ¹⁵ .
Broccoli Juice	Cold-pressed organic broccoli juice with lemon is produced by the Georgian company Aromaproduct Ltd. and the Georgia’s Natural Group, which focuses entirely on exports ¹⁶ . The juice is available in four different bottle sizes.
Broccoli Puree	Broccoli puree is widely used in children’s diet from an early age (4 months). It is not being produced or imported in Georgia. One of the best-known producers is the Swiss company Semper.

¹⁵ Startup Georgia, 2018 – http://startup.gov.ge/geo/winners_details/37

¹⁶ Aromaproduct Ltd. and Georgia’s Natural Group, 2018 – <http://aroma.ge/georgian/products/juices/organic-natural-pure-juices-and-blends-nfc-category/282>

8. Broccoli Value Chain Participants

The main participants of the broccoli value chain can be sub-divided into the following groups:

Suppliers of seeds, plant protection products, fertilizers, etc.

This group includes agricultural supply stores that are operating in all municipalities in Kvemo Kartli. Apart from the required products, farmers can also obtain free advice with regards to growing broccoli here.

Agricultural supply stores are mainly local and small in size. The vast majority of surveyed farmers are using imported broccoli seeds. They believe that imports guarantee high-quality yield, as they achieve the level of productivity indicated on the package, which is not the case with local seeds. It is also worth noting that no local broccoli seeds exist.

Representatives of agricultural supply stores have confirmed that farmers prefer imported seeds, particularly from Japan and Switzerland. Most popular products include Parthenon seeds by the Japanese firm Sakata and Monaco seeds by Syngenta (Switzerland). Another frequently mentioned cultivar is Larka. Seeds from Italy, Netherlands, South Korea and other countries are also available on the Georgian market under the following names: Green Magic, Marathon, Calabrese, Wisdom, Di Albenga, Ramoso Caclabrese, Agassi, Iron Man and Lord¹⁷.

Most agricultural supply stores in the region are supplied by stores in Tbilisi, who themselves conduct imports of fertilizers and pesticides from abroad.

Farmers

Traditionally, broccoli is not a popular vegetable in Georgia. Therefore, the majority of farmers grow it for commercial reasons. Thus, while other vegetables (e.g. onions) may be grown by farmers for personal consumption alone, in the case of broccoli, only a relatively small part is used for personal consumption, while the majority serves commercial purposes.

Storage/Refrigeration Facilities

As broccoli is a perishable product, storage facilities constitute an important link in the chain. Such facilities are used by some of the producers to store broccoli. However, storing products in refrigeration facilities is associated with additional costs. Therefore, most farmers store broccoli in cellars. Perishable products such as broccoli cannot be kept in household facilities for a lengthy period of time. If producers wish to store broccoli with the prospect of selling it at a higher price later, they must use dedicated storage facilities.

There are 8 refrigeration and 51 storage facilities operating in Kvemo Kartli. The combined area of the refrigeration facilities is around 3200 m², while the combined area of the storage facilities is 59,883m².

¹⁷ <http://apma.ge/supply>

Table 8. Refrigeration and storage facilities in Kvemo Kartli

Municipality	Refrigeration Facility		Storage Facility	
	Number	Area, m ²	Number	Area, m ²
Marneuli	5	3420	0	0
Gardabani	2	1400	1	500
Bolnisi	0	0	27	33,065
Dmanisi	1	860	8	20,164
Tsalka	0	0	15	6154
Tetritskaro	0	0	0	0
Kvemo Kartli (Total)	8	5680	51	59,883

Source: Ministry of Environmental Protection and Agriculture of Georgia

Storage facilities are available in all municipalities with the exception of Tetritskaro and Marneuli, while refrigeration facilities are less widely available. However, respondents have stated that access to storage and refrigeration facilities does not constitute a challenge for them.

Intermediaries

As with many other products, intermediaries represent the main sales channel for broccoli. Intermediaries are usually individuals, rather than groups. Most farmers cooperate with intermediaries who supply the purchased product to supermarkets. In some cases, farmers sell their broccoli directly on the local agricultural market, or in Marneuli.

Exporters / Importers

Broccoli is exported both in its primary form, and as a juice. Imported products include broccoli puree for children and broccoli heads.

Market Retailers

Intermediaries sell broccoli on local markets in various towns and cities. Due to Tbilisi's proximity to Kvemo Kartli, broccoli produced in Kvemo Kartli is usually taken by intermediaries to the markets in the capital. The largest agricultural markets in Tbilisi are the Akhmeteli market in Gldani, the Navtlughi market, and the Desertirebi market on Station Square.

Retail Stores (Supermarkets, Pharmacies)

Broccoli is available in all major supermarkets that are supplied by intermediaries. Farmers do not have direct contact to supermarkets and conduct their business through intermediaries.

Supermarkets also stock imported broccoli. As for the pharmacies, they offer imported broccoli in the form of puree.

Processors

There is currently only one broccoli processor in Georgia – Aromaproduct Ltd., operated by the Georgia's Natural Group, which exports organic broccoli juice. Commercial processing of broccoli does not take place in the Kvemo Kartli region itself. The aforementioned processor only focuses on exports.

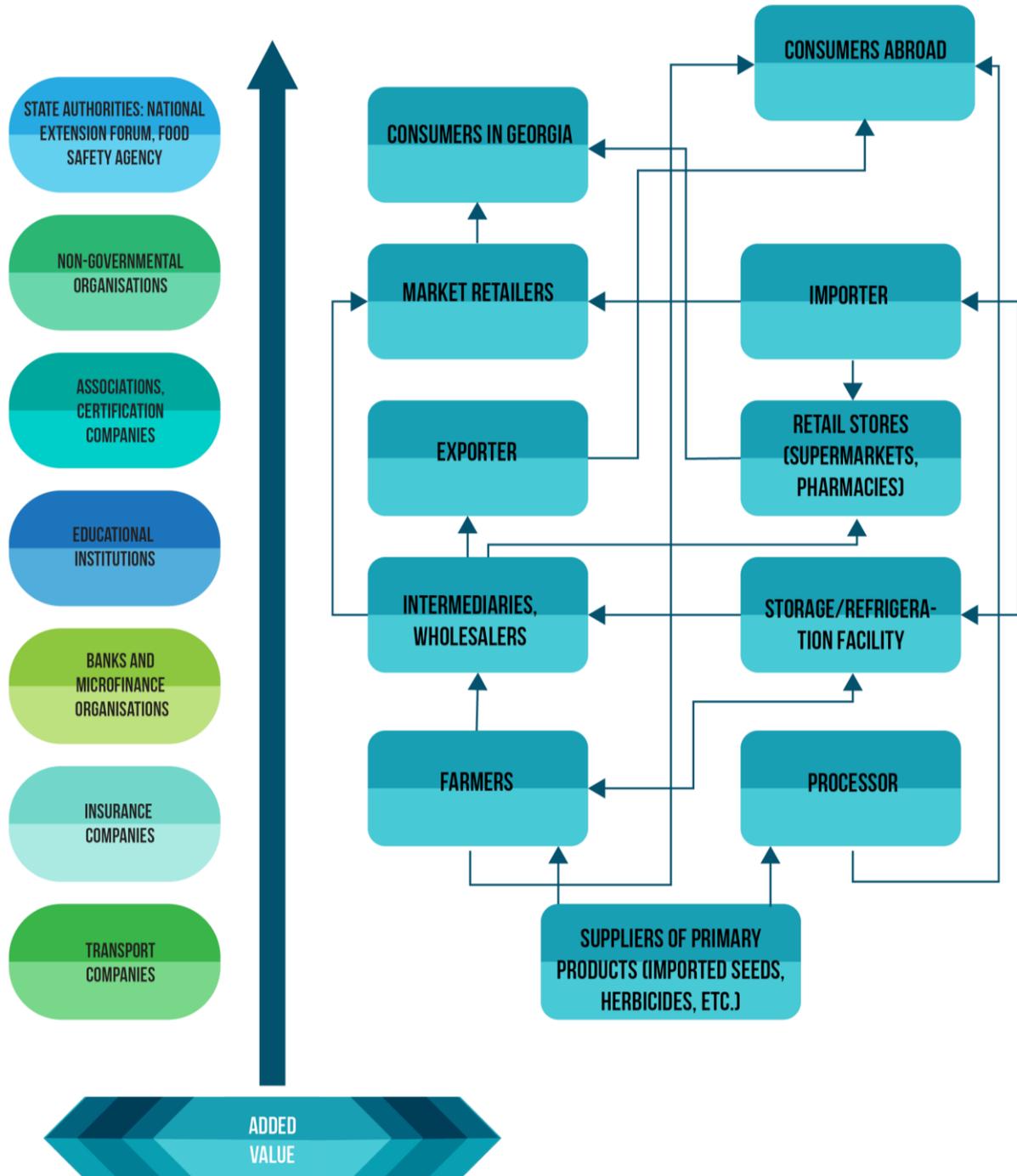
Local and Foreign Consumers

As mentioned earlier, most broccoli consumed in Georgia is imported, although small quantities are also being exported to neighbouring countries. Most people consume broccoli in its primary form (broccoli heads), with other products including broccoli juice and broccoli puree for children. Microgreens, which are a relatively new product in Georgia, are consumed in smaller amounts.

9. Illustration of the Broccoli Value Chain

9.1 The Broccoli Value Chain Grid Map

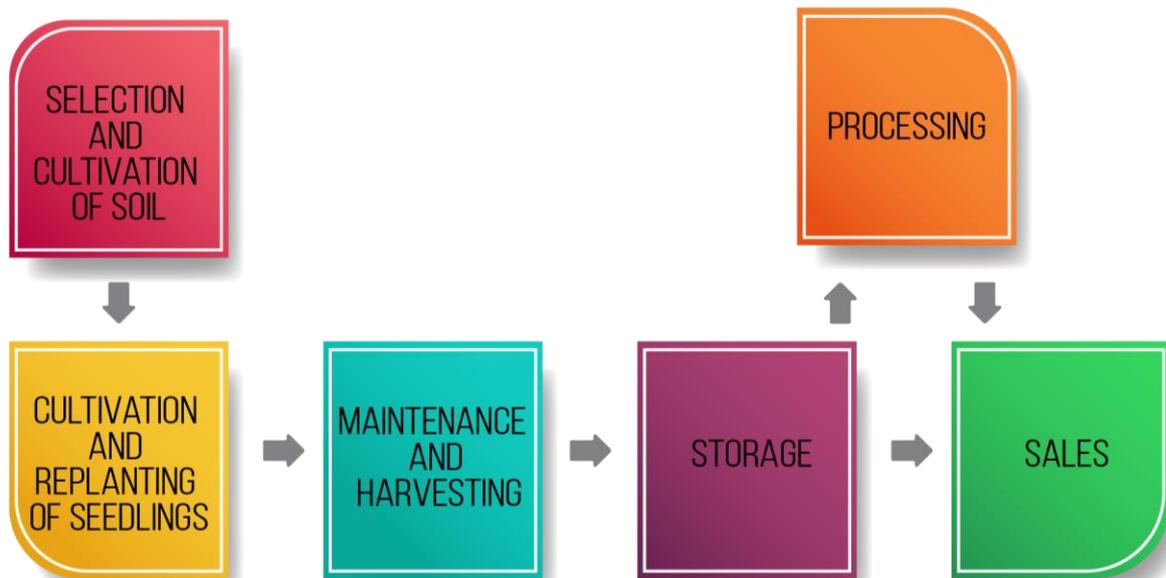
Drawing 1. Broccoli Value Chain



9.2 Description of the Main Stages

The ongoing processes in the broccoli value chain can be divided into the following stages:

Drawing 2. Main stages



Selection and Cultivation of Soil

When choosing the soil for broccoli cultivation, it is important to bear in mind that broccoli is a crop that requires light and moisture. With the exception of sandy and swampy soils, the vast majority of soil types are suitable for growing broccoli. It is also important to select suitable catch-crops, which include beans, potatoes, cucumbers, tomatoes, beetroot and onions. It is not recommended to plant broccoli after other members of the cabbage family, as soil fertility will be low, and the risk of diseases will be high (broccoli and other members of the cabbage family are threatened by the same diseases).

As for soil cultivation, the tillage of soil in Eastern Georgia takes place in the autumn. Organic (50-60 tonnes/ha) or mineral fertilizers (N150 P120K90) are applied prior to cultivation. Phosphorus and potassium fertilizers are also applied prior to tilling, while nitrogen fertilizers are applied later¹⁸.

Cultivation and Replanting of Seedlings

Seeds and seedlings are both used to grow broccoli. Seedlings are more widely used in Georgia. Broccoli can be harvested 2-3 times per year¹⁹. The seedling method is used to obtain early-season harvest. Seeds are planted in cassettes in February or March, and the resultant seedlings are then planted on permanent spots 35-45 days later. The timescale of agrotechnical activities used for broccoli cultivation is shown below:

¹⁸ This technique does not apply to organic broccoli, which requires a separate technique.

¹⁹ <http://agronews.ge/brokolis-biologia-moqhvanis-agroteqnika-da-teqnologiuri-ruka/>

Table 9. Agrotechnical schedule of broccoli cultivation

#	Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Soil cultivation (manuring, digging)												
2	Soil loosening on ground surface												
3	Planting seeds in cassettes												
4	Seedling cultivation and replanting												
5	Irrigation												
6	Loosening or mulching												
7	Additional nourishment												
8	Harvesting												

Source: Agrokavkaz²⁰, I.Kvernadze²¹, interviews with farmers.

If broccoli is grown by using seeds, then they are planted on open ground at the end of May and transferred onto permanent spots in mid-July. For this method, it is recommended to proceed with nourishment only 3 weeks after the sprouting of the plant.

Most respondents in Kvemo Kartli stated that the cultivation and replanting of seedlings takes place in February and March, while harvesting takes place in September, as shown in the table above. However, as broccoli can be harvested several times each year, the group of surveyed farmers included those who start cultivating seedlings in August and gather harvest in November.

Maintenance and Harvesting

The maintenance component consists of cultivation (5x), irrigation (2x) and disease control. Among the diseases mentioned by the respondents were aphids, mildew and stem/root rot. However, none of the respondents cited a lack of knowledge as an obstacle in fighting the aforementioned diseases.

The harvesting period can last for two weeks. As the heads of the plants are cut, new heads will sprout, and will be picked later.

Storage

Although a shortage of storage and refrigeration facilities has been cited by respondents as one of the main challenges, there are numerous storage facilities operating in the region, where it would be possible to store broccoli. However, the price of storage is not acceptable for the majority of the producers. These facilities mostly act as intermediaries by purchasing broccoli from the farmers. The purchase prices vary from ₾1.5 to ₾4, while the length of storage ranges from one month to 40 days, which is slightly more than the 2-3 week norm. The harvest must be stored at a temperature of 0 °C and relative humidity of 98-100%.

It is worth noting that both refrigeration facilities participating in the study also act as exporters, conducting exports to Armenia.

²⁰ <http://agrokavkaz.ge/dargebi/mebostneoba/brokoli-brokolis-movla-moqhvanis-teqnologia.html>

²¹ http://www.rogor.ge/article_1550_rogor-moviyvanot-brokoli.html

Processing

At present, broccoli in Georgia is only processed by one company in the form of juice. This company has a very specific production chain, as it grows organic broccoli on its own land, using a suitable technique that differs from the technique described in the table above.

With regards to other forms of processing (e.g. canning) of broccoli, it does not currently take place in Georgia, in spite of the country's largest food plant Marneuli Agro operating in Kvemo Kartli. The plant does not use broccoli in its products, due to the fact that canned broccoli becomes soft and loses its commercial appeal.

Sales

Most of the broccoli produced in Kvemo Kartli (55%) is sold in other regions, while the rest is sold locally. The main sales channels can be ranked in the following order of importance:

1. Farm gate sales to intermediaries;
2. Using own transport to deliver the product to the market and sell it to market sellers;
3. Using own transport to deliver the product to a local market and sell it to consumers;
4. Using own transport to deliver the product to another region and sell it to retailers.

As with many other agricultural products, intermediaries play an important role in the broccoli value chain.

9.3 External Factors Affecting the Broccoli Value Chain

Extension Centres and Farmers' Service Centres

Information/consultation centres of the Ministry of Agriculture are operating in five municipalities within the region (Gardabani, Bolnisi, Dmanisi, Tsalka and Tetrtskaro). The Kvemo Kartli Regional Division, which coordinates all the institutions under the Ministry of Agriculture, is operating in the town of Marneuli.

There are also up to 40 privately operated farmers' service centres in Kvemo Kartli, three of which are relatively large. The consultation services are free and cater to all categories of farmers in the field of horticulture. As for livestock production, there are up to 25 veterinary pharmacies in the region providing relevant consultation, also free of charge. The pharmacies are selling veterinary medicine and inventory for livestock production, while the farmers' service centres sell agrochemicals, together with the relevant machinery and equipment.

Extension centres and farmers' service centres are important for the development of the broccoli value chain, as they supply knowledge and raw materials to farmers. They provide farmers with advice regarding agrotechnical activities, which positively affects productivity.

Food Safety Agency

Following the signing of the Deep and Comprehensive Free Trade Area (DCFTA) Agreement, food safety issues have become more relevant than ever. Foremost of all, the Food Safety Agency must ensure harmonisation of the Georgian legislation with the EU legislation and adopt legislative acts that ensure stricter controls both in primary production and the processing sector.

Based on the 24 January 2017 Decree #2-14 by the Minister of Agriculture "On the Adoption of the Food Safety Agency's 2017 State Programme for Food/Animal Food Safety, Veterinary and Phytosanitary Control", 10 127 inspections were carried out in the field of food safety. Based on the state control results²², 2415 business operators (including 181 from Kvemo Kartli). On the one hand,

²² <http://nfa.gov.ge/ge/sursatis-uvnebloba/monitoringi/dokumentis-shemowmeba>

stricter regulations ensure food safety, but on the other hand, they lead to an increase in production costs, which may later reflect itself in higher prices.

International Non-Governmental Organisations / Projects

Projects funded by international donor organisations are being implemented in Kvemo Kartli, as well as in other regions in Georgia. The main projects are listed below:

- Alliances Lesser Caucasus Programme

This project is implemented the Mercy Corps, and funded by the Swiss Agency for Development and Cooperation (SDC). The project covers several regions in Georgia. It has been implemented in Kvemo Kartli since 2011, and is primarily aimed towards developing the livestock sector.

- Centre for Civic Engagement

The USAID-funded Centers for Civic Engagement project saw the opening of 10 centres across Georgia, which aim to enable and conduct civic dialogue²³. One of these centres is located in Kvemo Kartli, serving 7 municipalities. It has a large room for public meetings, a room for smaller-scale meetings, as well as a computer room and a library. The centre also has audio-visual equipment, and is actively used for meetings and various events.

- Restoring Efficiency to Agriculture Production (REAP)

Another USAID-funded project REAP²⁴ aims to identify potential entrepreneurs and enable investment growth. Its target group includes farmers' service centres, primary producers, information and service suppliers, storage facilities and processing enterprises.

Other notable projects include the annual preparatory meetings for the Georgian Farmers' Congress, organised by the biological farming association Elkana in various regions, including Kvemo Kartli.

Projects implemented in the region lead to an increase in funds, increased access of farmers to knowledge, and greater engagement of farmers in regional affairs. Although none of the aforementioned projects concerns broccoli specifically, the existence of such projects stimulates regional development.

Associations

Sectoral associations are not represented in Kvemo Kartli. However, the Tbilisi-based Export Development Association (EDA)²⁵ provides services that include all the aspects of export development which may be required by a company. To achieve full international coverage, EDA cooperates with a leading European export consultation firm.

EDA provides 15 types of services, including export readiness and export potential assessment (audit), target market research, selection of potential partners, etc. The goal of the association is to help producers overcome export barriers. Although broccoli is currently exported in low quantities, the importance of this chain link can grow together with growth in production.

Educational Institutions

There are 2 private institutions of higher education operating in the region. Furthermore, there are 2 professional training institutions in the city of Rustavi, teaching several professions. The financial and technical base of these institutions is quite limited²⁶.

²³ http://cce.ge/portal/alias__CCE/lang__ka-GE/tabid__4594/default.aspx

²⁴ http://www.reap.ge/index.php?lang_id=GEO&sec_id=1

²⁵ <http://eda.org.ge/ka/>

²⁶ Kvemo Kartli Regional Development Strategy 2014-2021 – http://droa.ge/wp-content/uploads/2017/09/kvemo_kartlis_regionis_ganvitarebis_strategia_2014-2021_clebistvis_0.pdf

Training sessions periodically take place in Kvemo Kartli. With regards to agriculture, the following notable educational events were implemented in the region recently (2017-2018):

- Training organised by Chemonics International in market gardening (April-December 2017) and berry growing, as well as seminars for bee-keepers’ cooperatives.
- Training organised by the Export Development Association in devising a business plan, winemaking, finances and poultry production.
- Farmer training organised by Evoluxer.

This link aims to help increase farmers’ awareness and strengthen not only agricultural skills, but also skills associated with marketing and branding of agricultural produce, fiscal accounting in enterprises, etc.

Financial Institutions

Commercial banks have branches operating in each self-governed district in Kvemo Kartli. Virtually all banks operating in Georgia have a branch and a service centre in the cities of Rustavi and Marneuli. The number of microfinance organisations in the region has also increased compared to previous years. However, as in the rest of the country, interest rates are quite high (between 15% and 26%), while service is considerably poorer than in Tbilisi. Nevertheless, respondents did not highlight any difficulties with regards to access to finances.

Insurance Companies

The agricultural insurance programme has been operating since 1 September 2014, and is aimed towards the development of the insurance market in the agriculture sector. As of 2017, beneficiaries can insure a land plot of up to 5 ha in area (30 ha for grains), benefitting from a 70% co-funding for all the crops included in the programme, and 50% for vine. Broccoli is among the crops included in the programme, and the following terms apply for it:

Table 10. Terms of Agricultural Insurance

Crop	Agency share	Insurer’s share	Insurance rate	Standard price (GEL/ha)	Standard price (GEL/kg)	Standard price (kg/ha)	Amount payable by the insurer	State subsidy
Broccoli	70%	30%	8.5%	20000	2	10000	510	1190

Source: The Project Management Agency of the Ministry of Environmental Protection and Agriculture, 2018.²⁷

Prospective beneficiaries can purchase the insurance policy from the following 5 insurance companies in Georgia: Aldagi, GPI Holding, IC Group, Ardi and Alpha.

The majority of broccoli-producing farmers do not have agricultural insurance. However, some of the larger producers (2 ha) are insured. Agricultural insurance helps provide financial stability for the farmers.

Transport Companies

As with all other vegetables, broccoli transport requires the use of refrigerated trucks to ensure that appropriate temperatures are maintained. Such a vehicle is usually 20-40% more expensive to use than a conventional (non-refrigerated) truck. Broccoli transport requires the following documents:

- Phytosanitary Certificate

The certificate is issued on the basis of carrying out phytosanitary procedures, which includes checking the documents attached to the goods, obtaining information about past inspections at the production

²⁷ <http://apma.ge/projects/read/agroinsurance/17:child>

site, visually inspecting the goods, and obtaining test samples in case of suspicion (the certificate will be issued if the test results come back negative). The phytosanitary procedures are carried out by authorised individuals at the location site of the goods. The certificate is issued by the National Food Agency or by the Revenue Service. The cost of the service is €25.

- Waybill²⁸
- Packing List²⁹
- CMR Document³⁰

Georgian producers have the experience of transporting broccoli to neighbouring Asian countries, but not to Europe. It is worth noting that the process of transporting goods to Europe differs from the process in Asia with regards to road tariffs, movement restrictions for heavy goods vehicles, the quality of roads (which affects transit times and fuel costs), transparency of procedures and payments, as well as road and customs capacities.

Insurance of goods constitutes one of the most important components of transportation. The terms of insurance differ in accordance with the type of goods and transport, company policies and countries involved. Insuring the goods is necessary to avoid financial losses.

9.4 Cost and Revenue Analysis

Analysis of farmers’ expenses and revenues shows that broccoli is profitable to grow. The average cost is €3862, while the average revenue amounts to €15,863. Such yield can be achieved through average productivity (10.6 tonnes/ha) and price (1.5 GEL/kg), in which case the winning margin is 76%. This is quite a high figure that reflects the commercial profitability of broccoli.

Table 11. Farmers’ expenses

Expense	Value
Seeds (GEL/ha)	672
Cultivation (GEL/ha)	359
Fertilizers (GEL/ha)	1347
Cassettes (GEL/ha)	200
Labour (GEL/ha)	551
Irrigation (GEL/ha)	114
Transportation (GEL/ha)	92
Fees (GEL/ha)	176
Unexpected expenses (10%)	351
Total expenses (GEL/ha)	3862

Suource: Author’s calculations based on interviews with farmers

If the average yield is 11,750 kg/ha, approximately 10% of which is lost during storage and transportation, then the total income from sales is 15,863 GEL/ha based on a sale price of 1.5 GEL/kg. Based on the expenses shown in the table above, the profit amounts to €12,000 per hectare. The profit margin is 1.13 GEL/kg (76%), while the prime cost is 0.37 GEL/kg.

²⁸ An executive document that has a legal and financial purpose. It is attached to each transport package, indicating the departure and destination points.

²⁹ List of transported goods, indicating the amount, size, weight and packaging method. The list of packaging is not compulsory, but it significantly reduces the waiting time at customs.

³⁰ A transportation document that is required for international land transport (except by train), indicating the identities of the sender, the courier and the recipient, as well as contact information, description of goods (packaging, weight, size etc.), duties (if applicable), instructions for customs (e.g. when transporting dangerous goods), and liabilities.

Even the minimum selling price of 0.5 GEL/kg makes broccoli production profitable. In this case, the profit margin is reduced to 27%, but production remains profitable as the minimum price exceeds the prime cost.

With regards to exports to Europe, the following additional expenses must be taken into account:

Transportation costs

Transportation costs in Europe can vary from €4000 to €5000 (₾11,905 to ₾14,881³¹) for a 20t container that maintains a certain temperature (+4 °C for most vegetables). Broccoli is a perishable product that is relatively risky to transport even under the appropriate temperature, compared to other types of products (domestic appliances, construction materials, etc.). Furthermore, transportation of agricultural goods requires a phytosanitary certificate, and there is a higher chance that the vehicle will get held up at the customs. Delays are associated with additional expenses (€150 for each additional day at the customs).

Insurance costs

Transporting broccoli requires insurance, which usually costs between 0.25% and 0.35% of the value indicated in the waybill.

Costs associated with food safety issues

As mentioned earlier, transporting broccoli requires a phytosanitary certificate, which costs ₾25. There are no other mandatory food safety certificates for primary production, but the buyers in European countries may ask for various documents. One such document is heavy metal content analysis, which is carried out in Georgia, and costs ₾150-170.

Furthermore, the standard devised by GLOBALG.A.P applies to food safety. This is an independent certification scheme for good agricultural practices, which is recognised and requested by retailers (supermarkets, hypermarkets, restaurants) not only in the EU, but across the whole world.

The standard is voluntary and can be downloaded free of charge³². It is worth noting that accredited certification authorities must also be recognised by GLOBALG.A.P. There are currently no such institutions in Georgia. However, there are some consulting companies that help producers implement the standard. These include STAR Consulting³³ and GDCI³⁴.

The GLOBALG.A.P. standard for fruit and vegetables includes the full production cycle of an agricultural product, from plot selection and soil cultivation to the production, sorting and packaging stages. The certificate is valid for 12 months. The standard costs at least \$10,000 to implement, of which \$5,000 are taken up by consultation costs. The remaining \$5,000 cover the costs of auditing and certification services. The largest expenses, which are difficult to calculate in advance, are associated with the infrastructural changes that must be implemented by farmers based on the consultations. Food safety experts believe that the biggest problem associated with broccoli in Kvemo Kartli may be the metal content in water used for irrigation, which negatively affects consumers' health.

³¹ The equivalent of €4000 and €5000 in GEL, as per the National Bank of Georgia exchange rate on 28 April 2018 (2.9762 GEL/EUR)

³² The standard can be downloaded here: https://www.globalgap.org/uk_en/

³³ <http://www.starconsulting.ge>

³⁴ <http://gdci-georgian.weebly.com/4321430443134317431643214323431443224304433043124317-4318432043174307432343254322430843054312.html>

Based on the above, food safety-related costs for the certification component alone can range from €25 for a phytosanitary certificate to €24,617³⁵ for a GLOBALG.A.P. Certificate.

The latest data regarding the prices in the EU show that as of 30 April 2018,³⁶ the wholesale purchasing price of imported broccoli in Poland is between 0.83 EUR/kg and 1.06 EUR/kg, with the average price being 0.95 EUR/kg.

Allowing for the average transportation costs of €13,393, food safety-related expenses of €185 (for a phytosanitary certificate and heavy metal content analysis), insurance costs of 0.3% of the total value indicated in the waybill, and the average wholesale sale price of 2.8 GEL/kg, the cost of growing broccoli and transporting it to the European Union are as follows:

Table 12. Export-related expenses

Expense	Value
Growing (GEL/ha)	3862
Transport (GEL)	13,393
Certification (GEL)	185
Insurance (GEL)	99
Total (GEL/ha)	17,539

Note: The average yield is 11,750 kg/ha, allowing for a loss of 10%

Allowing for a price of 2.8 GEL/kg, a yield of 11,750 kg/ha, and a loss of 10% during storage and transportation, the sales revenues amount to 29,610 GEL/ha, with a profit of 12,071 GEL/ha, which is slightly more than the average local profit from broccoli sales (12,000 GEL/ha). The profit margin is 1.14 GEL/kg (40%), while the prime cost is 1.65 GEL/kg. The prime cost is higher for exports, while the profit margin is lower. This is due to the fact that transportation costs are quite high, while the volume of the transported produce is relatively low³⁷.

These calculations do not allow for costs associated with obtaining a GLOBALG.A.P. Certificate or another international certificate, which would render production unprofitable under the existing conditions of productivity.

9.5 Value Flow Chart

Price information obtained from the value chain participants show that involvement in the value chain is profitable for all participants.

The drawing below shows the highest and lowest prices for each participant, as well as the added value, which represents the price difference between the links.

The calculations apply to non-processed headed broccoli.

³⁵ The equivalent of \$10,000, as per the National Bank of Georgia exchange rate on 28 April 2018 (2.4617 GEL/USD)

³⁶ https://www.fresh-market.pl/en/prices_online/prices_online

³⁷ Calculations allow for transportation of 10,575 kg of produce with a 20t container, as this is the yield per hectare. This significantly increases the transportation costs per unit. Although exporters often make agreements among each other with regards to grouping products in containers to reduce transportation costs, grouping agricultural produce with other products is associated with certain difficulties. It is therefore preferable to reduce costs by transporting similar products in large quantities.

Drawing 3. Added value for each link of the value chain



Note: Farmer's prime cost calculated as 0.37 GEL/kg

We can see from the above that the farmer has a relatively high average added value of 1.38 GEL/kg, while the values for other participants vary between 0.50 and 1.00 GEL/kg. However, it must be pointed out that intermediaries, market retailers and supermarkets are working on substantially larger quantities of broccoli than each farmer.

9.6 Main Players and Relationships between Them

9.6.1 Horizontal Relationships in the Value Chain

The main horizontal relations are described below.

Table 13. Horizontal relations within the chain

RELATIONSHIP	DESCRIPTION OF THE RELATIONSHIP
BETWEEN AGRICULTURAL STORES	There are numerous agricultural stores in the region, and they are operating in a competitive environment.
BETWEEN FARMERS	Farmers produce broccoli individually, and are not united within any cooperatives or associations. Commercial production of broccoli is largely concentrated in several villages within the region.
BETWEEN INTERMEDIARIES/STORAGE FACILITIES	Broccoli is mainly purchased by intermediaries. There are many intermediaries operating in the region, which facilitates the sale of broccoli. However, the competition between the intermediaries is not fierce, as they are offered the produce by farmers at similar prices.
BETWEEN MARKET RETAILERS	The market has many retailers, and therefore also a competitive environment. However, the prices are similar. Farmers often appear in the role of retailers when they sell their own produce on the market.
BETWEEN SUPERMARKETS AND BETWEEN PHARMACIES	The number of supermarkets and pharmacies is growing. The level of competition is quite high both among the supermarkets and pharmacies. However, there are no significant differences in prices.
BETWEEN PROCESSORS	There are no broccoli processors with the exception of one company, which is integrated vertically.
BETWEEN EXPORTERS	Broccoli is exported individually, sporadically, and in low quantities. There is no apparent cooperation between the exporters.
BETWEEN CONSUMERS	Consumer demand for broccoli is growing, as healthy diet is becoming increasingly popular. Nevertheless, there is a problem of low awareness due to the fact that broccoli is a non-traditional crop for the majority of the population.

9.6.2 Vertical Relationships in the Value Chain

The main vertical relations are described below.

Table 14. Vertical relationships within the chain

RELATIONSHIP	DESCRIPTION OF THE RELATIONSHIP
BETWEEN AGRICULTURAL STORES AND FARMERS	Farmers have a free access to fertilizers, pesticides and seeds. They do not need to travel to Tbilisi in order to purchase these products, but many do so due to the proximity of the capital.
BETWEEN FARMERS AND INTERMEDIARIES	The relationship between farmers and intermediaries is informal, and is not based upon any contracts or even verbal agreements. Most farmers do not have a stable relationship with intermediaries. Contractual relationships do not exist even in cases when farmers and intermediaries have been cooperating for a long time. There are numerous verbal agreements among ethnic minorities in villages.
BETWEEN INTERMEDIARIES AND MARKET RETAILERS	An informal, non-contractual, but stable relationship. Most retailers purchase produce from the same intermediaries on the basis of verbal agreements.
BETWEEN INTERMEDIARIES AND SUPERMARKETS	A formal relationship that is strengthened by agreements between intermediaries and supermarkets.

10. Broccoli Export to the European Union

Generally speaking, a product entering the European Union market encounters two types of barriers – tariff and non-tariff³⁸.

Products of Georgian origin that satisfy food safety standards can enter the EU market free of customs payments, although there are several exceptions:

Products subject to annual tariff quota³⁹

This category only includes garlic, which is subject to a quota of 220 tonnes.

Products subject to market entry price, which are exempt from the ad-valorem component of the import tax⁴⁰

This list includes 28 varieties of agricultural produce that are subject to an ‘entry price,’ which means that a minimum price is set on the import of the products in question.

Products subject to the anti-counterfeiting mechanism⁴¹

This mechanism controls 277 varieties of agricultural products, which have fixed annual quotas attached to them in accordance with the agreement. These quotas can be changed on request, if Georgia proves that the request is based upon changes in local production. Thus, if local production was to increase, then it would be possible to increase the quantities in the agreement.

It is worth noting that broccoli does not figure on any of the aforementioned lists, which means that it is not subject to any restrictions. If Georgian broccoli can satisfy food safety standards, then it can be exported to the European Union tariff-free.

In order to benefit from the free trade regime, Georgian products must satisfy the product origin criteria described in the DCFTA protocol.

Furthermore, based on advice from the Export Development Association,⁴² rookie exporters must perform the following actions:

1. Check the readiness of the export;
2. Select target markets with regards to export power;
3. Study the peculiarities of the target markets;
4. Study the target markets on site;
5. Devise and follow a marketing plan.

It is also important for exporters to be able to use the EU Trade Helpdesk⁴³ in order to find out about more about tariffs, EU-internal taxes, etc. Although vegetables are generally regarded as low-risk food, the EU requirements regarding food safety are of utmost importance.

Based on recent statistics, the largest importers of broccoli and cauliflower in the EU are the United Kingdom, Germany, France, Netherlands and Belgium.

³⁸ Tariff barrier – customs duty; non-tariff barrier – technical requirements, standard requirements and product/process certification.

³⁹ Appendix II-A <http://www.dcfta.gov.ge/public/filemanager/agreement/trade/დანართი%20II.pdf>

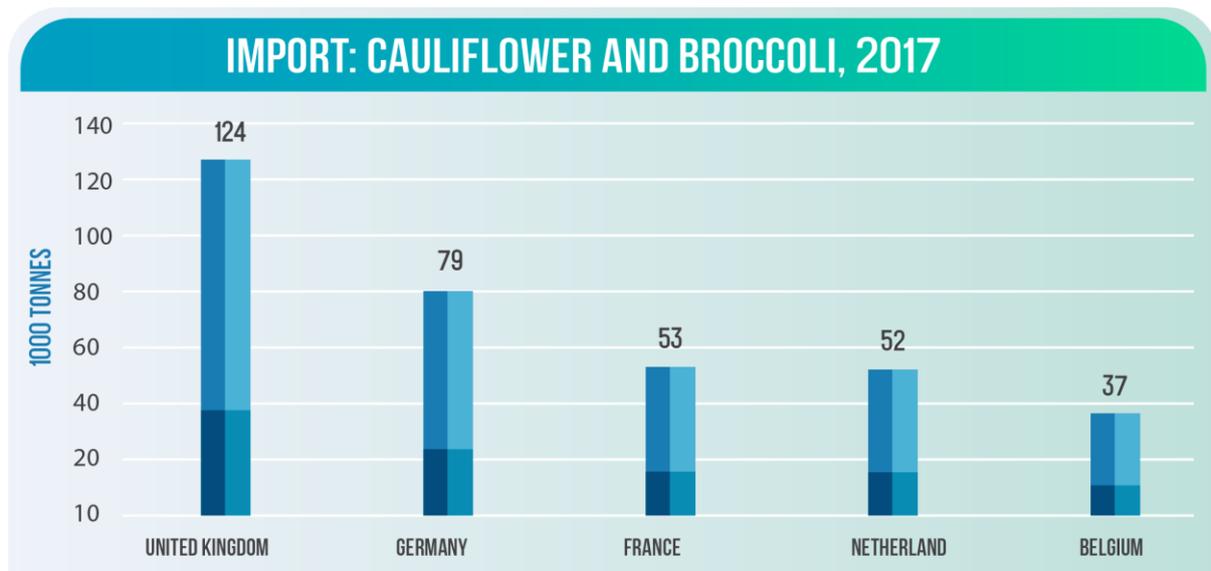
⁴⁰ Appendix II-B <http://www.dcfta.gov.ge/public/filemanager/agreement/trade/დანართი%20II.pdf>

⁴¹ Appendix II-C <http://www.dcfta.gov.ge/public/filemanager/agreement/trade/დანართი%20II.pdf>

⁴² Export Development Association, 2018 – <http://eda.org.ge/eng/>

⁴³ EU Trade Helpdesk, 2018 – <http://trade.ec.europa.eu/tradehelp/>

Figure 11. Largest importers in the European Union, 2017



Source: Trademap, 2018

The markets in the aforementioned countries are mainly supplied by other EU member countries. Thus, the United Kingdom imports most of its broccoli from Spain, Germany, France, Kenya etc. Germany’s main suppliers are France, Italy and Spain (see Table 15 below).

Table 15. Trading partners in the European Union

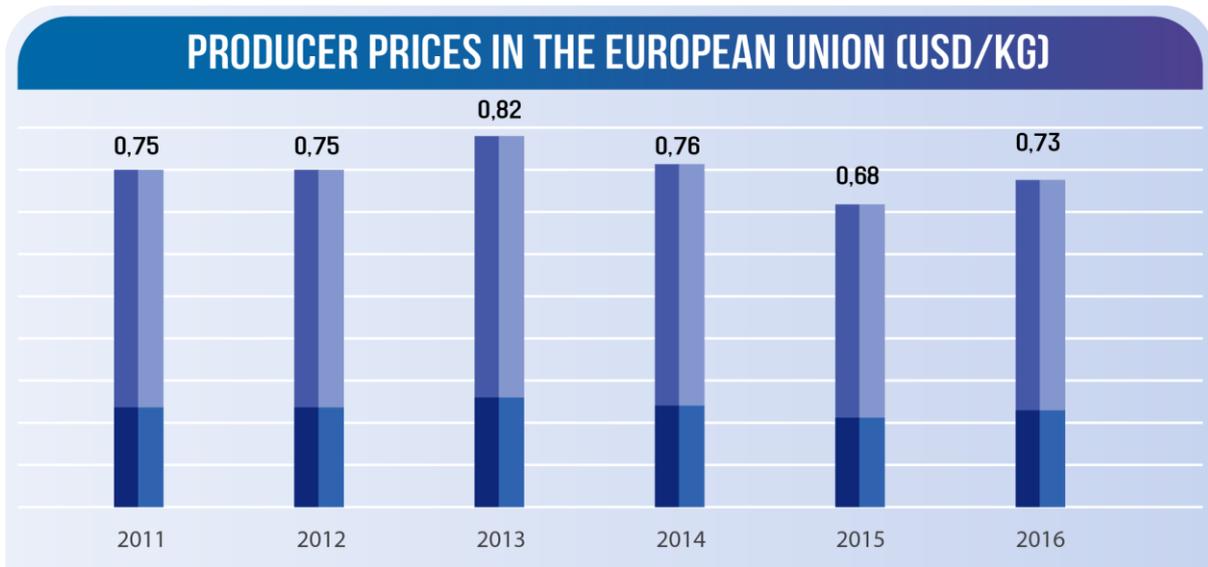
	Largest Export Markets for Broccoli in the European Union					
	U. K.	Germany	France	Netherlands	Belgium	Portugal
Importers	Spain	France	Spain	Spain	France	France
	Germany	Italy	Belgium	France	Netherlands	Netherlands
	France	Spain	Italy	Germany	Spain	Spain
	Kenya	Netherlands	Portugal	Belgium	Portugal	Germany

Source: Trademap, 2018

Italy, Spain and France are the main producers of broccoli in the European Union. As these countries are known for their high standards in food production, it will be difficult for Georgian broccoli to compete against them.

With regards to competition, it is interesting to note the producer prices in the European Union.

Figure 12. Producer prices in the European Union



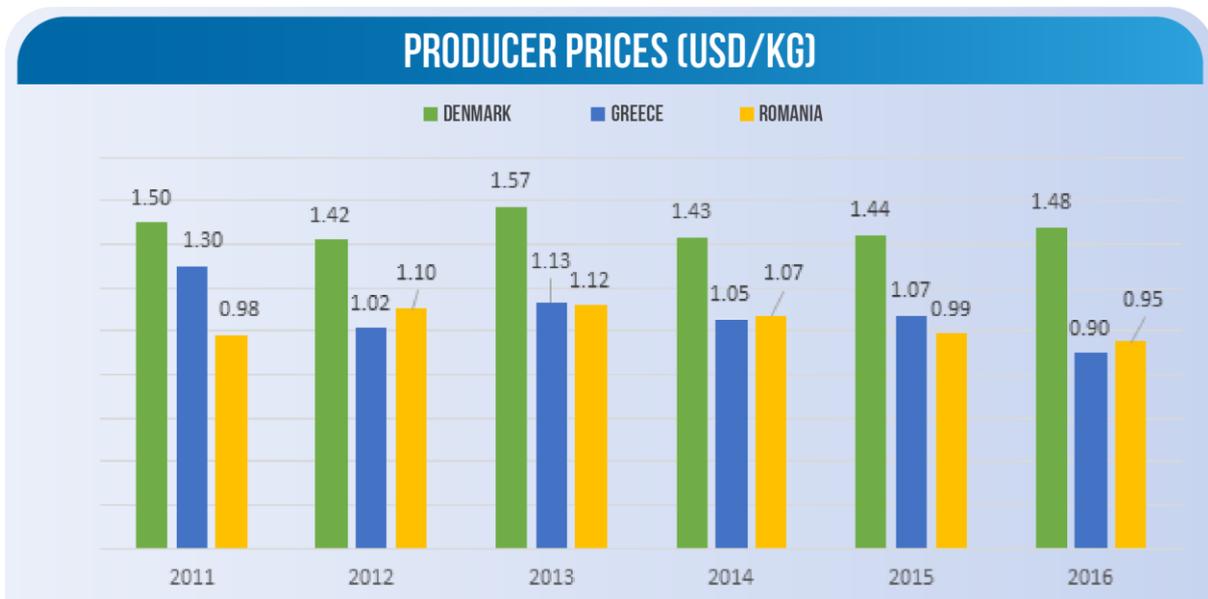
Note: The figure shows the average calculated price (USD) in EU countries.

Source: FAOSTAT, 2018

The average producer price in the EU is 1.8 GEL/kg, while the average producer price in Georgia is 1.5 GEL/kg. We can therefore conclude that there is no major difference in producer prices between Georgia and the European Union, and that Georgian broccoli is less competitive than its European counterpart in terms of pricing.

Countries with relatively high producer prices over the last several years include Denmark, Greece and Romania.

Figure 13. Producer prices in various countries



Source: FAOSTAT, 2018

In terms of pricing, Georgian broccoli can be more competitive in the aforementioned countries. However, transportation costs can be high in case of countries such as Denmark, which will lead to a price increase. In case of Greece and Romania, transportation costs are likely to be relatively low.

As mentioned earlier, the latest data regarding the prices in the EU show that as of 30 April 2018,⁴⁴ the wholesale purchasing price of imported broccoli in Poland is between 0.83 EUR/kg and 1.06 EUR/kg.

It is also worth noting that agricultural production in the EU is subsidised. The share of subsidies in the total sales carried out by farmers from the EU in 2016 was 21%⁴⁵, which has a negative effect on free competition and puts European producers in an advantageous position. Since there are no plans to change the subsidy policy in the near future, Georgian exporters will have to compete against subsidised prices.

⁴⁴ https://www.fresh-market.pl/en/prices_online/prices_online

⁴⁵ Organisation for Economic Co-operation and Development, 2018

11. SWOT Analysis of the Broccoli Sector

Based on the interviews, as well as the existing literature, one of the main strengths of broccoli is its positive effect on health. It is possible to satisfy the demand for broccoli throughout the year, as it can be grown both on open ground and in greenhouses. Experts believe that the climate and soil conditions in Georgia allow broccoli to be grown without the use of chemicals. Respondents also pointed out that broccoli production requires less financial and human resources than many other crops. For example, it is easier to grow than cauliflower and berries. Furthermore, as broccoli requires irrigation, the existence of suitable irrigation systems in Kvemo Kartli has been identified as one of the region's main advantages. Farmers can benefit not only from the consumption and sales of broccoli, but also from using the leftovers as cattle feed.

Broccoli's main weaknesses are its perishability and low productivity. Furthermore, there is an apparent lack of experience in Georgia with regards to broccoli production. Georgia has long produced vegetables from the cabbage family (headed cabbage, white cabbage, red cabbage, Chinese cabbage etc.). However, cauliflower and broccoli are regarded as relatively untraditional crops in the region, hence the lack of experience. Broccoli production began 5-8 years ago. Obstacles listed by the respondents include a lack of suitable equipment, lack of greenhouses for seedlings, lack of access to high-quality seeds, and a shortage of processing enterprises.

There are numerous opportunities in the broccoli sector that can be used by farmers to boost their revenues. One such opportunity is to implement modern production techniques to improve productivity. Leading countries produce more than 40 tonnes of broccoli per hectare, while the best available figure for Georgia is 15 t/ha. It is possible to not only boost productivity, but also increase the sown areas. Broccoli is currently produced in low quantities, and the country has to rely on imports. It is particularly important to increase off-season production, so that Georgian broccoli can compete with the imports.

As mentioned earlier, broccoli is a relatively untraditional crop in Georgia. Focussing on its production will help diversify production. Diversification will, in turn, help raise the level of food safety.

Apart from boosting productivity, there is also the potential to develop the processing link within the value chain, which will allow the producers to obtain added value. This can be achieved by increasing the level of cooperation among farmers. The implication here is not that it is necessary to establish formal cooperatives, but to improve cooperation and ensure that processors are consistently supplied with large quantities of broccoli. Difficulties associated with the development of this link include the necessity of maintaining food safety standards, which is particularly important in cases such as children's food production (e.g. broccoli puree).

In order to popularise broccoli production, one can establish demonstration plots where farmers will be able to familiarise themselves with best practices of broccoli production.

Like many other agricultural crops, broccoli is threatened by various natural disasters, the chief among which are hail and drought. Furthermore, there is a risk of various diseases spreading on a massive scale. This has to be taken into account when selecting the broccoli cultivar. Naturally, it is preferable to select a cultivar that is adapted to the region's climate and soil conditions, and is also disease-resistant.

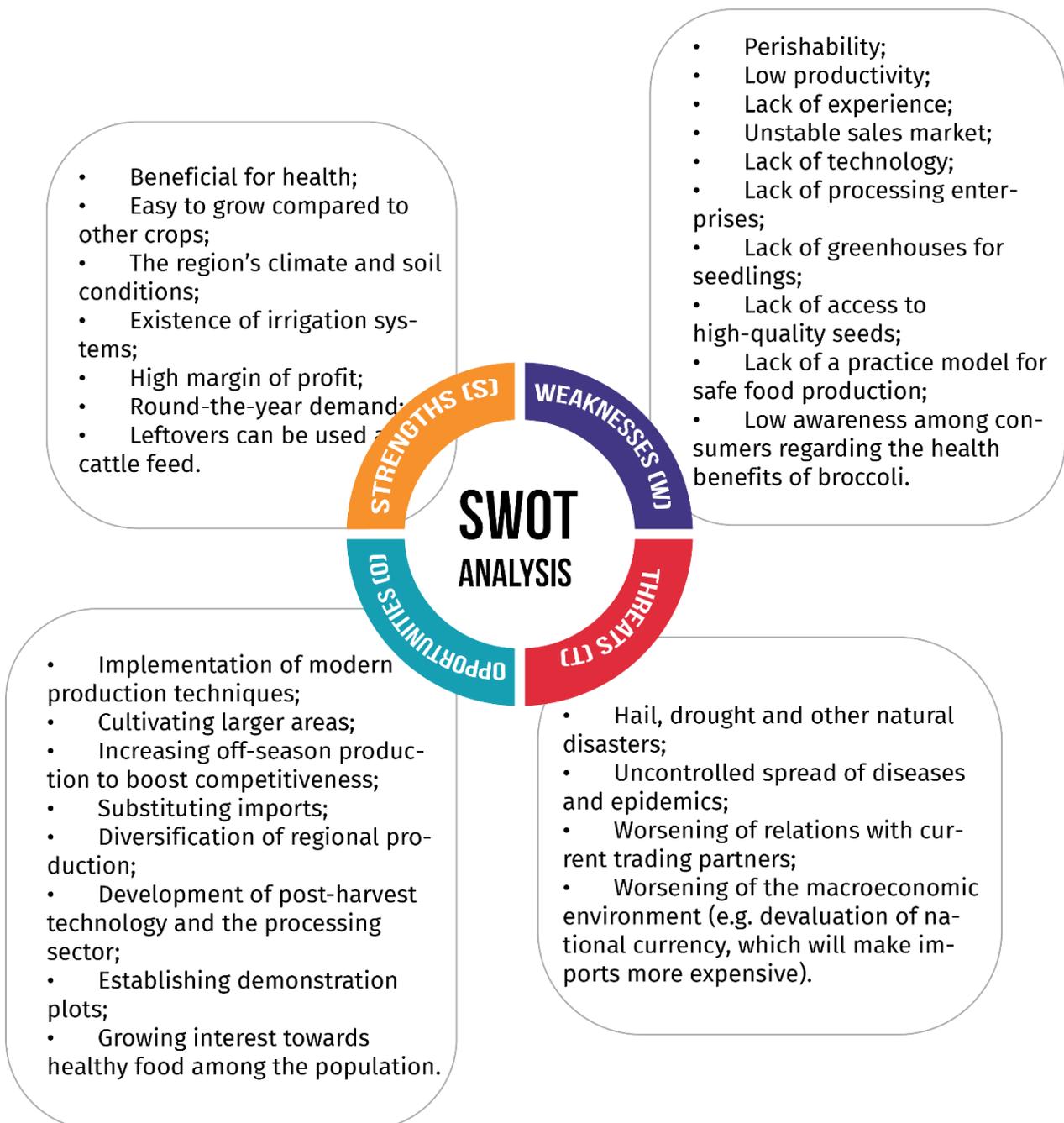
It is also important to consider threats such as the worsening of relations with trading partners. This is particularly the case with broccoli, as the country relies on imports. For the same reason, we must

consider threats such as devaluation of the national currency, which will make the import of both broccoli and broccoli seeds more expensive, subsequently affecting the price of broccoli itself.

The table below summarises the strengths, weaknesses, opportunities and threats associated with broccoli growth.

It should be noted that under the current conditions of productivity, Georgian broccoli is less competitive in the European Union, as certification would lead to the costs exceeding the sales revenues. However, the potential to export broccoli to the EU exists in case of increased productivity.

Table 16. SWOT Analysis



12. Potential of the Broccoli Sector

Employment Prospects

Most respondents stated that broccoli growth is not very labour-intensive. Labour costs come behind the costs of fertilizers and seeds on the list of expenses. Their share in the total cost of broccoli growth amounts to 14%. As the broccoli harvesting process lasts for approximately one week, most farmers use their family members as workforce. However, larger enterprises do hire labourers.

Revenue Generation

For broccoli producers, broccoli often represents one of the main agricultural crops. However, farming enterprises are diversified. Therefore, based on information obtained from the respondents, revenues obtained from broccoli sales constitute 5%-30% of the total revenues from agriculture.

Impact upon the Environment

With regards to environmental impact, we must note the use of broccoli in crop rotation, which helps maintain the balance of nutritional elements in the soil, deters harmful insects and prevents the spread of various diseases.

It should also be noted that planting the same crop on the same area for several years will have a negative impact both on the soil condition and productivity.

13. Discussion and Recommendations

The study shows that broccoli is a high profit margin vegetable that currently has a lower export potential than a potential to substitute imports. This is due to the following factors:

- Broccoli imports substantially exceed its exports;
- Compared to other vegetables, the price (and the profit margin) of broccoli on the local market is high, and there is demand for it throughout the year;
- Against the background of Georgia's economic development, it is expected that an increase in the population's income will lead to a growth in demand for improved nutrition (diversified diet);
- Broccoli produced in Kvemo Kartli is cheaper than the imports, as well as broccoli produced in other regions of Georgia. Under the conditions of stable market supply⁴⁶, this points towards the competitiveness of Kvemo Kartli-produced broccoli.

Export-related difficulties are caused by the following factors:

- European countries are among the world's largest producers of broccoli;
- High levels of production in the European Union account for relatively low prices that Georgian broccoli struggles to compete with (taking the transportation and certification costs into account);
- Low productivity in Georgia increases transportation and certification costs per unit of product.

At present, the government's interest towards the broccoli sector is negligible, as witnessed by the absence of a strategic development plan for this field.

Overcoming the existing obstacles in the broccoli sector requires joint efforts by the farmers, as well as public, private and non-governmental organisations. These efforts must be directed towards the development of the broccoli sector and its export potential. In order to achieve this, the following is recommended:

For the Farmers:

- Implement new technologies and increase productivity;
- Focus on off-season production. However, the climate in Kvemo Kartli does not significantly differ from the climate in European countries. It will therefore be difficult to compete against European producers in this regard;
- Enlarge the farming enterprises, which will help reduce transportation and certification costs;
- Implement exemplary food safety practices and satisfy the minimum requirements.

For the Public Sector:

- Familiarise yourself with modern technologies for broccoli growth and inform farmers about these technologies through the information/consultation centres. The Scientific Research Center of Agriculture and the Academy of Science can jointly advise farmers about modern technologies;
- Increase awareness about healthy diet among the population. Focus on non-traditional products and enable diversification of diet, especially for children;

⁴⁶ Broccoli producers in Kvemo Kartli are currently unable to provide a stable supply for the local market (see Figure 10).

- Study the demand on international markets and the agricultural calendars of European suppliers of broccoli, in order to find out when the supply of broccoli is relatively low, and to support off-season production.

For the Private Sector:

- Develop greenhouse, refrigeration and processing facilities. Enable on-site production of packaging materials (boxes, jars, etc.) for primary and processed products. This will help increase the competitiveness of Georgian broccoli on the international market (including the EU).
- Inform farmers about the food safety standards. The current production practices do not satisfy even the minimum food safety demands. Therefore, broccoli producers in Kvemo Kartli will find it very difficult to obtain international certificates. At this stage, it is recommended to focus on implementing the minimum standards, and subsequently hone the production practices.

For Non-Governmental Organisations:

NGOs can support both the farmers and the representatives of the public and private sectors in implementing the aforementioned recommendations. Many NGOs operating in Georgia are oriented towards developing agriculture, including market gardening. To this end, the following is particularly important:

- Increase farmers' access to agricultural tools and machinery;
- Raise farmers' awareness about modern technologies;
- Raise awareness about the health benefits of broccoli among the population.

Bibliography

1. Agrokavkaz – *Technology for Broccoli Growth*, 2018.
<http://agrokavkaz.ge/dargebi/mebostneoba/brokoli-brokolis-movla-moqhvanis-teqnoqnia.html>
2. L.M.Alexander – *12 Top Performing Broccoli Varieties*, 2014.
<http://www.growingproduce.com/vegetables/12-top-performing-broccoli-varieties/#Tinsel/66706/2>
3. UN Food and Agriculture Organisation Statistics (FAOSTAT), 2018.
4. Ministry of Environmental Protection and Agriculture Data, 2014.
5. Centers for Civic Engagement, 2018. http://cce.ge/portal/alias__CCE/lang__ka-GE/tabid__4594/default.aspx
6. EU Trade Helpdesk, 2018 – <http://trade.ec.europa.eu/tradehelp/>
7. Organisation for Economic Co-operation and Development, 2018.
<http://www.oecd.org/tad/agricultural-policies/producerandconsumersupportestimatesdatabase.htm#tables>
8. Export Development Association, 2018. <http://eda.org.ge/ka/>
9. I.Kvernadze – *How to Grow Broccoli*. http://www.rogor.ge/article_1550_rogor-moviyvanot-brokoli.html
10. International Trade Centre, 2018. <https://trademap.org/Index.aspx>
11. Restoring Efficiency to Agriculture Production, 2018.
http://www.reap.ge/index.php?lang_id=GEO&sec_id=1
12. Project Management Agency of the Ministry of Environmental Protection and Agriculture, 2018. <http://apma.ge/projects/read/agroinsurance/17:child>
13. National Statistics Office of Georgia, 2018/
14. Startup Georgia, 2018. http://startup.gov.ge/geo/winners_details/37
15. National Food Agency – *State Food Safety Control 2017*.
<http://nfa.gov.ge/ge/sursatis-uvnebloba/monitoringi/dokumentis-shemowmeba>
16. Fresh Market (Poland), 2018. https://www.fresh-market.pl/en/prices_online/prices_online
17. *Kvemo Kartli Regional Development Strategy 2014-2021*. http://droa.ge/wp-content/uploads/2017/09/kvemo_kartlis_regionis_ganvitarebis_strategia_2014-2021_clebistvis_0.pdf
18. Deep and Comprehensive Free Trade Area Agreement, 2018.
<http://www.dcfra.gov.ge/ge/agreement>
19. AROMAPRODUCT Ltd. and GEORGIA'S NATURAL Group, 2018.
<http://aroma.ge/georgian/products/juices/organic-natural-pure-juices-and-blends-nfc-category/282>

