Food and Agriculture Organization of the United Nations

European Bank for Reconstruction and Development

TEA SECTOR REVIEW
GEORGIA

FAO INVESTMENT CENTRE

COUNTRY INVESTMENT HIGHLIGHTS

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Number 16

TEA SECTOR REVIEW
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Foreword

Tea has a long tradition of cultivation in Georgia, where the first tea plants were introduced as early as 1845 in experimental plantations along the Black Sea coast. By the turn of the twentieth century tea had become a crop of industrial significance and Georgia, by that time part of the Russian Empire, was the key tea supplier to the rest of the country. In fact, peak production occurred in the mid-1980s at 150 000 tonnes per year on an area of over 65 000 ha, and Georgia was by far the largest tea producer in the former Soviet Union. Azerbaijan was at that time producing around 35 000 tonnes per year, and these two former Soviet republics accounted for over 95 percent of the Soviet Union's domestic tea production and for the bulk of the Soviet Union's domestic tea supply.

The structural changes that followed the collapse of the Soviet Union in the early 1990s led to a rapid decline in the Georgian tea sector. In 2014 the cultivated tea areas reached a historic low of 1800 ha of which a mere 800 ha were productive — a 99 percent decrease from peak production years in the 1980s. Total tea output, in turn, decreased to under 2000 tonnes per year, which is a tiny fraction of the large volumes produced during Soviet times.

However, interest in the tea sector has increased in recent years and in an effort to revive its once thriving tea sector, the Georgian government started a Tea Rehabilitation Program in 2016 to subsidize weeding, pruning, and other operations, with the objective to rehabilitate up to 7000 hectares of abandoned tea plantations over a number of years.

In spite of a long tradition and accumulated know-how of tea production and processing, there is little doubt that investments in both technology and knowledge will be required for Georgia's tea sector to grow in a successful and sustainable way. Production must focus on efficiency and quality, while keeping in mind that the environment is critical to achieving this.

It is in this spirit that the joint sector review of the Food and Agriculture Organization of the United Nations (FAO) and the European Bank for Reconstruction and Development (EBRD) aim to provide a general overview of the Georgian tea sector, with a focus on the key sector aspects such as financial profitability, quality, international competitiveness and environmental sustainability. Ultimately, our hope is that this report will serve as a basis for informed policy and investment decisions to national and international stakeholders with an interest in this promising sector.

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This report was prepared by the Food and Agriculture Organization of the United Nations (FAO) in 2019–2021 at the request of the European Bank for Reconstruction and Development (EBRD). Its objective is to provide an overview of the tea sector of Georgia, identify sector challenges, potential environmental risks associated with its planned expansion, and inform policy discussions and possible EBRD engagement in the sector.

The team of authors worked under the guidance and overall supervision of Dmitry Prikhodko (Senior Economist, FAO). The lead authors of the study are Ms Alexandra Sokolova (Economist, FAO) and Mr Boris Sterk (Economist, FAO). Substantial contributions were provided by Ms Ekaterina Krivonos, (Economist FAO), Messrs Jacopo Monzini (Senior Natural Resource Management and Climate Change Specialist, FAO) and John Snell (International Tea Industry Expert). The authors are thankful for the review and contributions by Mr El Mamoun Amrouk (Senior Economist, FAO and Secretariat of the Intergovernmental Group on Tea).

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Abbreviations and acronyms

APMA	Agricultural Projects Management Agency
BAU	business-as-usual
CIS	Commonwealth of Independent States
COGS	cost of goods sold
COP	cost of production
CSA	climate-smart agriculture
CTC	crush, tear and curl
EATTA	East Africa Tea Trade Association
EBRD	European Bank for Reconstruction and Development
ECMWF	European Centre for Medium-Range Weather Forecasts
EIRR	Economic Internal Rate of Return
FAO	Food and Agriculture Organization of the United Nations
FIRR	Financial Internal Rate of Return
Geostat	National Statistics Office of Georgia
GHG	greenhouse gas
GFSI	Global Food Safety Initiative
HACCP	hazard analysis and critical control point
HoReCa	Hotel/Restaurant/Café
HS	Harmonized System
IFAD	International Fund for Agriculture Development
IGG	FAO Intergovernmental Group
(I)NDC	(Intended) Nationally Determined Commitment
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
ITC	International Tea Committee
L&B	Leaves and bud
LCA	Life cycle assessment
LDC	Least developed country
LUCF	land-use change and forestry
MAX	Maximum
MEPA	Ministry of Environmental Protection and Agriculture
MIN	Minimum
MRL	maximum residue limit (Agrochemical residues)
MT	metric tonnes
NFA	National Food Agency
NPV	net present value
PA	Pyrrolizidine alkaloids
PO	purchase order
R&D	Research and development

RCP	Representative concentration pathway
SRC	Scientific Research Center
SWOT	strengths, weaknesses, opportunities and threats
TDM	Trade Data Monitor
TNC	Third National Communication to the UNFCCC
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USSR	Union of Soviet Socialist Republics
WMO	World Meteorological Organization

Executive summary

THE GLOBAL MARKET

Global tea production increased from 4 to over 6 million tonnes between 2007 and 2017 (Figure E1), however, increasing tea consumption and production is mostly due to population growth in producing countries and not to consumption growth in high-value importing markets. After increasing for several decades, global tea trade has stagnated since 2010 at around 2 million tonnes per year, equivalent to around USD 8 billion (2018). Kenya is the largest exporter in terms of volume (500 000 tonnes); however, China is the most significant exporter in terms of value (USD 2 billion) and together with the other two major exporters – India and Sri Lanka – the four countries account for two-thirds of the global tea exports by value (Figure E1).

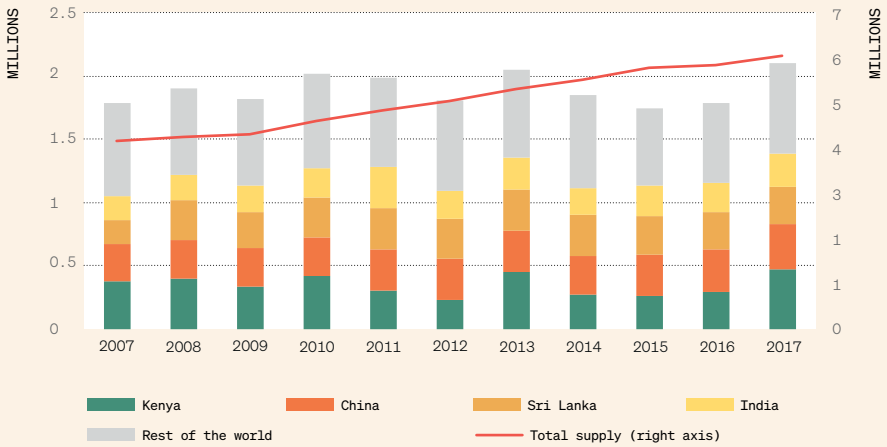

Figure E1
Evolution of global tea supply and exports (in million tonnes)

SOURCE: FAOSTAT. 2020. [online]. Supply Utilization Accounts. www.fao.org/faostat/en/#data/SCL.

Growth in demand for and production of green tea is expected to reach 7.5 percent per year by 2027 and will stay considerably higher as compared to that of black tea (2.2 percent per year for the same period).

In turn, the specialty[1] and health and wellness[2] sub-categories are where the most growth is happening globally, with Europe and North American markets leading the way.[3]

1 Teas sold in counts of less than 40 servings per packet.
2 Those products that claim a functional effect on the body.
3 It should be borne in mind, however, that "tea" in this context translates to anything that can be infused with hot water, other than coffee, cocoa and a few grain derivatives. Within these markets *Camellia sinensis* ("real tea") is morphing from teabag cut material towards more leafy types (Orthodox manufactured teas) and green teas but the largest increase is in the herbal sector, predominantly within the "functional" group of products in the health and wellness category.

In terms of price developments, the average FAO Composite Tea Price (FAO, 2018) remained firm over the last decade until 2014 where there was a 5.3 percent decline, mainly due to the weakening of the crush, tear and curl method (CTC) tea prices. Prices recovered in 2015, reflecting the recovery in CTC prices offsetting the decline in Orthodox teas as imports into the Russian Federation, and the Near East fell due to weakened economic growth rates associated with lower world oil prices.

In the medium term, the projections suggest that supply and demand of black tea will be in equilibrium by 2027 at a price of USD 3 per kg. Prices over the last decade increased from an annual average of USD 2.39 per kg in 2008 to USD 3.15 per kg in 2017, with monthly peaks of USD 3.18 per kg, USD 3 per kg and USD 3.26 per kg, reached in September 2009, December 2012 and May 2017, respectively. The projections indicate a decline in nominal terms of 1.4 percent, while in real terms, prices would actually decline by an annual average of 3.6 percent over the next decade (Figure E2).

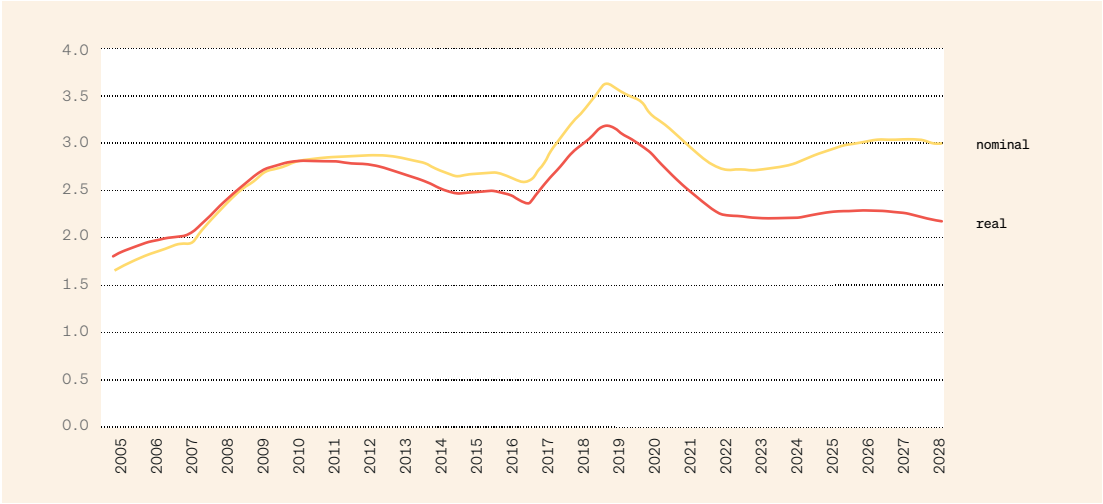

Figure E2
FAO Tea Prices (USD/Kg) baseline projections to 2027

SOURCE: FAO. 2018. *Current Market Situation and Medium-Term Outlook for Tea to 2027.* Twenty-third Session of the Intergovernmental Group (IGG) on Tea, Hangzhou, China, 17–20 May 2018 [Cited 12 May 2021]. www.fao.org/3/BU642en/bu642en.pdf.

The stronger demand for green tea and health and wellness teas as well as for high quality expected in developed markets, suggests that these product categories should be areas of focus for the Azerbaijani tea industry in the next decade.

In fact, according to sector experts, it is likely that within a decade there will be a two-tier industry: one providing industrial grade tea (for extraction for bottled teas, decaffeination and less discerning markets) and another highly bespoke hand-crafted tea industry, providing relatively small quantities of expensive but high-quality teas. This fact suggests two possible main strategies for producers: (i) to be a low-cost provider of industrial tea; or (ii) to focus on producing high-quality tea in line with consumers' expectations within developed markets.

PRODUCTION

Key production indicators

As part of the Union of Soviet Socialist Republics (USSR), Georgia was the main producer and supplier of tea to the rest of the Soviet Union with a production of over 150 000 tonnes from an area of over 65 000 ha in the mid-1980s. The transition to a market economy and the loss of the former Soviet market following the break-up of the USSR led to a rapid and drastic decline of the tea sector. The cropped area reached lows of 1800 ha in 2014 of which a mere 800 ha were productive – a record low and a 99 percent decrease from peak production years in the 1980s. Production, in turn, decreased to values typically under 2000 tonnes per year.

Although tea is an integral part of Georgia's rich agricultural heritage, it has not been the main source of income for farmers. In fact, the net value of tea production at the farm level in Georgia according to FAO data decreased from USD 25.5 million in 2000 (3 percent of farm total) to USD 3.2 million in 2016 (1 percent) as milk, grapes, meat, hazelnuts, potatoes, tomatoes and other products generate more income than tea. When measured by its net production value (in constant USD 2004–2006 prices), tea also generated less income per hectare in 2014–2016 (USD 1071/ha) than the average farm income (USD 1769/ha) derived from all crops. While tea production has been marginally more profitable than the production of cereals and certain types of fruits and vegetables, it is clear that it is not the main investment priority for farmers.

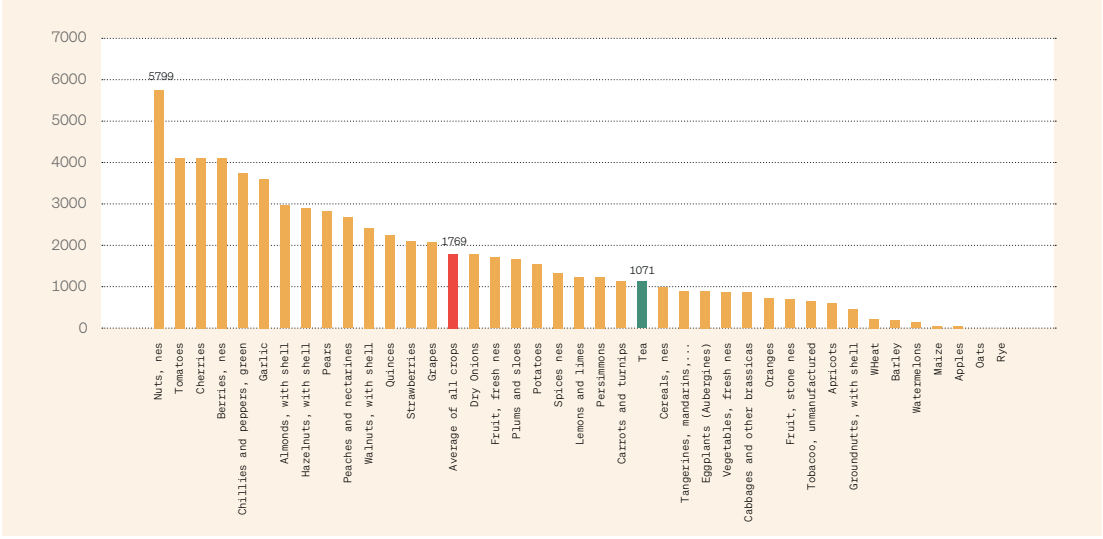

Figure E3
Average annual net value of production in 2014–2016, USD/ha, constant prices

SOURCE: FAOSTAT. 2020. [online]. Value of Agricultural Production. www.fao.org/faostat/en/#data/QV.

More recently, partly as a result of the Tea Rehabilitation Program, the productive tea area expanded from 803 ha in 2014 to 1827 ha in 2018. Currently, the area under tea represents around 0.4 percent of the country's total cropped area (compared to around 5 percent in 1992) and around 1.5 percent of the land area under permanent crops.

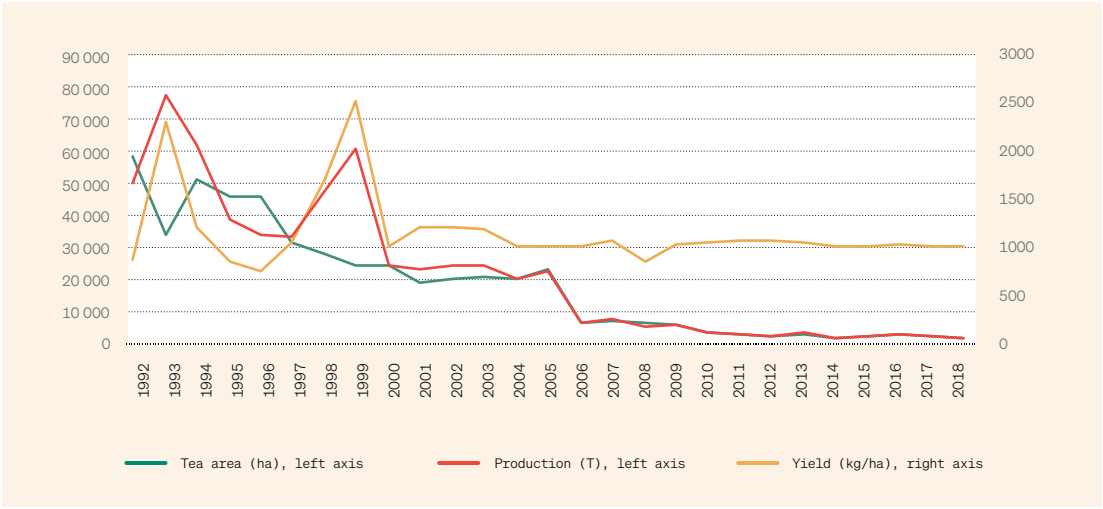

Figure E4
Georgia – Key tea production indicators

SOURCE: FAOSTAT. 2020. [online]. Production Indices. www.fao.org/faostat/en/#data/QI.

Tea plantations are situated in the coastal plain of western Georgia, where mild temperatures, high humidity and year-round precipitation offer favourable conditions for tea cultivation. The tea growing area is split between four administrative units: the regions of Samegrelo–Zemo Svaneti (often referred to simply as Samegrelo), Imereti and Guria and the Autonomous Republic of Adjara. According to 2015 estimates by the Ministry of Environmental Protection and Agriculture (MEPA), 5971 ha were to be considered for rehabilitation out of about 9000 ha of the remaining tea plantations. Between 2016 and 2018, over 1000 ha of the old tea plantations were rehabilitated, bringing the total productive area to 1800 ha. The regional distribution of plantations considered for rehabilitation and actually rehabilitated plantations until 2018 is described in Table E1.

Table E1
Tea plantations considered for rehabilitation and actually rehabilitated plantations, 2016–2018

Region	Considered for rehabilitation (ha)	Rehabilitated 2016–2018 (ha)	Number of plantations rehabilitated (2016-2018)
Samegrelo	2553	493	15
Guria	2202	203	13
Imereti	978	327	21
Adjara	238	0	0
Total	**5971**	**1023**	**49**

SOURCE: Geostat. 2021. [online]. www.geostat.ge/en.

According to the 2014 Agriculture Census, there were 173 productive plantations in Georgia with an average size of 4.6 ha. Between 2016 and 2018, 49 plantations with an average size of 21 ha were rehabilitated, bringing the total number of productive plantations to 222 and increasing the average productive plantation size considerably to 8.2 ha. This may indicate that the tea rehabilitation programme has benefitted mostly large farms. This could be attributed to the conditions for rehabilitation (described further below in the section on policy), which make it more difficult for smaller farmers to benefit from state support.

As rehabilitated plantations can take from three to seven years to become fully productive depending on the intensity of pruning applied and other factors, an increase in production is not yet visible, furthermore, 2018 saw the lowest green tea leaf output in Georgia at just over 1500 tonnes (Figure E5).

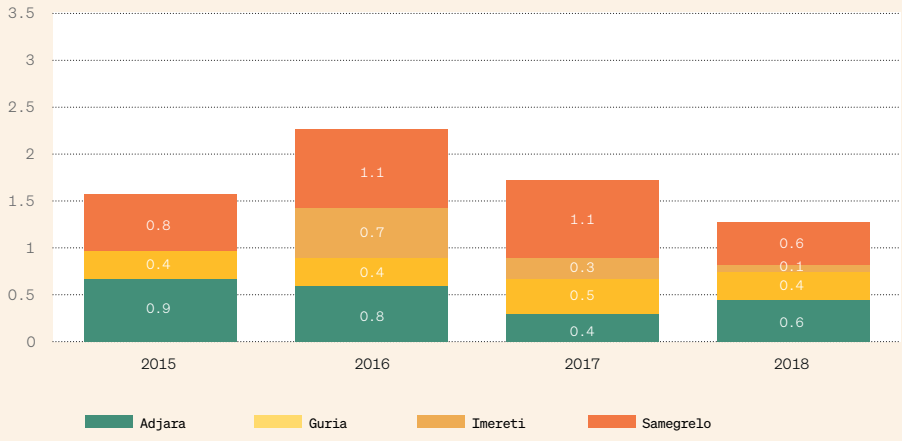

Figure E5

Production of tea leaves per region (ths tonnes)

SOURCE: Geostat, 2018. Data taken from National Statistics Office of Georgia. [online]. www.geostat.ge/en.

Yield estimates for 2015, before the rehabilitation programme started, suggest an average yield of around 2.5 tonnes/ha based on a total green tea leaf output of 2100 tonnes from a productive area of about 800 ha. This is slightly higher than the global average of 2 tonnes/ha. It must be borne in mind, however, that as opposed to many other crops, the performance of the primary production of tea can hardly be assessed based solely on yields. In fact, plucking more leaves in one harvesting round will increase harvest occasion but can have a significant negative impact on quality and yields. While harvesting decisions are inherently local and need to be made on a case-by-case basis, they always require a careful cost-benefit analysis of quality versus quantity in view of the local context (agro-climatic conditions, production costs and especially labour costs, prices, target markets). We examine such production issues in more detail in sections 2 and 3.

Financial profitability

Crop profitability per unit of land is a key factor influencing land use decisions by farmers. Our findings suggest that as per the currently dominant production methods (Model 1, Table E2) tea profitability per hectare is low. However, tea profitability per hectare in Georgia varies considerably depending on the production and harvesting practices adopted, and our analysis also shows that changes in existing practices can considerably improve tea profitability through a careful examination of improvement options on a case-by-case basis (Models 2–5). Nevertheless, even in this case there appear to be other crops more financially attractive to farmers Georgia's tea growing regions, such as blueberries or hazelnuts for instance (see Models 7 and 8).

Our net present value (NPV) and financial internal rate of return (FIRR) estimates take into consideration a period of 20 years. Since the cost of land is around GEL 15 000/ha and this is the single most significant investment cost (when required), it therefore has a significant impact on NPV and FIRR. This is illustrated in sub-models (a) and (b) of Models 1 and 2. In Model 1 (rehabilitation without changes to current practices) the NPV is invariably negative and the FIRR is only positive in the case where no investment in land is required. As illustrated by Model 2, improvements in production practices have the potential to significantly increase profitability per hectare due to improvements in quality, resulting in higher farm gate prices, and also presenting a positive NPV and FIRR in both sub-scenarios (with and without investment in land).

Models 3 and 4 assume that investment in land, as in the first case organic certification, is sought (subject to specific conditions which might be difficult to achieve in any given plantation) and in the second case a new plantation is considered. In spite of higher gross margins per ha as compared to the baseline model (M1), NPV is negative in both cases over a period of 20 years. Model 5 is where the highest gains are realized through improved production practices and the introduction of mechanical harvesting. As the gains are significant enough to bring NPV to positive values even if investment in land is considered, only this scenario is shown.

While our financial benefits summary for different scenarios is only indicative — as such benefits are ultimately farm-specific and depend on a number of variables — it clearly suggests that there is significant potential for improving tea gross margins through changes in production practices combining a lower reliance on manual labour and improvements in quality. In order to make these improvements, the situation with the major tea origins must be taken into consideration. Nowadays, tea farmers in Georgia receive higher prices for the green leaf than their peers in India and Viet Nam (Table E3).

In addition, as most of the value added along the tea value chain is created at the processing level in both countries, the picture is very different for processors (Model 6). While assuming that processing from own tea production from an estate of 10 ha and a 25 percent share has a value of about USD 15/kg of premium tea output, we estimate that gross margins of up to USD 120 000 can be achieved for the processing unit. In this scenario, the estimated FIRR over a period of 20 years is 55 percent.

Models 7 and 8, in turn, present the financial benefits for a new blueberry and hazelnut plantation respectively, in both cases taking into consideration investment in land. The financial benefits from blueberries per unit of land clearly stick out in comparison with tea but also hazelnuts.

Finally, Model 9 is a replication of Model 1(a) (with investment in land) but using economic prices. The related economic internal rate of return (EIRR) is provided instead of FIRR.

Table E2

Financial benefits summary for tea under different production scenarios and other crops*

		Margin		NPV			
Model	Description	GEL/ha	USD/ha	GEL	USD	FIRR	EIRR
M1(a)	Old plantation rehabilitation with business-as-usual (BAU) production practices scenario **with** investment in land	837	284	-16 102	-5475	-5%	
M1(b)	Old plantation rehabilitation with BAU production practices without investment in land	837	284	-2466	-838	5%	
M2(a)	Old plantation rehabilitation with application of improved agro practices with investment in land	5900	2006	12 778	4344	17%	
M2(b)	Old plantation rehabilitation with improved practices and without investment in land	5900	2006	26 414	8981	44%	
M3	Old plantation rehabilitation and organic certification	3642	1238	-3940	-1340	8%	
M4	New plantation with application of improved agro practices	5319	1808	-18 657	-6343	4%	
M5	Old plantation rehabilitation applying improved agro practices and investing in mechanical harvesting	10 940	3720	40 180	13 661	27%	
M6	Tea processing unit	355 967	121 029	1 485 527	505 079	55%	
M7	New blueberries plantation	28 888	9822	58 203	19 789	17%	
M8	New hazelnut plantation	6206	2110	-11 092	-3771	6%	
M9	Economic calculations / Old plantation rehabilitation with no improved agro practices	3058	1040	-6582	-2238		6%

SOURCE: Authors' calculations based on field visits, 2019.

*An exchange rate of GEL 0.34 for USD 1 has been assumed throughout the report, valid at the time of fieldwork in late 2019.

Table E3
Average green tea leaf farm-gate price

Origin	Price, USD /Kg
Georgia	0.30*
Azerbaijan	0.64**
Sri Lanka	0.57
India	0.10
Viet Nam	0.09

SOURCE: Authors.

*Average price for 20 percent of output at GEL 3 (USD 1.1) and 80 percent at GEL 0.35 (USD 0.13) depending on quality.

**Average price for 20 percent of output at AZN 1.4 (USD 0.82) and 80 percent at AZN 1 (USD 0.59) depending on quality.

Model 5 provides a discussion of options for reducing labour costs through the introduction of mechanization when relevant, and in parallel to improving leaf output, quality is key to improving Georgia's competitiveness *vis-à-vis* main global tea producers. Our estimates show that the current production costs for manufactured tea (i.e. after processing) in Georgia are higher than in Sri Lanka, India or Viet Nam, where either higher-quality teas are produced at a similar cost or similar quality teas are produced at a much lower cost (Figure E6).

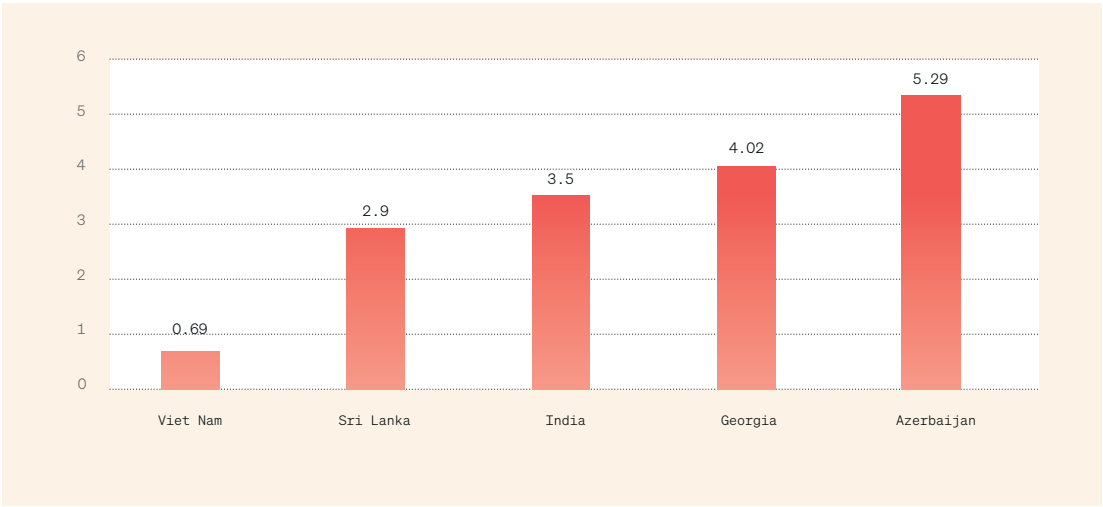

Figure E6
Estimated average cost of production for 1 kg of made tea (after processing)

SOURCE: Authors' own calculation.

Processing

Processing factories are responsible for drying, withering, rolling, fermenting, sorting, blending and packaging tea. In order to make 1 kg of processed tea (or the so-called "made tea"), 4–4.5 kg of raw tea leaves are necessary. The average Georgian green tea leaf production for 2016–2018 suggests a made-tea production of about 600 tonnes from locally produced tea leaves.

There are currently about 30 to 35 tea processing factories across the country, of which seven factories are large while the rest are small- to medium-sized enterprises, including 15 cooperatives. Most of the tea factories lack enough raw material (green tea leaf) to process and are operating way below their operational capacities. From this perspective, the requirement for farmers to own or establish a processing plant in order to access government support for tea plantation rehabilitation is counterintuitive.

Visits to these factories revealed that withering, one of the first and foremost important steps in tea processing, can be improved to produce a better quality of tea. Tea leaf processing typically takes place using old Soviet-era machines, which can to a certain extent be renovated locally. These machines were developed with a focus on maintaining a high volume of production and not on maintaining or improving the quality of processed tea leaves. Modern international quality standards require investment in better-quality machinery suited for tea leaf supply and renovation of the processing, packaging and storage facilities to comply with the hazard analysis and critical control point (HACCP) and Global Food Safety Initiative (GFSI) standards. Some investments have already been made with companies who have managed to purchase new processing equipment from China, Japan or Turkey. In addition, a few companies renovated factory buildings and have or are going to acquire a certificate (ISO, HACCP).

There are two main methods of processing tea. The first and only one used in Georgia is the standard, or Orthodox method; the second is the CTC method.[4] Given that only the first method is employed in Georgia, our discussion throughout the report is focused on the Orthodox method of tea processing (see the definitions section for a description of both methods).

Exclusively black and green teas from the leaves of *Camellia sinensis* are produced in Georgia in significant quantity, while white tea and oolong tea production has started only recently and therefore the quantities remain marginal. As the price of these products is high, local demand is limited.

Quality and competitiveness

Georgia has a legacy of black tea production from the Soviet period when the focus was on producing the largest possible quantity at the lowest possible cost. Nevertheless, it is truly believed within the sector that Georgian tea production is of good quality. While every terroir has its unique characteristics, the bulk of Georgian production still needs to meet the standards of other global competitors in terms of quality.

In this study, the organoleptic qualities of four Georgian teas as compared to teas from several major import origins, which were chosen based on their dominance in the Orthodox category, were reviewed (the methodology is described in Section 3). The top two origins (Sri Lanka and India) have better developed characteristics than the domestic production, while Viet Nam is similar. These teas therefore have a potential value in bulk form on the international market.

4 For an explanation of these terms, see the Glossary section.

The majority of Georgian black teas are bright but thin and lack development. Quite often, the sourness of local tea can be attributed to the absence of pre-manufacture care, as well as fermentation in some cases. This does not imply a lack of expertise within the sector but rather the result of a mismatch between the field and obsolete factories that are largely working under capacity. Consequently, this adds to the cost of production (COP) and impacts the quality and finish of the tea for a variety of reasons.

- At certain times the factories dictate when the farmers can deliver the leaf; subsequently they decide if they have enough leaf to switch on high-capacity processing equipment. Consequently, when farmers leave the leaf on the bush too long, they are paid for poor quality leaf instead of premium leaf that could have been delivered if harvested at the right time.
- Working with individual smallholders, not all tea is going to mature at the same time so leaf consistency, on receipt, can also be an issue.
- Leaf production is very uneven throughout the season so the processing equipment must be working at different capacities and under different conditions, which requires a lot of work to produce the same quality month to month.

In order to estimate the market price of the teas whose quality we assessed, the scores of the sensory analysis were combined with other criteria that determine the value of a tea in the international market, including leaf score, defects and market weighing. The results summarized in Table E.4 show that India and Sri Lanka fetch higher prices for comparable tea types. However, it is evident that Georgia is indeed able to produce – although in extremely limited quantities – high-end specialty teas targeted at premium and niche markets (such as Oolong).

Without a doubt, improvements in quality are critical to the success of the Georgian tea sector. While decisions on production strategies are highly individual and depend on a number of strictly local factors, they invariably need to be based on a solid cost-benefit analysis to ensure the financial viability of individual undertakings and the Georgian tea sector as a whole.

Table E4
Calculated values for Georgian and Azerbaijan leaf teas vs seven relevant competitive origins (all producers of Orthodox leaf teas)

Origin	Rate (%)	Market price USD/kg
Kenya	Kericho	3.83
Sri Lanka	Low grown leaf	4.96
Malawi	EP	3.90
Viet Nam	Lamdong	2.18
Argentina	Maingrade	1.91
China	Green steamed	8.25
India	Nilgiri orthodox	5.66
Kenya	KTDA East of Rift	4.40
India	Assam post second flush	5.27
India	Darjeeling	14.60
Indonesia	W Java	3.80
China	Green Pan fired	10.50
Georgia	Georgian Tea A	3.58
Azerbaijan	Azerbajani Tea A	3.58
Georgia	Georgian Tea B	3.60
Georgia	Georgian Tea C	18.17
Azerbaijan	Azerbajani Tea B	2.95
Azerbaijan	Azerbajani Tea C	0.82
Georgia	Georgian Tea D	4.27

SOURCE: Authors' own elaboration.

Environmental sustainability

Although not to the same extent as in other main tea production areas in Africa and Asia, tea production in Georgia is exposed to the elements and vulnerable to climate change. While recorded and projected changes may not result in immediate adverse impacts, the vulnerability of current production as well as of the future expansion/rehabilitation of tea areas is not to be neglected. The described trends and projections may reduce the overall resilience of tea mostly because of increased water needs (especially in possible expansion areas) and increase exposure to new pests and diseases. The registered increase in temperature variation (MIN-MAX) and changes in precipitation patterns are causing — among others — a shift in agro-climatic zones. Our (conservative) estimates show that it is likely that, within 50 years, certain tea growing areas (those further inland) may be affected and tea cultivation there may not be possible without irrigation (Figure E7).

Furthermore, although industry and public sources claim that tea production is not currently facing pest and diseases problems, Georgian tea producers and public plant protection services need to be prepared to cope with potential risks in case of outbreaks. Addressing the relevant bottlenecks will reduce the overall risk to tea cultivation and its expected expansion. Therefore, the expansion and/or rehabilitation of tea growing areas in the country will require parallel investments in research and development, as well as water management initiatives to prepare for possible adverse impacts, and to ensure that the required irrigation for tea in such areas will not adversely impact water resources.

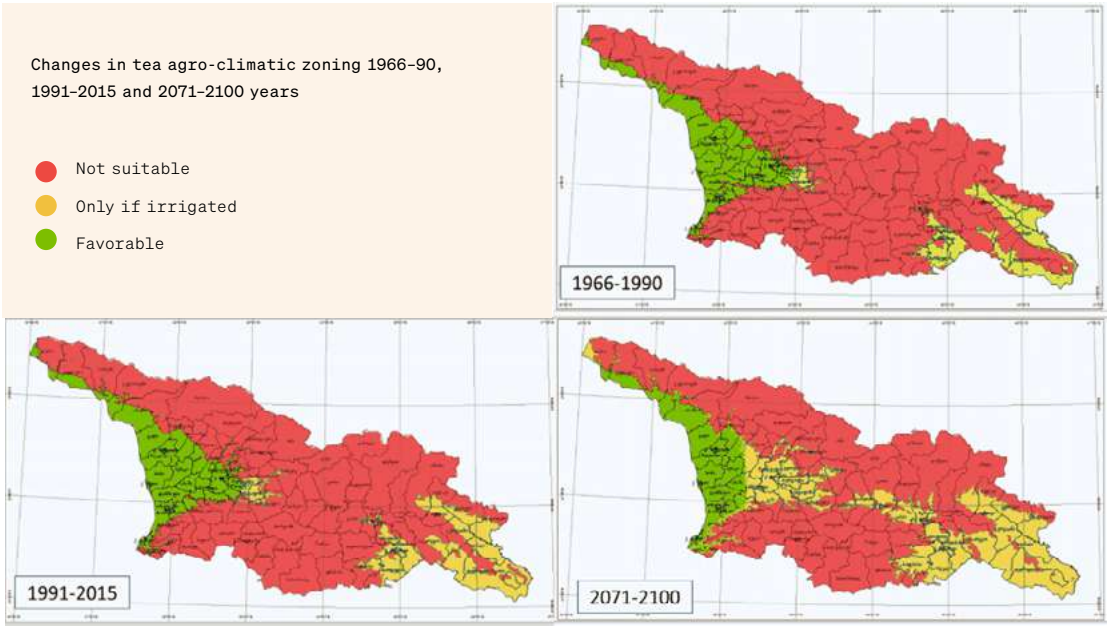

Figure E7
Expected changes in the areas suitable for tea growing in Georgia due to climate change

NOTE: The agro-climatic zones shifting was evaluated according to changes of the following agro-climatic parameters: total of active temperatures, precipitation in the vegetation period and average absolute minimal temperature. These are the parameters used for agro-climatic zoning of Georgia for the first time in 1970s (MEPA, 2017a).

SOURCE: Authors, adapted from MEPA. 2017. Climate Change National Adaptation Plan for Georgia's Agriculture Sector. Tbilisi.

Concerning the general environmental impact of tea cultivation, the potential adverse effects of current tea cultivation in Georgia appear to be limited or negligible for existing farms and moderate/high in the case of new plantations. In fact, assuming there is or will be no land-use change in tea areas, tea cultivation is an effective way of protecting mountainous soils from erosion and instability. Nonetheless, the overall impact of tea processing should be considered moderate/high due to the obsolete technologies and energy sources currently in use. Tea sector growth in Georgia can be environmentally sustainable, but only assuming that the appropriate safeguards are in place and that the environmental impact, from cultivation to processing, is limited or neutralized.

CONSUMPTION

At around 400 grammes per year, per capita tea consumption in Georgia is considerably lower than in neighbouring Azerbaijan and Turkey and comparable to the EU average (480 grammes, Figure E8). On a global scale, the price elasticity of tea demand is relatively low and differences in consumption are influenced significantly by local culture and tradition. While there is no data on tea demand elasticity in Georgia, FAO estimates that global demand elasticity for black tea varies between -0.32 and -0.80, which means that a 10 percent increase in black tea prices leads to a decline in demand for black tea between 3.2 percent and 8 percent, revealing the relative inelasticity of demand for black tea. In fact, FAO statistics show that per capita tea consumption in least developed countries[5] is slightly higher than in the European Union, which is due to long-standing consumer preferences ingrained in local culture.

While rising incomes in Georgia might open up opportunities for high-end niche products, such as specialty or health and wellness teas, a focus on quality should be a priority not only with a view of reaching the lucrative export markets, but also in terms of domestic marketing due to the limited size and growth potential of the national market.

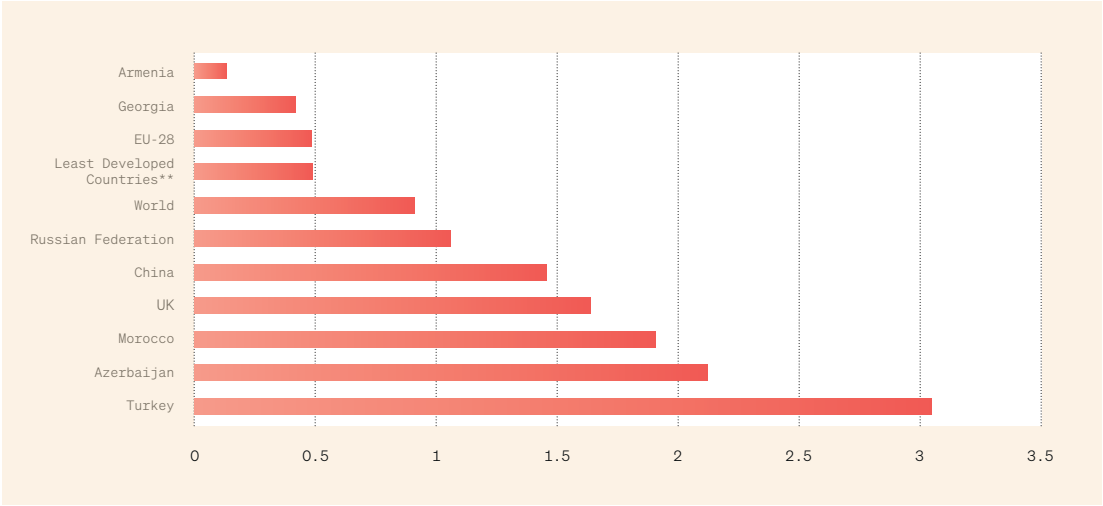

Figure E8
Average yearly per capita tea consumption (kg)

SOURCES: for Georgia: Geostat. 2019. [online]. www.geostat.ge/en; for Azerbaijan: Azerbaijan Statistics Office. 2018. [online] www.stat.gov.az/?lang=en; for all other countries: FAOSTAT. 2020. [online]. Food Balances. www.fao.org/faostat/en/#home.

5 As per the 2018 UN Department of Economic and Social Affairs definition. Further information is found at www.un.org/development/desa/dpad/least-developed-country-category/ldcs-at-a-glance.html

Based on our estimates, total tea consumption in Georgia is about 1560 tonnes per year, with an approximate total value of GEL 88.5 million (or USD 31.5 million; Table E5). According to the National Statistics Office of Georgia, only about one-quarter of tea is consumed within households, while the remainder is consumed at the workplace or HoReCa (Hotel/Restaurant/Café) sector, which includes consumption by tourists and other visitors.

Tea prices for both loose tea and teabags show an increasing trend in Georgia, with the weighted average price of both types increasing by 40 percent between 2012 and 2018. As of 2018, the average consumer price for loose tea was GEL 38/kg (USD 14/kg) and GEL 64/kg (USD 23/kg) for tea in teabags. According to local experts, 30 percent of tea consumed in Georgia is loose tea[6] and 70 percent is in the form of teabags. The average price of a 50 g package of 25 teabags was about GEL 3.3/kg (around USD 1.1/kg) in 2018 (Geostat).

Table E5

Georgia - key tea consumption indicators

Average total yearly consumption (T)**	1564
Average per capita yearly consumption (kg)**	0.42
Average per capita yearly consumption within households (kg)**	0.10
Averge yearly consumption in households (T)*	355
Average yearly consumption per household (kg)*	0.34
Weighed average price per kg (GEL)*	56.6
Total tea market value (million GEL)**	88.5
Weighed average price per kg (USD)**	20.1
Total tea market value (million USD)**	31.5

SOURCE: *Geostat, 2019. Data taken from the National Statistics Office of Georgia. [online]. www.geostat.ge/en.

**Author's calculation.

The limited size of the domestic market makes the issue of mixing Georgian-grown tea with imported, often low-quality tea, and marketing it as "Georgian tea", all the more problematic. The effect of such practices on the evolution of consumer preferences both domestically and in key export markets may be significant, as consumers are led to believe that tea characteristics they have become accustomed to are those of Georgian tea while in fact they are consuming mostly imported tea. The introduction of rules of origin or geographic indications coupled with parallel efforts to educate consumers about the unique characteristics of tea grown in Georgia are a possible basis for the creation of more discerning tea markets not only domestically, but also in key export destinations.

6 Most of the loose tea is consumed by the Muslim population of Georgia.

TRADE

The loss of the Soviet market following the collapse of the USSR in the early 1990s is largely responsible for the decline of the Georgian tea sector. In fact, at its peak in the mid-1980s, the bulk of Georgia's production of 150 000 tonnes of tea mostly supplied other Soviet republics, accounting for up to almost two-thirds of total tea consumption in the USSR at the time.[7] By 2006, Georgia had become a net tea importer and its exports have since then stagnated at around 2000 tonnes/year[8] until 2016 when they slowly started picking up again (Figure E9).

Figure E9
Tea export-import by value during 2000–2018

SOURCE: Geostat, 2019. Data taken from the National Statistics Office of Georgia. [online]. www.geostat.ge/en.

Since 2016 Georgian tea exports have gradually started shifting from bulk to packaged black tea, their value has increased considerably, almost tripling between 2016 and 2019 (from USD 1.6 million to USD 4.4 million).[9] However, as of 2019, tea exports still remain marginal in terms of their contribution to the total value of Georgian agrifood exports (almost USD 900 million) at just 0.5 percent.

Somewhat in contrast to neighbouring Azerbaijan, Georgia has diversified its tea exports both in terms of types of teas and export markets (Figure E10). In 2019, around two-thirds of the total exported volumes were accounted for by green tea, mostly exported to Central Asia (Mongolia, Kazakhstan and Turkmenistan). This is a significant shift from Soviet times, when Georgia exported almost exclusively black tea to other Soviet republics. Black tea is now mostly exported to neighbouring Turkey (in bulk) and Azerbaijan (in packs of less than 3 kg). Packed black tea is where most of the export value was created, representing only 12 percent of tea exports in volume terms, but accounting for almost half of their USD value.

7 Consumption estimates for the former USSR are based on FAOSTAT Food Balances standardized data from 1985.
8 They reached a historic minimum of 1600 tonnes in 2016.
9 Data reported by the National Statistics Office of Georgia through Trade Data Monitor (TDM).

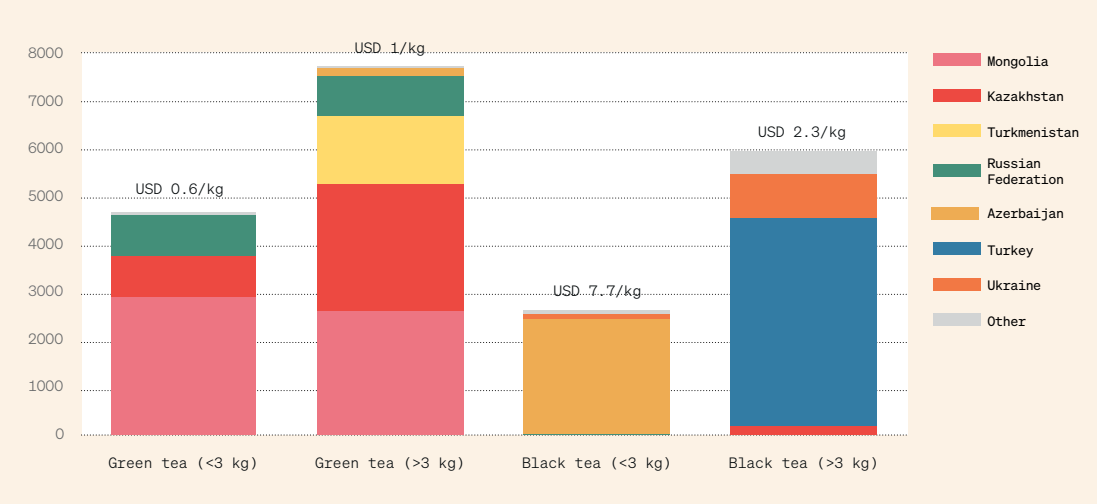

Figure E10

Destination, size of packaging and average export value by type of Georgian tea, 2019 (volume in tonnes, price in USD)

SOURCE: Trade Data Monitor (TDM). 2020. [online]. www.tradedatamonitor.com.

However, the average Georgian green tea leaf production for 2016–2018 suggests a made-tea production of about 600 tonnes from locally produced tea leaves, equivalent to only one-third of export volumes. In addition, taking into account domestic consumption it is highly likely that the majority of Georgian tea exports are made of foreign teas that have been processed, blended and packaged by the Georgian tea processing industry. As previously mentioned, tea of blended origins, sometimes containing minimal amounts of Georgian-grown tea is often exported under the "Made in Georgia" brand.

Tea imports on the other hand, have averaged around 2500 tonnes per year since 2017, half of them can be accounted for by black tea in bulk. In turn, these were mostly constituted by low-value (USD 0.2/kg) imports from Turkey (50 percent) and higher-value imports from Sri Lanka and India (around USD 2.3/kg). The other half were imports of packaged tea, mainly from Azerbaijan and Russian Federation, with an average import value of USD 6/kg and above. Green tea imports were marginal (less than 3 percent of total volumes).[10] Considering that domestic tea consumption is estimated at around 1500 tonnes/year, it is probable that a significant share of bulk tea imports caters to the Georgian tea processing industry that re-exports them under its various brands.

10 Data on volumes and prices refers to 2019 (TDM).

Overall, domestic consumption and external trade patterns suggest that, subject to achieving adequate levels of efficiency and product quality, a focus on export markets could be a cornerstone in the context of the revival of the Georgian tea sector as this represents a promising opportunity for further value addition. In addition to the traditional production of black tea, the production of quality green teas and organic tea may be worthwhile alternatives to explore. Considering options for the protection of tea origin and traceability of domestically produced tea, from field to cup, might be a way of ensuring trust in the "Tea Grown and Made in Georgia" brand both domestically and internationally.

POLICY CONTEXT

In an effort to revive its once thriving tea sector, in 2016, the Georgian government adopted a Tea Rehabilitation Program subsidizing weeding, pruning, fencing and other operations with the objective of rehabilitating up to 7000 hectares of abandoned tea plantations over the next years. The programme is managed by the Agricultural Projects Management Agency (APMA) of the MEPA and disburses funds to its beneficiaries to be spent on the rehabilitation of old tea plantations.

The amount granted by the government is a share of an estimated average cost of rehabilitation of GEL 2500 (USD 910) per hectare.[11] The share of this amount that an applicant will receive depends on land ownership and legal status and ranges from 60 percent for physical persons producing on own land to 90 percent for cooperatives producing on leased, state-owned land. These grants are only accessible to farms between 5 and 300 ha and, in order to benefit, applicants need to purchase a small processing plant if they do not own one already.

While the programme is already showing results in terms of the expansion of the productive tea area (over 1000 ha were rehabilitated until the end of 2019), its economic and social sustainability still need improving, as described in the recommendations section.

SWOT ANALYSIS

Table E6 summarizes the main strengths, weaknesses, opportunities and threats (SWOT) that the Georgian tea sector is facing, as identified by our study.

11 Including VAT or GEL 2050 (USD 747) after VAT (net).

Table E6
SWOT Analysis of tea production in Georgia

STRENGTHS	WEAKNESSES
• long historical association with tea; • slow growth due to dormancy creates high polyphenol/ health quota and confers Georgian teas unique organoleptic qualities; • good internal tea production skillset; • current governmental support for tea; • large processing capacity; • state support and technical assistance available to support industry expansion; • proximity to "traditional" Commonwealth of Independent States (CIS) markets and high-value markets (European Union) for export;	• highly inequitable supply chain (margins and pricing in the hands of the black tea processors and packers); • rules of origin not upheld so consumers cannot differentiate local tea from imports (in fact, consumers have been conditioned to import quality); • current leaf style is not conducive to export-quality retail packs; • need to improve production practices, especially at the harvesting and post-harvest stages to improve quality; • high labour costs.
OPPORTUNITIES	**THREATS**
• opportunity for organic production as pesticides and chemical fertilizers are generally not used; • development of GIs and voluntary quality/carbon labels; • room to increase productivity of existing fields, match factory capacities to green leaf catchment, refine manufacturing process to mimic and therefore replace foreign teas in domestic black tea packs; • unique clonal material and northerly latitude creates unique teas. Opportunity to make world-class quality leaf teas if market strategy supports; • natural stock creates smooth profiles perfect for green tea if market strategy supports (conducive to lowering labour costs through the introduction of mechanized harvesting).	• loss of skillset with ageing population; • land use competition by more profitable crops; • return on Investment and financial profitability, even with government support, is not as attractive to farmers as compared to other crops; • tea will mainly attract current processors limiting the economic impact on rural communities; • climate change poses risks with regards to the inability to produce tea at certain altitudes without irrigation and the introduction of new pests.

SOURCE: Authors own elaboration.

RECOMMENDATIONS

Reassess support to the tea sector in view of its potential, alternative crop and greening. Under the current support system, tea appears to be one of the few crops that receive substantial public support in Georgia. The local tea varieties, a long dormancy period and inherent tea processing skillsets mean that Georgia could re-emerge as a quality origin. However, agro-climatic conditions in the coastal areas of the country allow for the production of a number of other crops where Georgia may have a stronger comparative advantage internationally, and that are financially more attractive to local farmers. Our analysis suggests a limited financial attractiveness of primary tea production for farmers in comparison with other such alternatives. In

addition, considering the international market situation whereby only a limited increase in demand for tea is expected in the next decade and real prices are expected to decrease, we suggest that equal priority be given to all crops considering their value-addition and employment generation potential. While we recommend that such a discussion be led by the MEPA of Georgia with key tea sector stakeholders at the national and local levels, the following recommendations should be considered as options for improving the efficiency and international competitiveness of the tea sector of Georgia, in view of expected global consumption trends.

Improve production practices of black tea. As per field visits, the following steps are seen as critical to improving the quality of current black tea manufacture in Georgia:

I. maximize the quality potential of the first harvest (first flush) in May;

II. ensure that harvesting is taking place in line with standard international practice, as the reported harvesting of 5–6 leaves and a bud cannot produce any quality tea capable of competing on international markets;

III. consider options for reducing the cost of labour in tea production, through a careful analysis of the costs and benefits of partially mechanized harvesting for different types of tea. Producers in many countries successfully produce quality green tea using mechanical harvesting;

IV. ensure an adequate post-harvest handling of tea leaves by reducing the time between tea harvest and processing;

V. modernize processing methods and equipment, when necessary.

Consider the production of specialty teas (especially green tea). The low yields and high labour costs (for hand plucking) make the primary input for production (green leaf) prohibitive in Georgia, unless the focus is on the manufacture of specialty teas. In addition, the potential loss of rural labour in the future also requires a strategy that can work with mechanically harvested leaf that focuses on green tea manufacture.

In particular, the Georgian tea varieties seem to be best suited for making very smooth liquoring bright green teas which, coupled with agro-chemical free notations, creates a significant opportunity both within Western markets (North America and Europe) and traditional Chinese markets (including China's domestic market). While this is a growth category, significant support from the government to make this happen will be required, in particular as regards an extension of the rehabilitation programme, which would dictate the type and support the building of processing units within specified guidelines, to ensure a national identity of type.

Support improved integration of the industry. It is evident that government objectives to increase the productive tea area are manageable goals, albeit the financial capabilities of smallholders have not necessarily been considered. In order to support smallholder inclusion through a more equitable distribution of value added, further consideration should be given to state support in:

- promoting farmer-processor cooperation;
- tea farmers' participation in the revenues from tea markets linked to specific geographical location;
- organic and carbon emission certification schemes.

In particular, this could be centered around a field and factory cooperative framework that would see ownership and profit sharing from:

- scaling tea leaf production to processing capacities;
- central control of field practices and leaf quality;
- aggregating smallholder purchasing power for farm inputs including technical assistance;
- the ability for farmers to access credit, as part of a vertically integrated, higher-margin enterprise;
- consider limits on the state support provided to large vertically integrated companies in order to ensure wider socioeconomic inclusion.

Without this intervention, it is highly likely that the large production companies will eventually move further into production.

Strengthen standards, quality coordination and sample analysis. Protecting the reputation of and ensuring the success of Georgian teas would require continuous efforts to guarantee their quality and safety. The collection of regional samples for testing of chemical residues, pyrrolizidine alkaloids and pathogenic microbes is strongly recommended as a first step, to monitor key tea quality parameters and ensure the identification of adequate support policies and well-targeted government actions. The industry in both countries may also further benefit from an increased understanding between farmers, processors and consumers about the main quality attributes and product grading. As the industry evolves, governments may consider developing national quality standards to protect the interests of farmers, producers and consumers by differentiating harvest timing and grading based on quality and sensory parameters.

Consider introducing rules of origin and geographical indications. For Georgian teas to receive the recognition they deserve — both domestically and in export markets — it is imperative that rules be enforced that allow consumers to know the actual origin of the tea they are consuming. At present, a very significant share of tea marketed as Georgian tea is, in fact, mostly comprised of imports. While both origins undoubtedly have some unique characteristics, this prevents consumers from developing their knowledge of the local terroir and the specific organoleptic qualities of their teas. This is a fundamental requirement for Georgian tea to be placed as a national product in its own market. Key steps would include: (i) introducing legislation that

differentiates value-added and domestic-grown tea products from other tea packaged in Georgia; and (ii) following EU regulations on the control of pesticide residues, heavy metals and pathogenic organisms throughout the entire value chain: imports, domestic production and exports.

Anticipate food safety risks. Although compliance with stringent maximum residue limits (MRLs) for agrochemicals in tea, or the use of prohibited chemicals do not present an issue for tea producers due to the current relatively low pest and disease pressure, food safety issues are on the agenda of regulators in key tea markets (especially the European Union). Considering that Georgia is actively importing, blending, packaging and re-exporting tea, strict food safety controls would protect the reputation of the domestic tea industry and further increase the attractiveness/value in export markets in the long-term future. For example, options for Global Food Safety Initiative (GFSI) certification and approval could be considered. Although this is not required for the internal market, the GFSI would be useful for the export markets, including the Russin Federation where GFSI is taking hold.

Consider organic certification. If certification schemes and testing support the fact that Georgian teas are chemical-free, it would offer a substantial marketing advantage that few origins can compete with; therefore, organic certification should be considered. Consumer demand for organic certified products is on the rise, especially within the specialty and green tea categories. For existing plantations (as is the case in Georgia) this should be relatively easy to achieve, particularly in the case where rehabilitated tea plantations have not been managed for many years. That said, there is a transition period for all crops before full certification (usually 3 years) and furthermore, the product value is enhanced because of this. Nevertheless, it is recommended that the demand and potential markets be confirmed prior to conversion of the plantations. Organic manufacture should not alter the cost/ha much and yields should remain about the same.

Support research. Considering the challenges posed by climate change, supporting research institutions would be critical, especially regarding (i) breeding new plant varieties adapted to local conditions and potential future risks (especially related to the potential need for irrigated tea production); (ii) plant protection from pests and diseases; and (iii) knowledge transfer to producers. Adequate public support in these areas would assure long-term industry sustainability.

GEORGIA AND AZERBAIJAN IN A COMPARATIVE PERSPECTIVE

A review of the tea sector in Georgia was conducted in parallel with a similar study of the tea sector of Azerbaijan under a joint FAO-EBRD project (FAO, 2022). While the tea sectors of these two neighbouring countries share a number of similarities in terms of production practices and historical legacy, they also present clear key differences. Table E7 summarizes the similarities and differences based on the findings of the two sector reviews.

Table E7
Comparative table of the tea sectors of Georgia and Azerbaijan

		GEORGIA	AZERBAIJAN
Key indicators			
Tea area (ha)	2018 planted/rehabilitated	1800	1130
	2018 productive	N/A	660
	Target	7000 rehabilitated	3000 total
Production (T)	Current (2018)	1700	900
	Current (2018)	N/A	8500
Yield (T/ha)	Current (2018)	≈1	0.8<1.4
	Target	N/A	2.8
Gross margins (USD/ha)	Baseline	420	1130
	Optimistic scenario	2250	3430
Alternative crops		Berries, hazelnuts, citrus fruit	Oranges, rice, tomatoes, subtropical fruit
Summary of similarities and differences			
Main similarities	· Historical legacy of tea production. · Currently producing almost exclusively black orthodox teas. · Good theoretical knowledge of the crop but widespread issues at the production level (especially in terms of harvesting practices and post-harvest care of leaf). · Unique tea organoleptic attributes but room for improvement in meeting international quality standards. · Strong potential for organic production. · Geographic proximity to traditional (CIS countries) and high-value (European Union) markets. · Currently limited economic significance of the tea sector. · Limited financial attractiveness of tea and presence of more attractive alternative crops. · Combined primary production with processing capacity can improve considerably the overall competitiveness of made tea production. · Current processing overcapacity and use of mostly outdated tea machinery. · High production cost in comparison to main tea producing countries (especially labour costs). · Issues with labelling practices and limited attention to rules of tea origin. · Presence of risks related to climate change that might require changes in agronomic practices. · Tea sector development mostly focused on the rehabilitation of old plantations. · Limited domestic tea consumption.		
Main differences		· Tea sector development mostly focused on the rehabilitation of old plantations. · Limited domestic tea consumption. · Potential mostly in terms of exports. · Currently exports tea to a variety of markets. · Underdeveloped potential for green tea production for export. · Irrigation currently not required in most cases, but might become needed in the future due to climate change.	· Tea sector development mostly focused on new plantations. · High domestic consumption. · Opportunities also on the domestic market. · Currently exports tea mostly to the Russian Federation and Turkey. · Potential mostly for improving the competitiveness of black tea production. · Irrigation currently needed in most cases.

SOURCE: Authors.

Chapter 1
Introduction

1.1 SECTOR OVERVIEW

Tea growing was first introduced in Georgia in the mid-19th century by Chinese farmers and initially Chinese varieties of *Camellia sinensis* were used. Due to the fact that local climactic and soil characteristics were conducive to growing tea in the western part of Georgia (Imereti, Samegrelo, Guria, Abkhazia and Adjara regions), when Georgia was part of the Russian Empire and the Union of Soviet Socialist Republics (USSR), significant resources were directed to establishing large tea plantations along Georgia's Black Sea coast. By the early twentieth century, Georgia was already a significant supplier of tea to the Russian Empire. Tea production reached its peak in the mid-1980s as the area of tea plantations in Georgia spanned about 67.7 thousand hectares, with production volumes of 160 to 180 thousand tonnes of green tea leaves per year (equivalent to a yield of about 2 to 2.5 tonnes/ha). The tea sector employed more than 180 thousand workers, with about 79 large tea factories functioning in 1985 and 160 smaller scale factories. The sector had become significant enough to justify the local production of portable tea harvesting machines ("Georgia" and "Cha-900").

After the collapse of the Soviet Union, most of tea plantations were either abandoned or replaced by blueberry and nuts farms, as Georgia became independent and transitioned from a planned economy to a market economy.

Since 2016, the government has undertaken steps to encourage the rehabilitation of abandoned tea plantations, however, no nation-wide "passportization" of the remaining tea plantations has been carried out to identify which plantations could be subject to rehabilitation. In fact, whether or not a specific plantation could be rehabilitated depends on a number of factors and therefore the analysis should include information on the state of plants, soil conditions and the operations required for rehabilitation, among others. This is a crucial step in ensuring the economic (and environmental) sustainability of the programme.

Nevertheless, the Ministry of Environmental Protection and Agriculture (MEPA) has produced some estimates of the area that could be subject to rehabilitation in 2015. Accordingly, about 6000 hectares out of a total of 9000 ha of tea plantations in Georgia have been estimated as having rehabilitation potential. Out of these, about 3000 ha were under state ownership (50 percent). The regional distribution of tea plantations in 2015 that could be subject to rehabilitation was as follows:

- Samegrelo — 2553 ha (43 percent)
- Guria — 2202 ha (37 percent)
- Imereti — 978 ha (16 percent)
- Adjara — 238 ha (4 percent)

While Abkhazia also used to be a significant tea-producing region, data is not available as the area remains inaccessible to the Georgian authorities.

1.2 THE ROLE OF TEA IN THE ECONOMY

Although an integral part of Georgia's rich agricultural heritage, tea has not been the main source of income for farmers even during peak production times. In fact, FAO data shows that in 1994, while tea occupied a total area of about 50 000 ha (about 28 times the current area and still about 70 percent of the 1985 peak area), it only represented 1.7 percent of the total agricultural land and accounted for 2.5 percent of the aggregate value of all crops. Since that time, the total gross production value of tea in Georgia has decreased considerably, in line with the reduction in area, and is currently marginal in comparison to other agricultural sub-sectors (Figure 1.1). The meat and dairy sectors are by far the largest contributors to the economy within the agricultural sub-sectors, while among permanent crops, grapes and hazelnuts generate the most value.

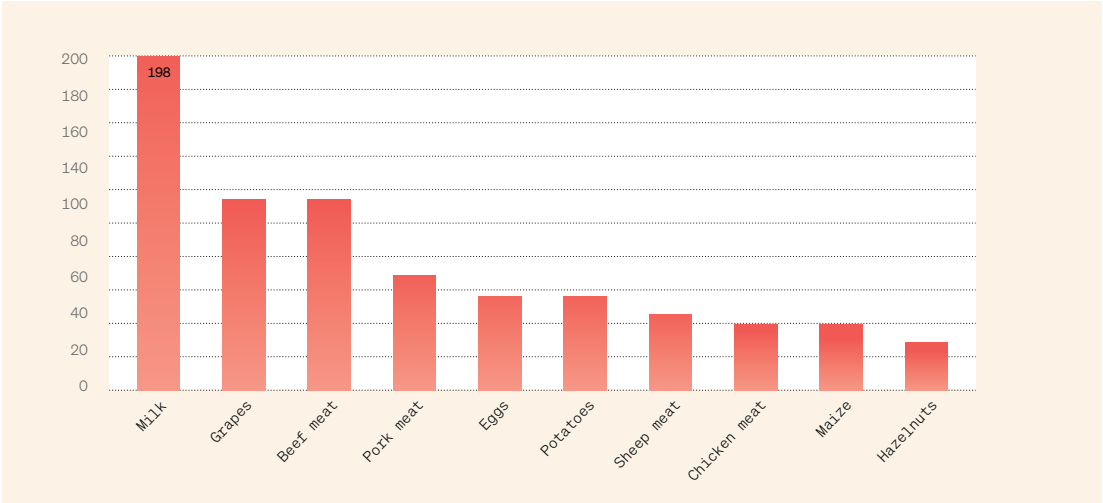

Figure 1.1
Gross value of agricultural production (in USD million), 2018

SOURCE: FAOSTAT. 2020. [online]. Value of Agricultural Production. www.fao.org/faostat/en/#data/QV.

Furthermore, when measured against the net production value (in constant USD 2004-2006 prices), tea also generated less income per hectare in 2014–2016 (USD 1071/ha) than the average farm income (USD 1769/ha) derived from all crops (Figure 1.2). While tea production has been more profitable marginally than the production of cereals and certain types of fruits and vegetables, it is clear that a number of other crops have the capacity to produce much more value per unit of land and, therefore, are more financially attractive for farmers.

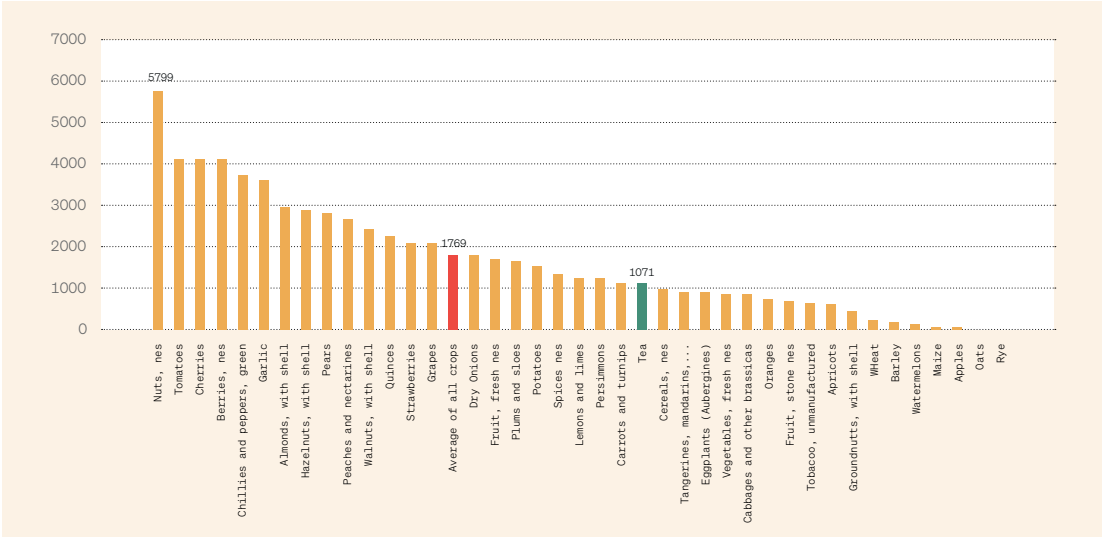

Figure 1.2
Average annual net value of production in 2014–2016, USD/ha, constant prices

SOURCE: FAOSTAT. 2020. [online]. Value of Agricultural Production. www.fao.org/faostat/en/#data/QV.

Within its production area, tea's main competing crops are other permanent crops: orchards (including hazelnuts), grapes, citrus fruit and berries. We explore this in more detail in the section on tea profitability. Currently, the total tea area in Georgia is equivalent to 1.5 percent of the area under permanent crops.

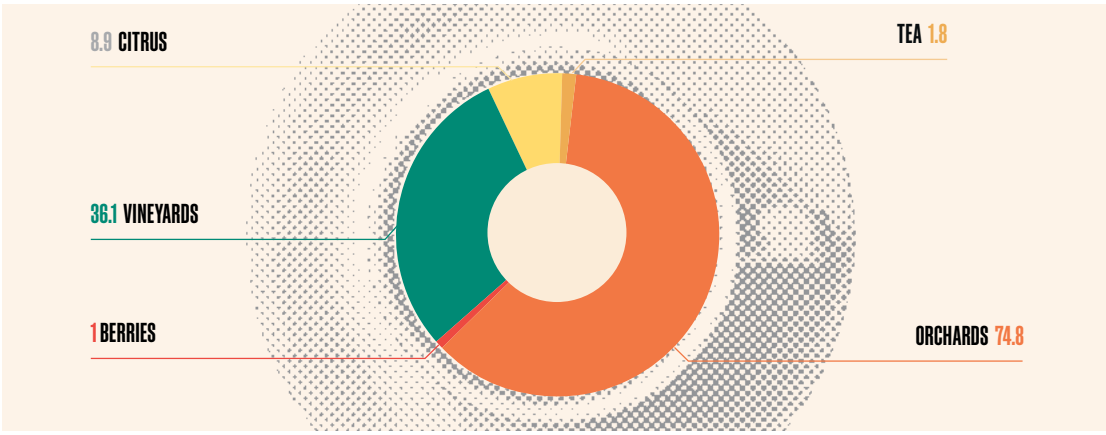

Figure 1.3
Land area under permanent crops (1000 hectares)

SOURCE: Geostat. 2018. [online]. www.geostat.ge/en.

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Chapter 2
The global market

2.1 KEY TRENDS

Global tea consumption and production has grown by almost 50 percent in just ten years (2007–2017, Figure 2.1). However, this growth in consumption is predominantly due to population growth and a per capita consumption increase in producing countries (China, India) and not in developed, high-value consumer markets. This, of course, is not to say that there is no increasing interest for higher-quality products in producing countries (see Box 2.1) but it remains much more limited than in markets such as the European Union, United States of America or Canada.

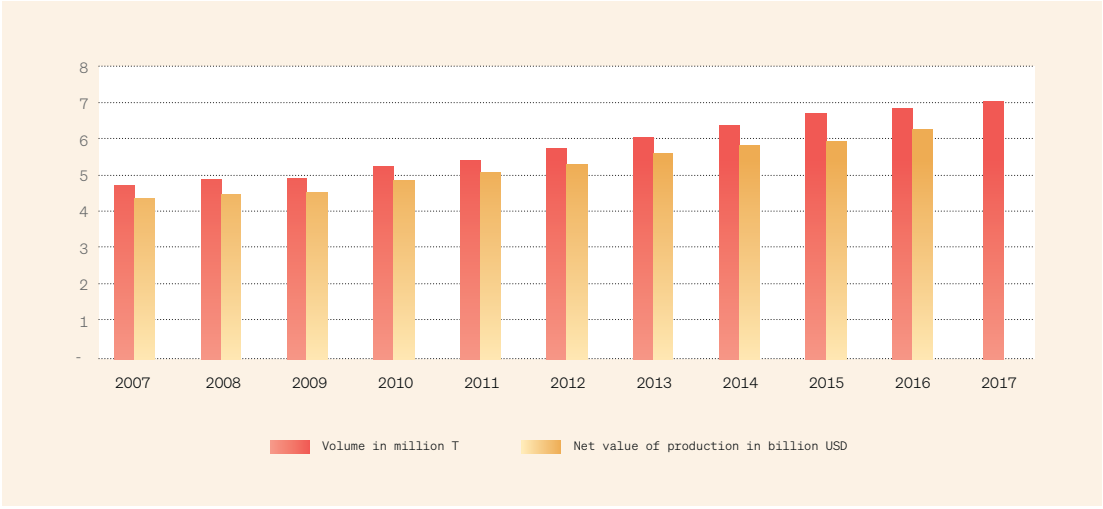

Figure 2.1
Global tea production – volume in million tonnes (red) and net value of production in billion USD (orange)*

*Based on farm-gate prices. For further information on the methodology for calculating this figure, please see: http://fenixservices.fao.org/faostat/static/documents/QV/QV_e.pdf

SOURCE: FAOSTAT. 2020. [online]. Value of Agricultural Production. www.fao.org/faostat/en/#data/QV.

Per capita consumption levels in tea producing countries have increased over the last decade. Although not significantly large in most cases, except for China and India, collectively their contribution has been significant. From 2007 to 2016, while per capita consumption has declined in traditional tea consuming countries in Europe by 17 percent, Africa and Asia's per capita consumption has accelerated. Countries with massive increases in per capita consumption include China (128.6 percent), Turkey (25.9 percent), Indonesia (26.6 percent), Pakistan (35.8 percent), Malawi (565.2 percent), Rwanda (110.2 percent) and Libya (39.8 percent). Tea consumption in Libya, Morocco, Afghanistan and China, reached respectively, 2.23 kg per person, 1.89 kg per person, 1.60 kg per person and 1.52 kg per person in 2016. The per capita average consumption for the United States of America, a coffee-dominated country with tea among the fastest growing beverage markets today, was on the rise by 0.40 kg per person in 2016, from 0.36 kg per person in 2007. Major declines have been registered in the Netherlands (-39.7 percent), Poland (-33.5 percent), United Kingdom of Great Britain and Northern Ireland (-23.0 percent), Ireland (-17.2 percent), France (-23.6 percent) and Russian Federation (-12.4 percent) (FAO, 2018).

Almost exclusively, market promotion in producing countries was based on the health benefits of tea consumption. Tea health benefits are leading the product's immersion into modern American culture and other emerging markets. Research efforts towards empirically supported evidences for health implications of tea consumption need to be strengthened further.
New growing markets are also building on product innovations and diversification into new segments of consumers. The bulk of tea consumed in the United States of America today is comprised of iced tea, at 85 percent consumption, but hot tea has been growing in popularity. Tea popularity is being driven by the Millennial (1981–1997) and Baby Boomer (1946–1964) generations. Ready-to-drink tea constitutes 48.6 percent of the market, with loose leaf (specialty) teas, 17.5 percent of the market. These two market segments have both experienced large growth rates, while other market segments (instant, bagged, pod) are experiencing stagnant levels of growth.

Other factors that could expand tea demand significantly over the next decade, but which have not been included in the projections as data are not completely available, would be the innovative developments from non-traditional players in the retail and service sectors. The demand for tea has accelerated due to the ongoing retail revolution and the growing investment in tea education that familiarize new clientele with the benefits of tea, where it is sourced, and how to properly brew it. Thanks to this approach, loose leaf tea has taken on a new relevance in the United States of America. Promoting tea culture-based market development and its immersion in the cultural identity of societies across the world should be one of the strategies to sustain and expand the consumption of tea.

On the supply side, the tea plant *(Camellia sinensis)* is highly sensitive to changes in growing conditions. Hence, commercial growing of tea is geographically limited to a few areas around the world, which are at risk due to climate change. Therefore, an expected supply response to expanding demand may not be as easy as it has been in the past, given the possible constraints to the availability of suitable land. In retail, discrete groups of similar or related products are said to belong to a "category". However, within the tea category there are well defined sub-categories that are gradually being

elevated to their own category, including "specialty" (teas sold in counts of less than below 40 servings per packet) and "health and wellness" (within "specialty", those products that claim to have a functional effect on the body). These two "tea" sub categories are where the majority of growth is happening globally, with markets in Europe and North American leading the way.

However, "tea" in this context translates to "anything that can be infused with hot water, other than coffee, cocoa and a few grain derivatives" and within these markets *Camellia sinensis* (or "real tea") is morphing from teabag cut material towards more-leafy types (Orthodox manufactured teas) and green teas. The largest increase is in the herbal sector, predominantly within that functional group of products in the health and wellness category. From an economic perspective "health and wellness" is the most valued by consumers but green tea also takes preference over black tea (Figure 2.2)

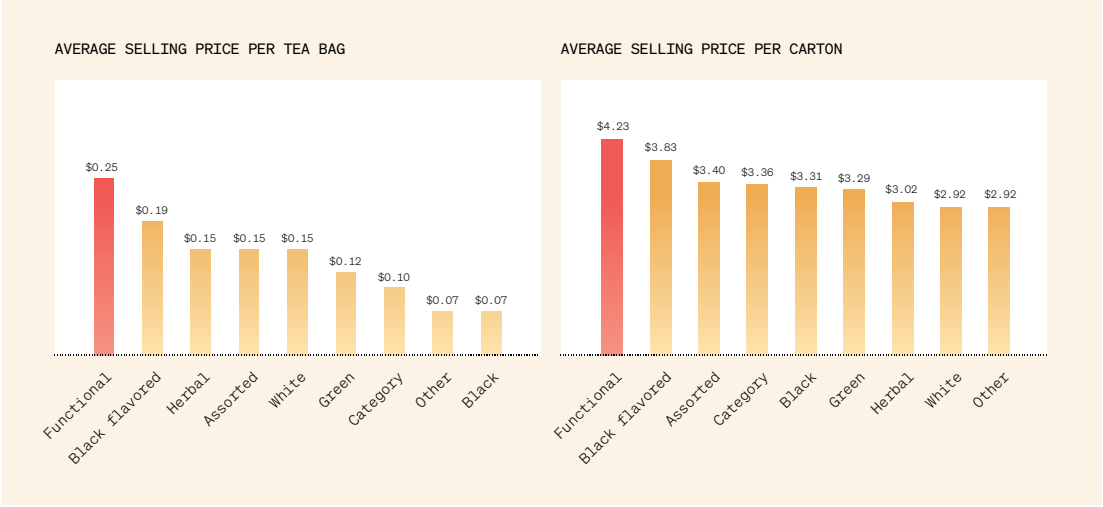

Figure 2.2

Nielsen 2018: Retail channel, tea category, segmentation and value

SOURCE: Nielsen, 2018. Nielsen Market Trace, Canada National All Channels.

BOX 2.1

MARKET DYNAMICS IN CHINA AND INDIA

China

China is starting to import different types of tea as the burgeoning middle class looks to escape tradition. As wealth increases, the appetite for better green tea increases and the Chinese population now consumes a much larger percentage of its own production than before.

Regarding RTD (Ready to drink/bottle teas): the appetite is on the rise throughout Asia, requiring expansion of extraction facilities for concentrates and instant powders, the building blocks for production. These start with a raw material requirement, which consumes tea into a separate category, soft drinks.

Experimentation with different teas (driven by international brands) has led to an increased demand for black tea imports from India and Sri Lanka, predominantly.

India

Like China, a burgeoning middle class is experimenting outside the norms of traditional Chai and buying from different channels, specifically in the grocery sector where portion controlled, higher value formats are found.

Population growth and the difficulties for India to meet international standards of MRL and social welfare has resulted in the production industry focusing on internal demand and markets whose import criteria are less stringent.

2.2 MARKET STRUCTURE

Unlike many other commodities, tea does not have a futures exchange and apart from a small operation involving swaps,[12] there are no formal hedging mechanisms other than long-term physical contracts.

Most tea is sold through open outcry auctions (based in major production origins) on a weekly basis, and is very much a reflection of the supply and demand within the industry. As such, when these centres record lower prices, for the most part this indicates an oversupply situation as has been the case for the last four years. Table 4.1 illustrates the individual average prices for the major auction centres of Sri Lanka (Colombo auction), India (Kolkata auction), Indonesia (Djakarta auction) and Kenya (Mombasa auction).

As production reactions to consumer trends (away from CTC and towards Orthodox) generally lag, there is the risk of an oversupply of mediocre qualities when the demand is increasingly for quality. As a result of this mismatch, since 2015 prices have dropped significantly (Table 2.1).

12 For further information see: Flowsurf. www.teaswap.co.uk

Table 2.1
Auction hammer prices, average quality tea bag grade black teas 2015–2019

Origin	Manufacture	2015 FOB US/Kg	2019 FOB US/Kg	% change
Sri L anka	Orthodox	2.88	2.71	(5.9)
India	CTC/Orthodox	2.50	2.28	(8.8)
Indonesia	Orthodox	1.98	1.56	(21.2)
Kenya	CTC*	2.89	1.85	(36.0)

*Kenya is fast accelerating orthodox leaf manufacture (1MMKg to date) but this is not represented in these figures.

SOURCE: Weekly auction prices FOB. https://vanrees.com/market-information/weekly-auction-prices/

The oversupply of mediocre to low quality tea can be attributed to a number of factors. These include, among others, infilling (the process of increasing field densities by adding bushes to fields already planted with tea), replanting fields with high yielding clones and the planting out of new areas of tea, predominantly in Africa where in the last five years there have been three record crops, and the market has been on a steady slide for the majority of offerings. Despite this, governments in East Africa in particular see it as politically expedient to support the cultivation of more tea by smallholders. Furthermore, from an agronomic point of view, it is almost certain that as yields increase the quality will suffer, particularly during seasons of good rain and heavy flush conditions. As prices slide, farmers will react by opting for more volume rather than quality. Nowhere is this more evident than in Kenya (Box 2.2).

The pressures on quality continue as increasing labour costs perpetuate the need to mechanize almost all tea origins, thus delivering poorer quality leaf for the foreseeable future (until the further optimization of mechanical methods is achieved).

BOX 2.2

DETERIORATION OF QUALITY DRAGGING TEA PRICES DOWN IN KENYA

Excerpt from 'Daily Nation' (Kenya), 8 October 2019

"...the low quality of teas grown in the country is hurting the prices fetched by the commodity in the international markets," industry players have said.

Kenya's black tea is among those with the lowest asking price at the Mombasa Weekly Auction, the East African Tea Trade Association (EATTA) has said, compared to Rwandan tea, which has among the highest markups. This has been blamed for example, mass production by Kenyan farmers at the expense of quality.

"We are more focused on volumes than quality. Rwandans are very particular on quality. We need to focus more on quality than volumes," EATTA chairman Gideon Mugo said.

While a kilo of Rwandan tea can fetch an upward of USD 6.30 (Sh 654.19) at the auction, Kenyan tea is currently attracting an average USD 2.05 (Sh 212.87).

"It had dropped to USD 1.76 (Sh 182.76) in July, the lowest in the last 5 years, compared to USD 2.26 (Sh234.68) per kilo in a similar period last year..."

According to tea sector experts, it is likely that within a decade there will be a two-tier industry: one providing industrial grade tea (for extraction for bottled teas, decaffeination and less discerning markets) and another highly customized hand-crafted industry, providing relatively small quantities of expensive but exquisite teas. This is not a prediction but rather a forecast of the rate of change already underway. To illustrate these dynamics the Nielsen market track data in Table 2.2 illustrates the clear decline (marked in black) and increases in smaller packs and loose tea in developed markets (North America is used as a proxy).

This suggests two possible main strategies for tea producers globally in the mid- to long run: (i) either to be a low-cost provider of industrial tea; or (ii) to focus on producing quality in line with consumers' expectations.

Table 2.2
North American Market winners and losers by Category, 2017 to 2018

	Market share in percent	Percentage growth
Specialty	61.4	+3
Regular	34.2	-1
Loose	4.4	+19

SOURCE: Nielsen Market Track, Canada National All Channels – 52 weeks to October 13, 2018

2.3 PROJECTIONS TO 2027

In this section, we look at FAO global tea market projections until 2027, as presented during the 23rd session of the Intergovernmental Group (IGG) on Tea (FAO, 2018). These medium-term projections were generated by the FAO world tea model, which is a partial equilibrium dynamic time series model.[13]

2.3.1 Production

By 2027, the world black tea production is projected to increase at an annual growth rate of 2.2 percent and to reach 4.42 million tonnes, reflecting major increases in China, Kenya and Sri Lanka (Figure 2.3). The expansion in China should be significant with an output approaching that of Kenya, the largest black tea exporter, underpinned by strong growth in domestic demand for black teas such as Pu'er. The world green tea output will increase at an even faster rate of 7.5 percent annually and reach 3.65 million tonnes, again reflecting an expansion in China where the green tea output is expected to more than double, from 1.53 million tonnes in 2015–2017 to 3.31 million tonnes in 2027. This growth in output would be the result of increased productivity rather than an expansion in area, owing to replanting of higher yielding varieties and better agricultural practices. Viet Nam is also expected to substantially increase its production of green tea with an average annual growth rate of 6.8 percent despite ongoing quality issues, which affect the price and exports earning of the country.

Figure 2.3
Actual and projected production: Black Tea and Green Tea

SOURCE: FAO. 2018. *Current Market Situation and Medium-Term Outlook for Tea to 2027.* Twenty-third Session of the Intergovernmental Group (IGG) on Tea, Hangzhou, China, 17–20 May 2018 [Cited 12 May 2021] www.fao.org/3/BU642en/bu642en.pdf.

13 Details of the model can be found in document CCP: TE 10/22 available at: www.fao.org/docrep/meeting/018/K7538E.pdf.

2.3.2 Consumption

As for mid-term projections of tea consumption, for non-tea producing countries net imports were used as a proxy for consumption, whereas for producing countries actual domestic consumption was used. Data on green tea consumption were not complete and it was difficult therefore to make any meaningful projections.

Black tea consumption is projected to grow at 2.5 percent annually to reach 4.17 million tonnes in 2027 (Figure 2.4), reflecting the strong growth in consumption in producing countries, which should more than offset projected declines in traditional tea importing countries. The largest expansion within the five top producing countries is expected in China where an annual growth of 5.9 percent is expected over the next 10 years. Higher consumption growth is expected in African countries with Rwanda in the lead (9 percent) followed by Uganda (5 percent), Kenya (4.4 percent), Libya (4.4 percent), Morocco (4.2 percent), and Malawi (4.2 percent). Moderate growth rates ranging between 2 and 3.5 percent are expected in other tea producing countries such as Bangladesh (3.1 percent), India (2.2 percent), Sri Lanka (3.3 percent), United Republic of Tanzania (1.8 percent) and Viet Nam (2.0 percent). Lower consumption growth rates are expected in western countries such as in the United Kingdom, where projections are negative as black tea struggles to maintain consumers' interest due to growing competition from other drinks including coffee. Only Germany (1.4 percent) and Poland (1.3 percent), followed by the Netherlands and France (both at 0.6 percent) are expected to have consumption growth rates higher than the region's average of 0.2 percent.

Some of the major factors contributing to higher consumption in tea producing countries are the growth in per capita income, an increased awareness of the health benefits of drinking tea and the product diversification process attracting more customers in non-traditional segments, including young people. The rapid growth of black tea consumption in China is due to the popularity of brick teas, such as Pu'er, which are heavily promoted for their health benefits.

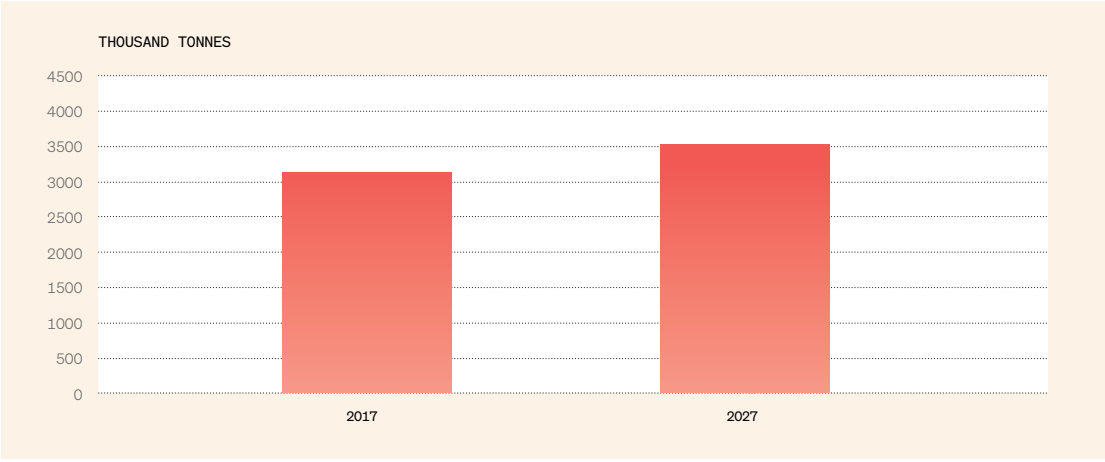

Figure 2.4
Actual and projected consumption: Black Tea

SOURCE: FAO. 2018. *Current Market Situation and Medium-Term Outlook for Tea to 2027.* Twenty-third Session of the Intergovernmental Group (IGG) on Tea, Hangzhou, China, 17–20 May 2018 [Cited 12 May 2021] www.fao.org/3/BU642en/bu642en.pdf.

2.3.3 Exports

Black tea exports are projected to reach 1.66 million tonnes by 2027 (Figure 2.5), with positive but weak growth rates projected for Africa's tea-producing countries (0.91 percent); Kenya will continue to lead with an average annual growth rate of 2.89 percent, whereas Asia's exports growth rates will be negative with an average decline of 0.7 percent, except for Viet Nam (2.6 percent). However, by 2027, export volumes for Asia are projected to reach 840 623 tonnes, while in Africa the volumes are lower at 711 816 tonnes. Major exporting countries are expected to remain the same, with Kenya being the largest exporter followed by India, Sri Lanka, Argentina, Viet Nam, Uganda, United Republic of Tanzania, Rwanda, Malawi, and China.

World green tea exports are projected to grow by 5.0 percent annually and reach 605 455 tonnes by 2027 (Figure 6.5). China is expected to continue dominating the export market, with an export volume of 416 350 tonnes, followed by Viet Nam with a significant decrease in volume of 148 493 tonnes, Indonesia at 12 889 tonnes and Japan at 10 445 tonnes. Japan and Viet Nam are expected to lead in terms of green tea exports growth rates, respectively at 9.3 and 9.0 percent, more than double compared to the growth rate expected in China (4 percent) for the next decade.

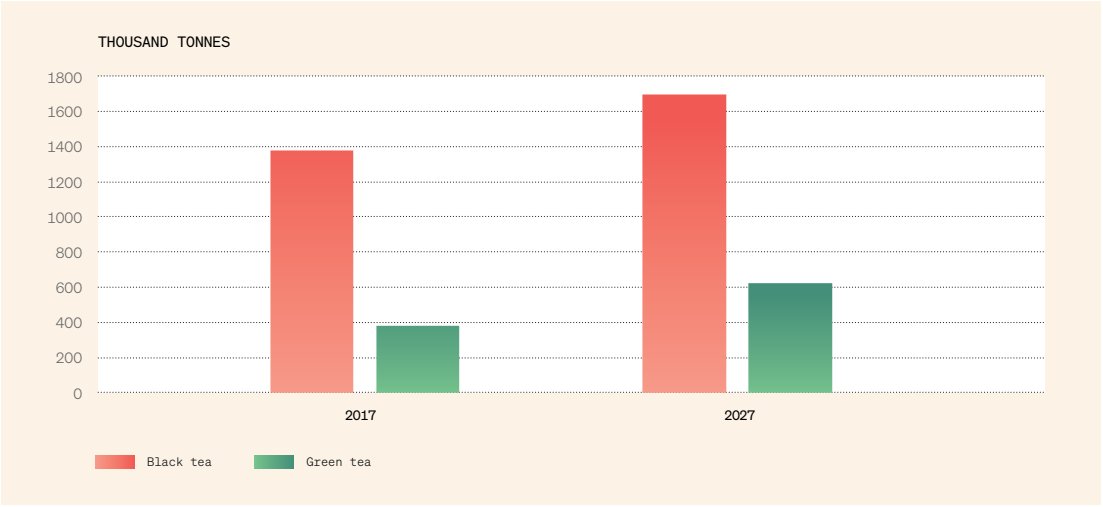

Figure 2.5
Actual and projected Exports: Black Tea and Green Tea

SOURCE: FAO. 2018. *Current Market Situation and Medium-Term Outlook for Tea to 2027.* Twenty-third Session of the Intergovernmental Group (IGG) on Tea, Hangzhou, China, 17–20 May 2018 [Cited 12 May 2021] www.fao.org/3/BU642en/bu642en.pdf.

2.3.4 Prices

In terms of price developments, the average FAO Composite Price remained firm over the last decade until 2014 when there was a 5.3 percent decline, mainly due to the weakening of CTC tea prices. Prices went up in 2015, reflecting the recovery in CTC prices offsetting the decline in Orthodox teas as imports from the Russian Federation, however prices in the Near East fell due to weakened economic growth rates associated with lower world oil prices.

In the medium term, projections suggest that supply and demand of black tea will be in equilibrium in 2027 at a price of USD 3.0 per kg. Prices over the last decade increased from an annual average of USD 2.39 per kg in 2008 to USD 3.15 per kg in 2017, with monthly peaks of USD 3.18 per kg, USD 3.00 per kg and USD 3.26 per kg, reached in September 2009, December 2012 and May 2017, respectively. The projections indicate a decline in nominal terms of 1.4 percent, while in real terms, prices would actually decline by an annual average of 3.6 percent over the next decade (Figure 2.6).

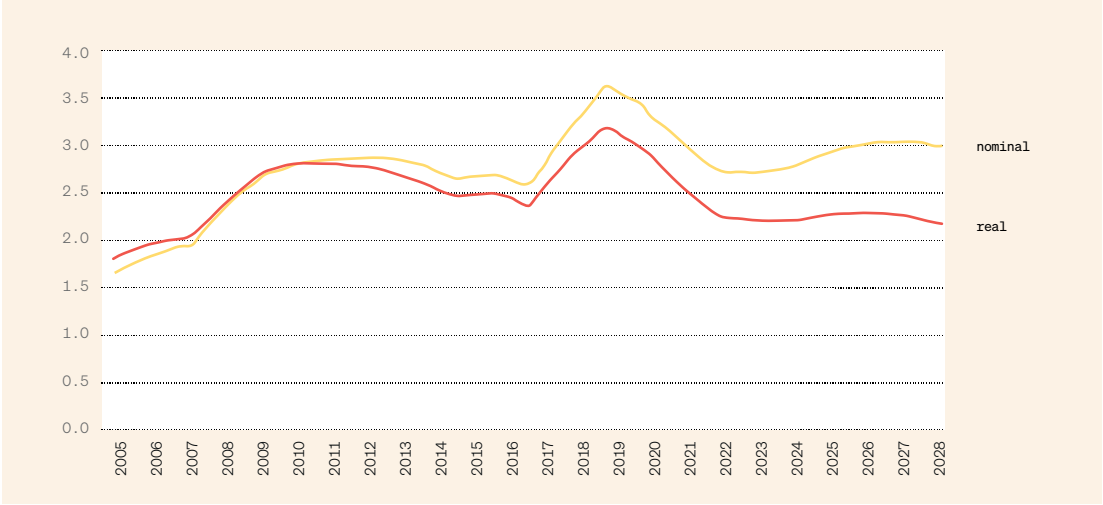

Figure 2.6
FAO Tea Prices (USD/Kg) baseline projections to 2027

SOURCE: FAO. 2018. *Current Market Situation and Medium-Term Outlook for Tea to 2027.* Twenty-third Session of the Intergovernmental Group (IGG) on Tea, Hangzhou, China, 17–20 May 2018 [Cited 12 May 2021] www.fao.org/3/BU642en/bu642en.pdf.

Price developments in 2017 indicate the delicate balance between supply and demand, and the need to maintain this to achieve sustainability. For example, assuming that output increases a further 5 percent, the impact on prices would be quite dramatic: nearly a 40 percent decline over the next ten years reaching USD 1.96 per kg in 2027 (Figure 2.7).

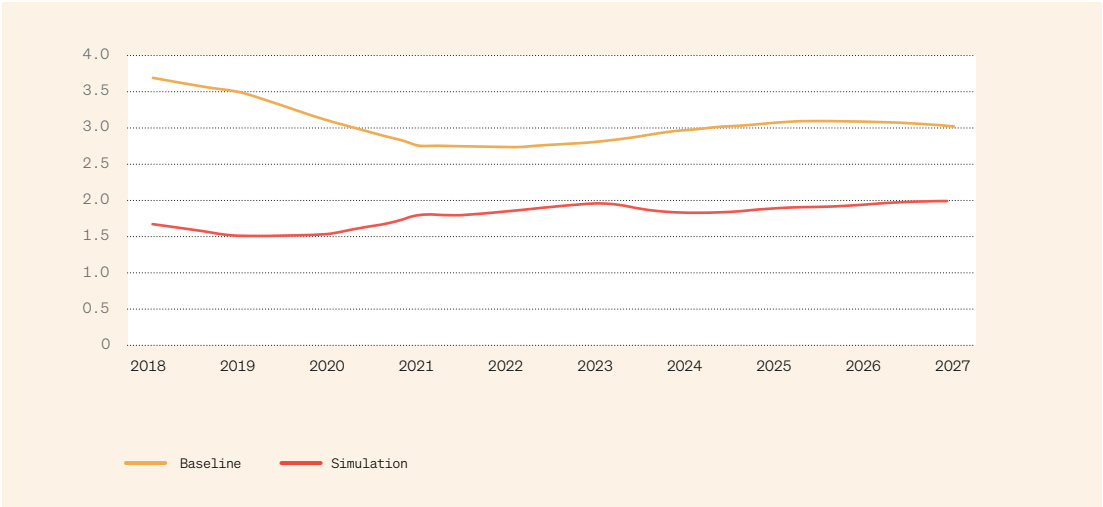

Figure 2.7
Effect on prices of a 5 percent production increase over the baseline

SOURCE: FAO. 2018. *Current Market Situation and Medium-Term Outlook for Tea to 2027.* Twenty-third Session of the Intergovernmental Group (IGG) on Tea, Hangzhou, China, 17–20 May 2018 [Cited 12 May 2021] www.fao.org/3/BU642en/bu642en.pdf.

On the contrary, if reactions to the rising per capita income in major emerging and developing countries, and the growing awareness of tea health benefits were to stimulate consumption, for instance by 5 percent more than the baseline, then prices could on average be 8 percent higher for the decade, reaching USD 3.20 per kg in 2027 (Figure 2.8).

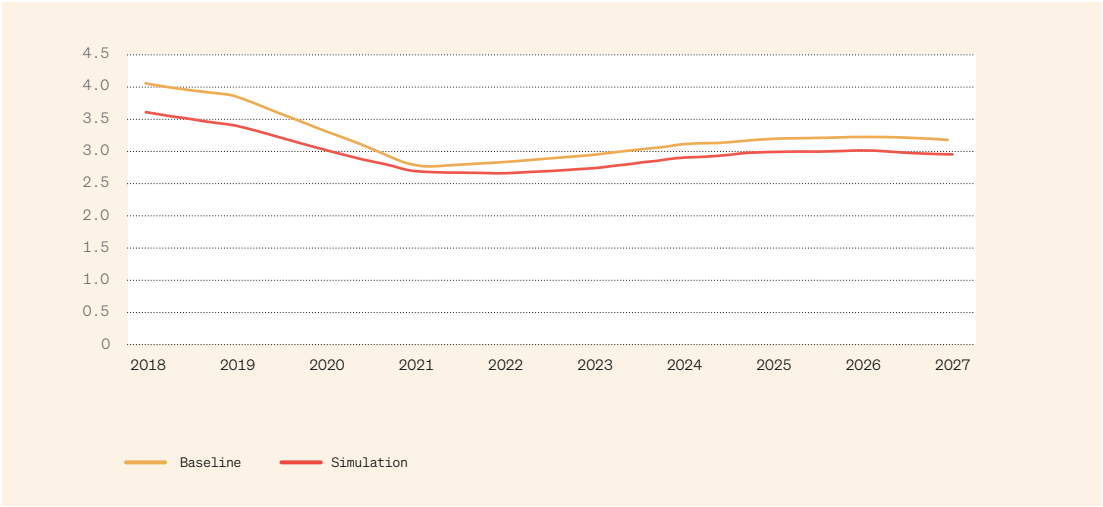

Figure 2.8
Effect on prices of a 5 percent consumption increase from the baseline

SOURCE: FAO. 2018. *Current Market Situation and Medium-Term Outlook for Tea to 2027.* Twenty-third Session of the Intergovernmental Group (IGG) on Tea, Hangzhou, China, 17–20 May 2018 [Cited 12 May 2021] www.fao.org/3/BU642en/bu642en.pdf.

In light of this, the IGG on tea strongly cautions stakeholders in the world tea economy to avoid overreacting to periodic price hikes, and to direct their efforts at expanding demand. For example, the IGG on Tea suggests there is scope for increasing per capita consumption in producing countries, as they are relatively low compared to traditional import markets. It is considered imperative to understand and address the declining consumption ongoing in the traditional market in Europe. Diversification into other segments of the market, such as organic and specialty teas, should be encouraged accordingly and the health and wellness benefits of tea consumption be used more extensively to promote consumption in both producing and importing countries. However, to target potential growth markets, recognition of and compliance with food safety and quality standards are deemed essential, in order to address the gap between the growing volume of exports and the declining exports earnings for some countries.

2.4 THE POTENTIAL EFFECTS OF CLIMATE CHANGE

Climate change is already having a significant impact on certain tea-producing origins. The monsoons in India are lasting longer and humidity levels in the main growing region of Assam are higher, thus leading to an increase in pests and diseases and therefore an increase in the use of agrochemicals.

In Kenya, desertification is the main issue with the Nandi hills and Sotik highlands and as a result, they are becoming fragile tea climates, whereas Kericho's rainfall patterns are more erratic and landslides more common. The Ethical Tea Partnership, in conjunction with GIZ (Deutsche Gesellschaft fur Internationale zusammenarbeit GmbH) and IDH (The Sustainable Trade Initiative) are focusing on this particular issue.[14]

In Sri Lanka the quality of the seasons is now less defined — the traditional Uva (Eastern) and Dimbulla (Western) quality periods, created by the monsoon winds are erratic at best, due to the increased rainfall and cloud cover that come with these events. Consequently, there has been less seasonal year-to-year price variability for the last five years. Furthermore, it is becoming more challenging to achieve quality tea manufacture at scale, and increasingly difficult to produce within the import legislative parameters (including MRLs and PA specific to Europe) in major tea producing countries across the world.

While such developments might create opportunities for tea exports from Georgia, especially as the country is currently able to produce tea, without the application of pesticides it must be borne in mind that in most cases climate change also presents risks to the Caucasus region, in terms of the arrival of new pests that might require pesticide use. These issues are explored in more detail in the section on Environmental Sustainability.

14 A study was produced to forecast impacts on production areas and set about positive programming to combat the effects. Please see: www ethical teapartnership.org/supporting-farmers-to-overcome-the-impacts-of-climate-change/

Chapter 3
Production

3.1 KEY PRODUCTION INDICATORS

In 2016, in an effort to revive Georgia's once thriving tea sector the government introduced a Tea Rehabilitation Program subsidizing de-weeding, pruning, fencing and other costs[15] with the aim to rehabilitate up to 7000 ha of abandoned tea plantations over the coming years. Partly as a result of the programme, since 2016 the area under tea has expanded from 803 ha in 2014 to 827 ha in 2018 (Figure 3.1).

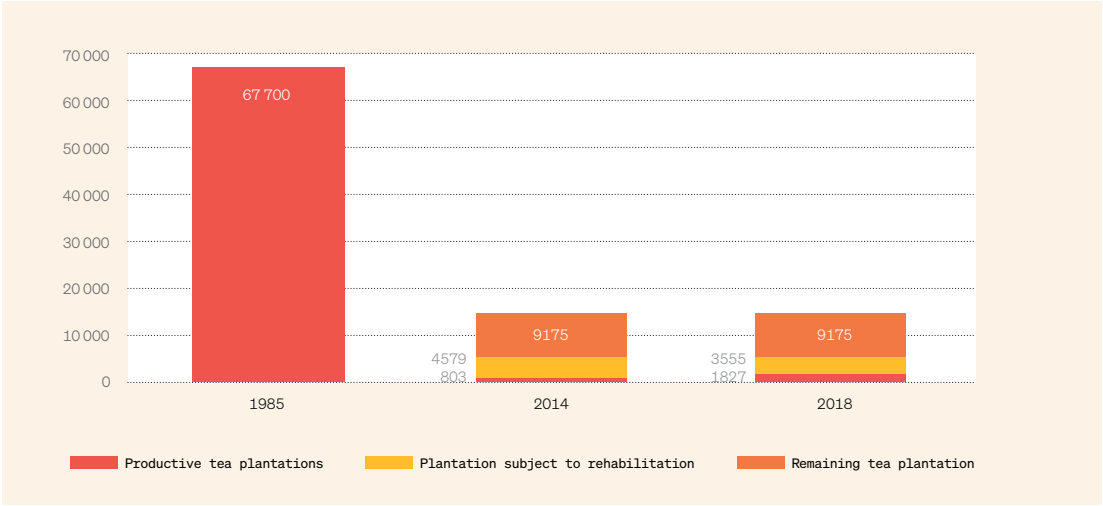

Figure 3.1
Evolution of the tea plantation area (ha)

SOURCE: Team estimations based on Geostat. 2018. [online]. www.geostat.ge/en.

15 A subsidy of GEL 2500 per hectare. Please see http://arda.gov.ge/projects/read/project_scope/12:parent.

While the area of rehabilitated and productive tea plantations has increased over the past three years, this increase has not yet been translated in terms of production of green leaves. In fact, as can be seen from Figure 3.2, total green leaf output has actually decreased slightly since 2016. This could be explained by the fact that the rehabilitation of abandoned plantations requires a deep and very heavy pruning, after which up to seven years are necessary for the plantation to come back to its full production. In addition, the programme has had a relatively slow start due to the fact that the rehabilitation subsidy is conditioned by an investment in a processing capacity (Prikhodko, D. *et al.*) beyond the financial capabilities of most smallholders. We examine this issue in Section 8 that addresses policy.

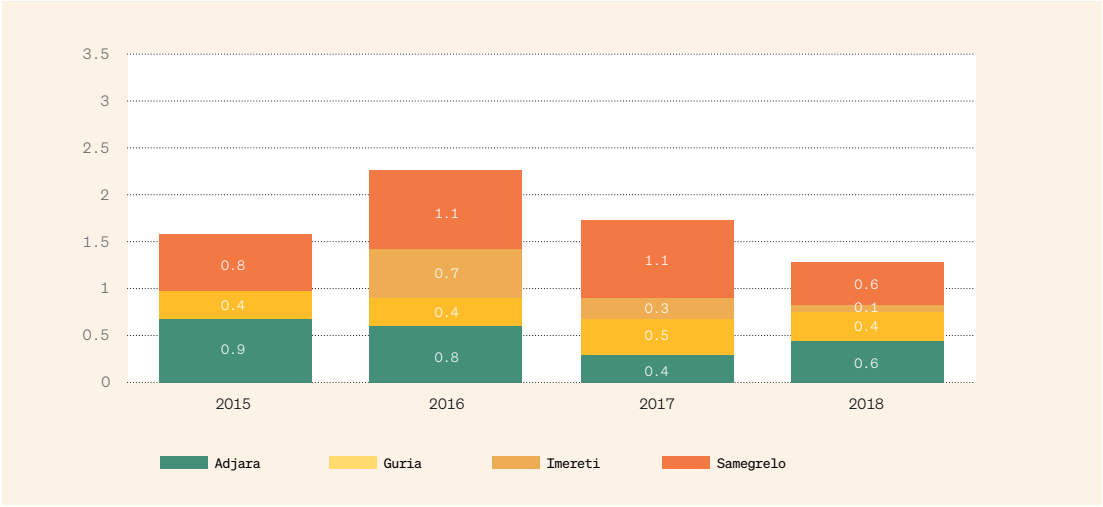

Figure 3.2
Production of tea leaves per region (1000 tonnes)

SOURCE: Geostat. 2018. [online]. www.geostat.ge/en.

The Georgian tea leaf production has shown a decreasing trend during last three decades. Figure 3.3 provides information about tea leaf production since 1992. The main tea producing regions in Georgia are Samegrelo, Adjara AR, Guria and Imereti.

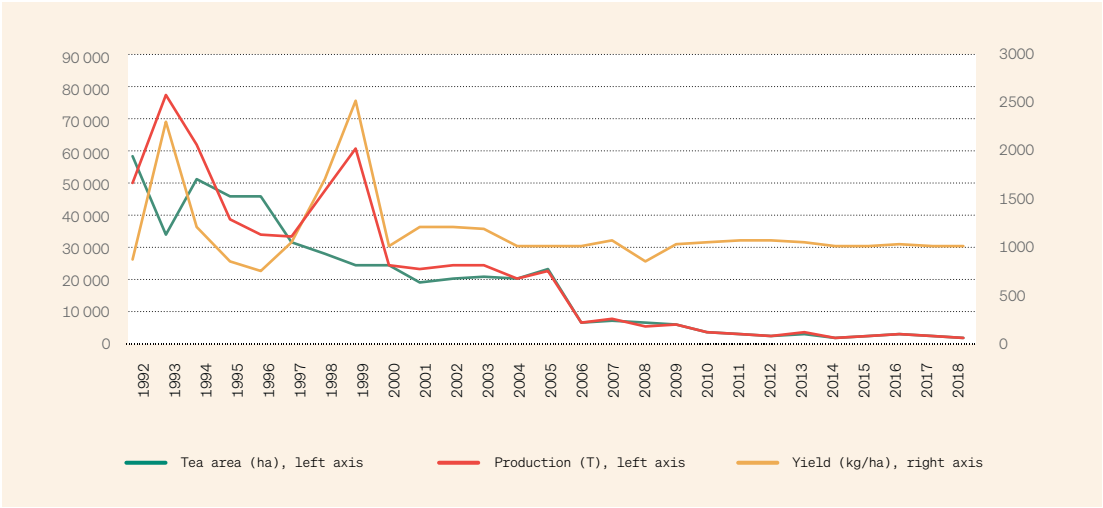

Figure 3.3
Georgia – Key tea production indicators

SOURCE: FAOSTAT. 2020. [online]. Production Indices. www.fao.org faostat/en/#data/QI.

As the rehabilitation programme is ongoing and over 55 percent of the current tea area is not yet fully productive, an estimate of current average yields is not a meaningful indicator of competitiveness.

Nevertheless, the yield estimates for 2015, before the rehabilitation programme started, were an average of around 2.5 tonnes/ha based on a total green tea leaf output of 2100 tonnes from a productive area of about 800 ha. This is slightly higher than the global average of 2 tonnes/ha and in line with yields achieved during Soviet times.

It should be noted, however, that in contrast to many other crops, the performance of the primary production of tea can hardly be assessed based solely on yields. In fact, plucking more leaves in one harvesting round will increase yield but can have a significant negative impact on quality. While harvesting decisions are inherently local and need to be made on a case-by-case basis, they always require a careful cost-benefit analysis of quality versus quantity in view of the local context (agro-climatic conditions, production costs and especially labour costs, prices, target markets). We examine such production issues in more detail in the sections on tea quality and tea financial profitability.

3.2 TYPOLOGY OF FARMS

Land privatization to rural families that was conducted in the early 1990s led to a predominance of relatively small farm holdings. Thus, a typical family farm has around 1.25 ha divided into three plots of around 0.4 ha in different locations (IFAD, 2015). Land fragmentation is high, as 92 percent of the tea producers own less than 0.5 ha (FAO, 2021).

The tea sector is divided into two major production systems: (i) the family holdings; and (ii) the agricultural enterprises with their own plantations and factories. Since independence, the smallholder sector has gained importance, accounting for 72 percent of the national tea production and 65 percent of the area harvested. Figure 3.4 shows the distribution of family holdings versus agricultural enterprises in tea and permanent fruit crops production. Clearly, the share of agricultural enterprises in production is much higher for tea than for other permanent crops (mainly fruit).

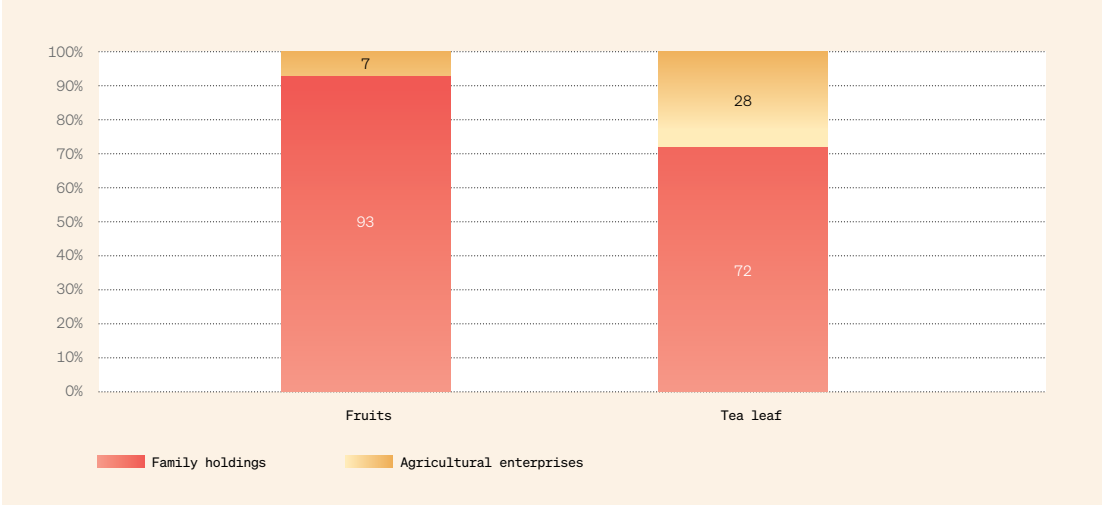

Figure 3.4
Share of family holdings in total production (percent)

SOURCE: GeoStat. 2018. [online]. www.geostat.ge/en.

According to 2014 national statistics, there were over 6600 holdings with tea plantations, of which only 173 were productive plantations (Table 3.1). The average size of tea plantations (productive and abandoned alike) was 0.7 ha but 4.6 ha if only productive ones are considered.

Some 92 percent of agricultural holdings where tea was cultivated had plantations of under half a hectare and 7 percent of the holdings were between 0.50–0.99 ha. Within the remaining 1 percent of holdings, we have found 33 plantations with a size of more than 10 ha and five plantations with a size of more than 100 ha.

Table 3.1
Distribution of tea holdings by region, 2014

	Holdings with tea plantations (units)		Tea plantations (ha)	
	Total holdings (No)	Productive (No)	Total plantations (ha)	Productive plantations (ha)
Georgia	6621	173	4579	803
Adjara AR	231	34	503	450
Guria	6130	09	2387	76
Imereti	180	13	342	23
Samegrelo	80	17	1347	254

SOURCE: Geostat, Agriculture Census 2014.

According to estimates of MEPA made in 2018, there are about 9175 ha of land still considered to be under the category of tea plantations, although most of these plantations are now abandoned and overgrown. The majority of these plantations are located in Samegrelo and Imereti, but some are also found in the Guria and Adjara regions (Table 3.2).

Table 3.2
Areas considered under the Tea Rehabilitation Program in Georgia

Regions	Municipalities	Area considered under tea plantation (ha)
Samegrelo	Zugdidi	237
	Senaki	581
	Tsalenjikha	748
	Khobi	346
	Chkhorotsku	525
	Martvili	963
	Total	**3400**
Imereti	Vani	45
	Terjola	36
	Samtredia	105
	Tkibuli	980
	Tskaltubo	720
	Chiatura	191
	Khoni	1056
	Total	**3133**
Guria	Ozurgeti	1309
	Lanchkhuti	535
	Chokhatauri	122
	Total	**1966**
Adjara	Kobuleti	650
	Khelvachauri	26
	Total	**676**
Grand total		**9175**

SOURCE: MEPA, based on operative data retrieved in 2018.

Between 2016 and 2018, 49 plantations were rehabilitated with an average size of 21 ha, bringing the total number of productive plantations to 222 and increasing the average productive plantation size considerably, to 8.2 ha. This demonstrates that the tea rehabilitation programme has mainly benefitted large farms which are mostly agricultural holdings. This could be attributed to the conditions required for rehabilitation (further described in the section on policy), which make it more difficult for smaller farmers to benefit from state support.

The regional distribution of plantations considered for rehabilitation and actually rehabilitated plantations until 2018 is described in Table 3.3.

Table 3.3.
Tea plantations considered for rehabilitation and actually rehabilitated plantations, 2016-2018

Region	Considered for rehabilitation (ha)	Rehabilitated 2016-2018 (ha)	Number of plantations rehabilitated (2016-2018)
Samegrelo	2553	493	15
Guria	2202	203	13
Imereti	978	327	21
Adjara	238	0	0
Total	5971	1023	49

SOURCE: MEPA. 2018. Georgian Tea Plantation Rehabilitation Program. https://mepa.gov.ge/En/Projects/Details/18

3.3 AGROCLIMATIC CONDITIONS

Tea in Georgia is grown in the coastal areas of western Georgia with a humid subtropical climate. This includes the following administrative units: Adjara, Guria, Imereti and Samegrelo-Zemo Svaneti. A brief analysis of the three key characteristics influencing the suitability of a given area for tea cultivation is provided in the following section.

Temperature. Average temperatures in Western Georgia vary between 22 °C in July and 5 °C in January. Owing to warm summers and chilly winters with occasional snow, this area benefits from favourable conditions to produce high quality organic teas. In fact, Georgia is one of the northernmost tea producing regions in the world and the cool weather conditions at night and during the winter months serve as a natural protection against pests and diseases, greatly reducing the need for pesticides. As a result, most of the tea production in Georgia is currently chemical-free, which gives the opportunity for certified organic production.

However, low temperatures between September and May also present a disadvantage. As evening temperatures decrease, this induces dormancy in the tea plant and restricts plant growth for seven months of the year. In terms of its competitiveness, Georgia is at a disadvantage because its tea season runs from May to September, while major global producers such as India, Sri Lanka and Kenya can produce tea year-round.

Water availability. The average precipitation in Georgia's tea-producing region is estimated at between 1100 and 1700 mm/year[16] and in spite of some seasonal variation, it is also quite abundant in the summer months. This allows for rainfed tea cultivation, in contrast to Azerbaijan where irrigation is required as precipitation is lower and the seasonal variability is higher (much drier summers). This situation is illustrated in Figures 3.5 and 3.6.

Soil. Tea yield reaches its full potential at a soil acidity between pH 4.5 and 5.5.[17] Over pH 5.5 and below pH 4.5 its yield declines and below 3.0 and above 7.0 tea dies. As a rule of thumb and all things being equal, a yield with a soil pH of 5.0 will be 30 percent higher than the yield from similar soil with a pH of 6.0 (Melican, 2016); likewise, with a similar soil at pH 4.0. This means that with the same input costs soil acidity will have a direct influence on yields, and therefore on farmers' profit. Estimates show that soil acidity in the tea growing areas of Georgia is generally within the required limits.

Overall, experts are of the opinion that the combination of cool climate and acidic soils provides Georgia with a unique terroir, particularly fit for green tea production — given these conditions, tea leaves mature more slowly, reducing bitterness and an aftertaste.

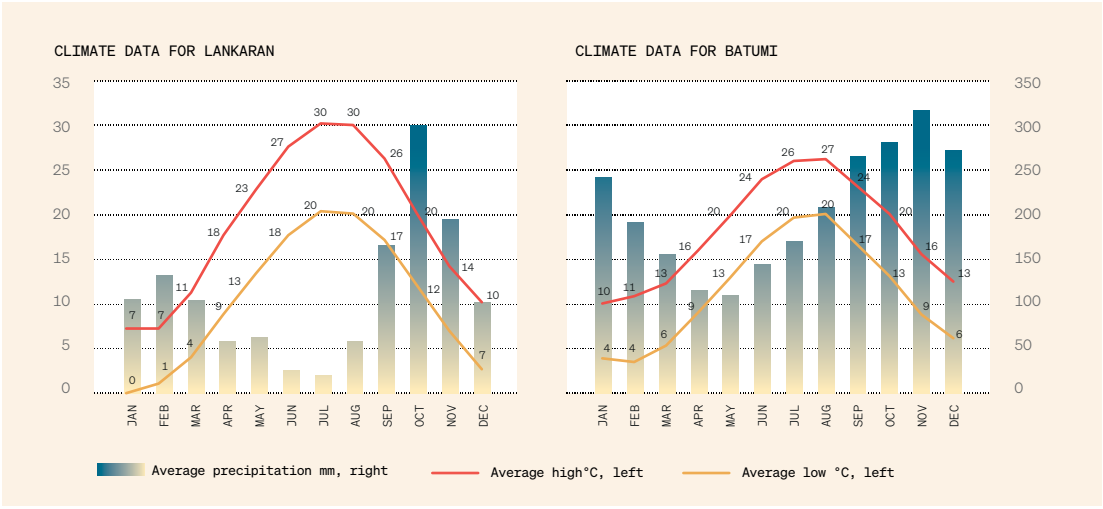

Figure 3.5 and 3.6
Climate data for Lankaran, Azerbaijan and Batumi, Georgia

SOURCE: WMO. 2020. [online]. https://climatedata-catalogue.wmo.int/homepage

16 FAO AQUASTAT Georgia, survey 2014.
17 Tea Cultivation – Tea Research Association. *Tocklai*

3.4 PRODUCTION PRACTICES

This section summarizes key observations on tea production and processing practices from field visits realized on 1 and 2 October 2019 in the west Georgian regions of Guria, Samegrelo and Imereti, during which four producers of varying distinction were visited. In the majority of cases, the tea value chain is vertically integrated with the same company in charge of tea leaf production, processing and marketing.

There are two main methods of processing tea. The first and only method used in Georgia is the standard, or Orthodox method; the second is the CTC method. Given that only the first method is employed in Georgia, our discussion throughout the report is focused on the Orthodox method of tea processing.

From the leaves of *Camellia sinensis*, only black and green teas are produced in Georgia. The white and oolong tea production with limited quantities has been started recently. The price of these products is high, but local demand is low.

With the exception of one producer, the lack of attention to green leaf control (plucking standard, time from field to factory, control of withering) made the quality of the tea relatively plain with a sour character when consumed "Western style" (2–3 grams per cup, fresh boiled water, steeped 3–5 minutes).

All manufacturers had the adequate tea processing knowledge but, as is the case in Azerbaijan, it was not applied sufficiently enough to optimize the output of made tea. In addition, there are a number of existing factors that have a negative impact on reaching full productivity and quality potential. Our findings on the key production and processing aspects are summarized in the following sub-sections.

Field visits made it clear that most of the focus for success in Georgia should be on the tea plantations rather than on the factories, due in large part to the impact of green leaf on the made tea cost of good sold (COGS). The team did not see many examples of rehabilitated fields, making it difficult to formulate a definitive concept of the success of such a programme. However, observations illustrated several difficulties as regards rehabilitation and ongoing maintenance within a sustainable model. Table 3.4 summarizes the pros and cons of tea rehabilitation in Georgia.

Table 3.4
The pros and cons of tea rehabilitation

Pros	Cons
Plant stock exists	Unknown stock mix/qualities
Rehabilitation can happen in a staggered fashion, in line with success in sales	Low planting density and structure of bush will continue to be poor yielding
Can be in production within four years, quicker than new planting	This structure invites continued weed growth requiring manual intervention
Cheaper than replanting	Limited ability to infill

SOURCE: Field visits.

3.4.1 Primary production

Tea bush and field care. The lack of care and attention to the management of green leaf from field to factory is problematic, particularly in such a well-versed community of tea producers. It is this singular lack of focus that limits the quality potential within the system. There was no visible control of withering and furthermore, handling to the factory was harsh in some cases (in trucks, no air circulation, potential for bruising and the time factor).

One of the issues is that plantation areas are not dovetailed to made tea factory capacities, consequently, there is no regular tempo to manufacturing volumes, leading to:

- excessive and variable times between harvest and the start of factory processing;
- poor management of leaf condition during this period.

In addition, most of the tea plantations in Georgia are not fenced in and therefore tea bushes often run the risk of being destroyed by livestock.

Yields. Green leaves yields (as observed during the field visit in June 2019) are rather low, which could be explained by different factors such as the quality of planting material used, suitability of soil (pH), pruning techniques, harvesting method and lack of fertilization. Current green tea leaves yields fluctuate between 2 tonnes and 4 tonnes per hectare. As estimated by the mission's agronomist expert, with the adoption of some improved agronomic practices these yields could increase by up to 5 tonnes per hectare. At full development, by using good agronomic practices the yields of mature bushes would reach around 5 tonnes/ha for a rehabilitated plantation and around 6 tonnes/ha for a new plantation. Yields for organic plantations rehabilitated are expected at 3.5 tonnes/ha.

Pesticide use. As illness or pests do not threaten tea bushes in Georgia (which on the contrary is a challenge in most tea producing countries), farmers do not need to apply many chemicals on the plantations. Furthermore, Georgian tea has the advantage of producing specialty teas[18] and therefore focusing on niche markets worldwide. Several small tea factories have been following this path already, focusing on high-grade tea and targeting high-end market segments inside as well as outside Georgia. In addition, most of these companies obtain an organic certification from the first and only local organic certification company Caucasert, which is accredited and recognized by EU member states and Switzerland. As of October 2019, there were two tea companies already certified as organic, and six tea companies in the conversion stage.[19] Obtaining the certificate requires about three years and costs approximately GEL 4000–5000 (USD 1400–1750). Moreover, the National Intellectual Property Center of Georgia (Sakpatenti) has registered one tea as Geographical Indication (GI) – Tkibuli Mountain Tea.[20]

Green leaf intake. Field visits showed that green leaf intake is not well controlled by any of the manufacturers visited. The major issues with this are:

- Quality of leaf: The leaf witnessed in withering troughs/beds was reasonably good but not consistent, making tea production exceptionally challenging.

18 Specialty tea often refers to whole leaf Orthodox tea, organic and single origin (single origin means that you cannot blend tea with other origins to achieve the desired taste).
19 http://caucascert.ge/files/RegisterEng121019.pdf
20 For further information see: Sakpatenti, National Intellectual Property Center of Georgia (IPCG).www.sakpatenti.gov.ge/en/state_registry/#.

- Time to factory: This was variable but leaf collection is very inefficient and time to factory was taking up to 24 hours (GBTC).

Furthermore, another issue is that the balance of power lies in the hands of the processors and not the farmers, therefore, harvesting is dictated primarily by when the factories are open and not when it is the appropriate time to harvest. This is the main limiting factor for made tea quality manufacture in Georgia.

The currently applied solution to this problem is to equip factories with various capacity rollers and to determine the volumes of green leaf intake based on their capacity. Although an improvement (it allows for the intake of smaller quantities of leaf by factories), this is not ideal as it still forces some farmers to sell their leaf when the factory needs the leaf for processing rather than when it is at its best quality.

Green Leaf prices vary tremendously, depending on quality and ownership. The majority of leaf was priced according to quality and can be averaged as follows:[21]

GEL 0.6/Kg	4–6 leaves
GEL 2.5/Kg	2–3 leaves

Collection and transportation of leaf. Given that most households owning tea plantations have less than 1 hectare of land for cultivation, there is little financial reason for them to process their harvested tea leaves. This role is taken on by factories (be they small, medium or large) that collect green tea leaves from tea growers for processing. The collection takes place via truck, and in some cases old Soviet-era vehicles are used. At times, tea leaves are kept for much longer than recommended (as long as 24 hours in some cases) before delivering to the factory, which causes significant deterioration in the quality of the final product.

3.4.2 Processing

There are about 30–35 tea processing factories of which seven are large in size, and the rest are small- and medium-sized enterprises, including 15 cooperatives. The seven large-scale factories in Georgia (Table 3.5) that harvest tea leaves from their own plantations and also purchase leaves from farmers, process them and make different types of tea. Based on the rough estimates from 2019, these factories processed about 1700 tonnes of lea leaves (425 tonnes of made tea).

Tea style. Most of these companies are focused on the production of low-grade tea (6 leaves and bud [L&B]), which accounts for the majority of their total production (80–90 percent). In addition, almost all large farms/factories harvest tea bushes for the production of tea bricks (Agura or Lao tea as known in Georgia), and it was estimated that about 1500 tonnes of leaves would be harvested in 2019 (500 tonnes of Agura tea). Only the Kobuleti Tea Company focuses on the production of tea bricks as a major product, while other large companies harvest tea to produce tea bricks as the last harvest of the year in October-November. In addition, pruning is considered to be part of the harvest,

21 Prices based on discussions with Martvili and subsequently confirmed by Lazitea.

and includes not only the leaves but also the branches of the tea bushes. This low-quality tea is sold to export markets (e.g. Mongolia, Kazakhstan). The remaining production is high- and medium-grade tea (2–3 L&B) for the high-end domestic and foreign markets.

There are other companies specializing in high-quality tea production. However, most of the tea factories in Georgia produce different quality teas to diversify their portfolio and serve low-end as well as high-end markets inside or outside of Georgia.

Table 3.5
Large scale tea processing factories in Georgia

Name	Location	Volume of tea leaf processed in 2019 (Tonnes)	Tea leaf for making Agura/ Lao Tea (Tonnes)
Ltd Tkibuli Chai	Tkibuli	210	70
Ltd Lazi	Tsalendjikha	450	100
Ltd GGG	Didi Chkhoni, Martvili	290	90
Ltd Geoplant	Ozurgeti	420	–
Kobuleti Tea Company	Kvirike, Kobuleti	174	1200
Ltd Anaseuli Experimental Tea Factory	Anaseuli, Ozurgeti	35	–
Ltd Jvari 91	Sachino, Tsalendjikha	150	50
Total		**1729**	**1510**

SOURCE: Field visits.

Processing methods and equipment. Most of the tea factories lack the raw material and tea leaf to process and are working well below their operational capacities. Withering, one of the first and foremost important steps in tea processing is not properly done in factories, which causes deterioration in the tea quality. Tea leaf is typically processed using old Soviet-era machines, which can only be slightly renovated locally. These machines were developed with a focus on maintaining a high volume of production and not on maintaining or improving the quality of processed tea leaves. Modern standards require much higher-quality machinery and renovated buildings for processing, packaging and storage to comply with standards, such as ISO and HACCP. However, some companies managed to purchase new processing equipment from China, Japan or Turkey. In addition, few companies renovated factory buildings and have or are going to take a certificate (ISO, HACCP). All of the factories visited by the FAO team had acquired, through various routes, new machinery from China or Taiwan Province of China.

3.4.3 Packaging, branding and marketing

Packaging and branding. In terms of packaging, there are four categories of tea produced in Georgia: (i) loose tea in bulk; (ii) loose tea in small boxes (packaged); (iii) tea bricks (Agura tea); and (iv) tea bags. Tea packaging is done by hand or by machines. Until recently, only one local tea production and processing company actively pursued branding and had a relatively well-defined marketing strategy. Currently, there are a few more companies (small-, medium- and large-scale) that have been developing packaging and branding.

However, they have limited access to advertising and therefore consumers are not fully informed about their brands.

Marketing. Georgian tea is sold both locally and internationally. Considering that the average 2016–2018 annual production of made tea from locally produced tea leaf was about 600 tonnes, and that the volume of exported tea was about 2000 tonnes during the same period, it is clear that a substantial part of imported tea to Georgia (nearly 2500 tonnes) was processed and packaged in Georgia and re-exported from Georgia to over ten countries. Georgia mainly exports a low-price tea (loose tea in bulk and tea bricks: more information on this is provided in Section 7 on Trade). The domestic market, which consumes about 1100 tonnes of tea annually, is dominated by imported tea and is highly competitive with many well-known international tea brands on the market: Maryam (Azerbaijan), Azertea (Azerbaijan), Greenfield (United Kingdom), Lipton (United States of America), Ahmad (United Kingdom), Hyleys, and Twinings. Georgian brands are also represented; however, their overall share is modest compared to imported tea brands. Domestic brands available on the shelves of the main retailers include: Gurieli, Anaseuli, Shemokmedi, Petra, Lazi, Tkibuli tea, and Manna.

It has been highlighted many times during discussions with stakeholders and ministry representatives that due to the exposure to international competition on the domestic market, it would not be feasible for Georgian tea to compete, the main reason being that imported tea from Sri Lanka or India is less expensive and of higher sensory quality.[22] However, the head of the Association of Tea Producers in Georgia claims that artificial colouring, and in some cases fungus, have been detected in samples taken from imported low-priced tea, subjected to a laboratory analysis in Tbilisi. The state of Georgia, currently has no basis on which to compel importers to include detailed product information in the labelling. There is no laboratory analysis made of the imported tea by the National Food Agency (NFA) and only a certificate of origin and documentary compliance is checked at the border in Georgia. Samples are not taken for laboratory analysis either, since tea in general is considered to be a low-risk product. If true, such practices would expose Georgian tea producers to uneven competition on the Georgian market.

In addition, the FAO team was informed that tea produced and packaged in Georgia by some domestic producers is usually a mix between domestic and imported tea (mostly from Iran), despite the fact that such information is not included in the labelling. The mixing of tea of various origins and packaging it as a Georgian product is a well-known practice within the industry, even in cases where the share of Georgian-produced tea is under 10 percent of the final product. The effect of such practices on the evolution of consumer preferences both domestically and in key export markets may be significant, as consumers are led to believe that the characteristics of the tea they have become accustomed to are those of Georgian tea, while in fact they are drinking mostly imported tea. The introduction of rules of origin or geographic indications and their enforcement, coupled with parallel efforts to educate consumers about the unique characteristics of tea grown in Georgia, are a potential basis for the creation of more discerning tea markets not only domestically, but also in key export destinations.

22 Tea in Georgia is imported from many countries, mostly Turkey, Azerbaijan, Sri Lanka, Russian Federation, Iran and UAE. However, a large share of imports from Turkey, Iran and Azerbaijan are in fact re-exports of Indian and Sri Lankan tea.

©Unsplah/Colin Roe

Chapter 4
Tea profitability and competitiveness

Crop financial profitability per unit of land is a key factor influencing land use decisions by farmers. A number of crop models (including a tea processing model) were prepared to illustrate the impact of different investments and the financial viability of tea production and processing. These models are based on detailed annual expenses, including inputs, land preparation and labour and estimate average yields in different production conditions. Additional models were prepared to illustrate investment in the production of alternative crops, with blueberries and hazelnuts — two crops suited to the coastal areas of Georgia — chosen as examples. Activity models of tea processing enterprises were prepared to illustrate the linkages along the commodity chain, and to show the impact and financial viability of a potential investment in tea processing. The following models were prepared:

Model 1A	rehabilitated existing tea plantation without any changes in agronomical practices (business-as-usual [BAU] scenario) and with investment in land
Model 1B	rehabilitated existing tea plantation without any changes in agronomical practices (BAU scenario) without investment in land
Model 2A	rehabilitated existing tea plantation accompanied by an adoption of improved agronomical practices and with investment in land
Model 2B	rehabilitated existing tea plantation accompanied by an adoption of improved agronomical practices without investment in land
Model 3	rehabilitated existing organic tea plantation accompanied by an adoption of improved agronomical practices (without investment in land)
Model 4	new tea plantation accompanied by an adoption of improved agronomical practices (without investment in land)
Model 5	rehabilitated plantation producing green tea using mechanization (with investment in land)
Model 6	processing (black tea)
Model 7	new blueberry plantation
Model 8	new hazelnut plantation
Model 9	economic calculation of Model 1, using parity prices and economic values

4.1 ASSUMPTIONS

The following assumptions were used in our models:

Prices. Financial input and output prices (farm-gate prices) for the tea crop and alternative crop models were collected during the field missions conducted in June and October 2019. For non-traded items, the entire production, at least in the areas of project intervention, is destined for local markets hence the market price is a fair measure of the willingness to pay and a good estimate of the opportunity cost. Therefore, financial prices are found to be reliable approximations of their economic value for most of the items used in the analysis. In the case of traded goods such as tea, parity price at farm gate was calculated. The crop produced being an export crop, it has to be processed before it can be exported. Therefore, the value to the economy is determined by the FOB price and in order to realize the export price, transport costs from the factory to the port, port handling costs, export tax, processing costs and transport from the farm to the factory have been factored in. A 1:4 conversion rate was used to convert tea leaves to made tea. The applied exchange rate is GEL 1 = USD 0.34 (applicable during field visits in 2019).

The financial price for labour is around GEL 20 (USD 7) per day. The high labour intensity of tea production (due to the manual harvesting of green leaves) coupled with seasonal migration of labour to urban areas or to Turkey, create situations where labour is in scarce supply and as a result, its opportunity cost is equal or greater than its market price.

Yields. The volume of green leaves collected ("plucked") is closely linked to the age of the plantation, plantation density, climate and humidity and the number of leaves collected. Usually, plucking operations involve the selection of two young leaves and the central, unopened bud (2 L&B). Lower quality harvest would include up to 5–6 L&B. Nowadays, most Georgian tea farmers use a selective plucking method when the first harvest (usually in May) of 2–3 L&B is done by hand, followed by a mechanized harvest of larger volumes, up to 5-6 L&B. There is firm consensus in the tea community that harvesting 5–6 L&B is seriously compromising tea quality and such practices will not be seen in major tea producing countries (India, Sri Lanka, Kenya). 2–3 L&B quality represents a smaller share of the total harvest, however it fetches a higher farm gate price. 2–3 L&B (assumed at 20 percent of total harvested volume) is sold to a processing unit at GEL 3/kg (USD 1.05/kg) while 5–6 L&B (assumed at 80 percent of harvested volume) is sold at GEL 0.6/kg (USD 0.2/kg). Thus, the average farm gate price, including both quality types with their respective shares and price, was assumed at GEL 0.88.

As previously mentioned, current green tea leaves yields fluctuate between 2 tonnes and 4 tonnes per hectare. At full productivity, by using improved agronomic practices the yields of mature bushes can be expected to reach around 5 tonnes/ha for a rehabilitated and around 6 tonnes/ha for a new plantation. Yields for organic plantations (rehabilitated) are expected to reach around 4 tonnes/ha. Figure 4.1 presents yields at full development for each production model, including models for blueberries and hazelnuts.

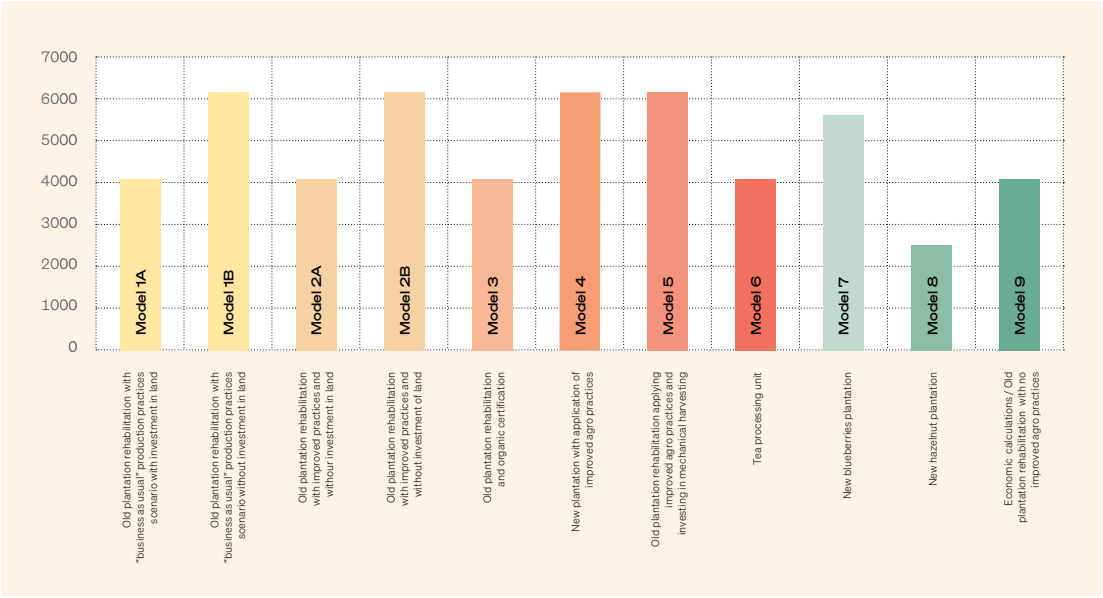

Figure 4.1
Anticipated yield profiles for different production models (tonnes/ha)

SOURCE: Field visits, 2019.

In the case of rehabilitation of an existing tea plantation, in Year 2 after rehabilitation the yield is expected to be about 25 percent of its potential at full development; in each succeeding year the increase in yields is assumed to reach about 10 percent; full development is expected in Year 7 after rehabilitation. For a new plantation, Year 1 is the investment year, first yields start in Year 4, and full maturity is expected in Year 9. Figure 4.2 presents the evolution of yields for each production model.

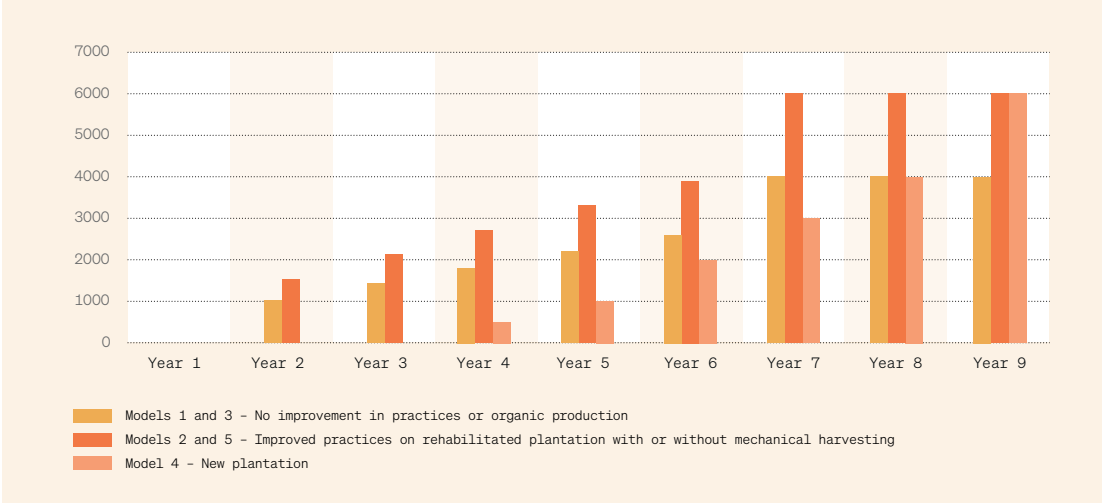

Figure 4.2
Evolution of tea yields per model (kg)

SOURCE: Field visits, 2019.

4.2 INVESTMENT COSTS

The rehabilitation of a tea plantation includes clearing trees and weeds from the agricultural land, deep pruning, fertilization and fencing. Investment costs in our models, including the cost of rehabilitation operations as per the Tea Rehabilitation Program, vary from GEL 7840/ha (USD 2670/ha) for the rehabilitation of an existing plantation on owned land without any improvement of agronomic practices (BAU scenario) to GEL 27 500/ha (USD 9350/ha) for rehabilitation with improved practices, including organic certification (GEL 5000 included in the investment costs) and GEL 38 000 (USD 13 000) for a new plantation without organic certification. The state programme is supporting tea rehabilitation and provides between 60 and 90 percent of GEL 2500 (between USD 525 and USD 788) subsidy per hectare of rehabilitated land (subsidies do not apply to operations related to the establishment of new plantations). The subsidy may represent anywhere between 17 and 28 percent of the actual of rehabilitation costs, and between 6 and 30 percent of the total investment costs.

The **new plantation,** besides investment in land, includes initial land clearing and the tea plants/seedlings which are the largest expenditures of the investment cost. In Georgia, transplants are planted densely so that about 15 000 bushes are planted per hectare. This density helps to rapidly create a "plucking table" that would be easy to harvest and large enough to create shading and prevent weeds. The largest share of the investment cost is represented by the cost of seedlings. The cost was calculated at GEL 0.8/ seedling (USD 0.27). The current practice is to use seedlings from seeds (and not clones from vegetative propagation). Thus, a total investment cost of GEL 38 000/ ha (USD 13 000/ha) has been estimated for the establishment of a new tea plantation.

Investment in mechanical harvesting could be considered for plantations producing leaves destined for green tea. In most tea-producing countries, tea leaves are harvested by hand. Few exceptions are countries (Japan, Argentina) with a very high cost of manual labour. It takes a lot of practice and concentration to maintain precision during selective hand plucking for any length of time – nevertheless, skilled pluckers who persevere for an eight-hour shift can collect up to around 15 kg of shoots. Any lapse in attention would add coarse leaf to the basket and result in a lower price for the resulting tea. Furthermore, any decline in labour efficiency (due to climate or working conditions) would significantly increase total production costs and decrease profit margin. Currently, some sheer harvesters are being used by Georgian farmers for selective plucking. The first flush or spring green leaf is harvested by hand for a high-end tea and the summer and autumn leaf are harvested by machine for lesser value teas. Common options for mechanical harvest are sheer plucking (via machine for one-person or two-persons) or by tractor.

Table 4.1

Plucking capacity per harvesting method

Method	Harvest per day and per person
Hand plucking method	
Hand plucking	10–15kg
Hand sheer plucking	100–200kg
Mechanical plucking method	
Portable machine for two persons	700–1000kg
Riding machine	4000–5000kg
Self-rail-tracking machine	2000–3000kg

SOURCE: World Green Tea Association. 2019. Cultivation of Japanese Tea Manual Mission's estimations. www.o-cha.net/english/cup/pdf/14.pdf.

Given the limited size of smallholder plots in Georgia, during field visits it was agreed that an adequate choice of machine would be a two-man gasoline engine machine. In our models, we envisioned the acquisition of a new Kawasaki [New Century Corp] DL-4CP-100 machine with a cost of USD 800. From the harvesting standpoint, such a two-man machine can manage 1500 kg of leaf per day and one machine should be largely sufficient for a small farm of up to a few hectares.

Processing. Traditionally, black tea has been the flagship product of the Georgian tea industry. However, in terms of volume, green tea (low quality, bricks) holds an important place at production and export levels, mostly as a re-export product, representing up to 55 percent of the value of Georgian tea exports in some years (e.g. 2017; 23 percent in 2019). In the long run, with some investment in the quality of green tea there is great potential for improvement, given the country's climate and soil characteristics and the possibility to use mechanized harvest that will not affect the quality of the final product. Overall, the processing methods used for black and green tea are very similar.

The whole set of production machines would include different machinery for each step of the process for tea output from several kilograms to several tonnes. Tea processing for all tea types (including both black and green) consists of a very similar set of methods with minor variations. The same equipment could therefore be used for both black and green tea making, with an additional steaming machine required for green tea to stop fermentation (where the oxidation process actually gives us the black tea). Investment costs could vary according to the capacity of processing, country of origin of the equipment, as well as to some technical decisions such as open-air withering (no additional costs) or withering with a machine (suitable for processing the volumes larger than 10 tonnes of green leaf). Based on field visits, our estimate of the cost of a whole set of processing equipment (produced in China) is around GEL 670 000 (USD 228 000) with a processing capacity of about 13 tonnes of made tea per season (from about 60 tonnes of green leaf), which would be adequate considering the limited size of plots in Georgia.

4.3 DESCRIPTION OF TEA PRODUCTION MODELS

Model 1A
Model 1B

Rehabilitated existing tea plantation without any changes in agronomical practices (BAU scenario).

According to these models, selective plucking is done once a month. Every month, the first harvest is done by hand to collect 2–3 L&B. This is followed by a massive mechanical harvest of up to 4–6 L&B, after which several weeks are required for the plant to recover and grow new leaves. Consequently, by using this method it is possible to harvest once a month only. This type of harvesting method leads to predominantly poor- quality leaf, with 4–6 L&B representing about 80 percent of the harvest, and 2–3 L&B representing the remaining 20 percent of the harvest. Fertilization is minimal, and only ammonium nitrate is used. As previously pointed out, there is a strong consensus among experts that this model of production would not be very competitive in terms of quality. Improved production models are proposed in Models 2, 3, 4 and 5.

The difference between sub-models (a) and (b) is that investment land is considered in the former, while no such investment is considered in the latter.

Model 2

Rehabilitated existing tea plantation with adoption of improved agronomical practices.

This model relies on optimal fertilization and frequent hand plucking to maintain the plant in a vegetative phase, with every bush plucked at intervals of 5–10 days, depending on whether the leaf is "flushing" or not (this would allow for higher yields and higher quality of collected leaves). This type of harvest leads to a higher overall quality of tea leaves, with 2–3 L&B representing about 70 percent of the harvest and the remaining 30 percent being 4–6 L&B.

Similar to Model 1, the difference between sub-models (a) and (b) is that investment in land is considered in the former while no such investment is considered in the latter.

Model 3

Rehabilitated organic tea plantation.

This model provides for a reduction in production costs due to lower input costs for pesticides and fertilizers. However, organic tea farming will also result in lower yields than conventional farming. The field mission observed a difference from 5 tonnes/ha for conventional tea farming, to 4 tonnes/ha for an organic tea plantation. The model includes frequent hand plucking, with the quality of the harvest assumed to be 100 percent 2–3 L&B.

Organic products can be sold at higher prices than regular production due to consumers' willingness-to-pay for better quality products, which is one of the main incentives for farmers to engage in organic cultivation. However, field visits do not allow for conclusions on the solidity of demand (and therefore willingness to pay a premium price) for organic tea leaves.

Although the price premium for organic tea is the most attractive incentive for farmers to engage in this production model, access to premium markets seems to be limited. The domestic organic market is limited in size while competitiveness on the international organic market will require a significant scale-up of the produced quantities. To maintain effective distribution channels, tea producers will incur additional costs – these are not accounted for in the existing model. In any case, despite growing demand for organic products, this market is still narrower compared to the one for conventional products.

The market for high-end organic, but also herbal and other specialty teas from Georgia, are expected to sell mostly in Northern Europe and the United States of America. It is hoped that the "Georgian tea" brand can recapture its former glory as successfully as Georgian wines. To achieve this, a focus on quality over quantity is needed. An example of an investment in an organic plantation is provided in Box 4.1.

BOX 4.1

INVESTING IN ORGANIC TEA PRODUCTION IN GEORGIA

The Renegade tea estate (www.renegadetea.com) was established in 2017 by four Estonians and one Lithuanian, covering an area of 47 hectares of rehabilitated tea plantations (in Tskaltubo and Tkibuli municipalities of Imereti region).

The company became a beneficiary of the tea rehabilitation program covering 12 hectares, whereas the rest was funded using own funds, partly generated through a crowd-funding platform called "Indiegogo", raising EUR 27 900 to rehabilitate one of the three plots (12 ha). Part of the funds was also used to acquire a processing plant. An abandoned old warehouse near the tea plantation is now used as a small factory to process harvested tea.

The company markets its tea as a high-end, fresh Georgian organic tea (with different mixes and flavors), generating sales though its online store and shipping them to customers abroad. A 350 g package, with eight varieties, costs EUR 95 (GEL 290), not including shipping costs. Just as the example shows, producers of organic tea in Georgia would have to target high-end market segments in developed countries where premium pricing can be achieved. The production of organic tea in the country could also be linked up with agro tourism.

Model 4

New tea plantation accompanied by adoption of improved agronomical practices (the same practices as described in Model 2).

As tea has a shelf life of several decades (over 50 years in most cases), the quality of the planting material is of critical importance when establishing a new plantation because of its effect on total returns over the lifespan of the tea plantation (in the investment costs section the influence of planting material on investment costs was discussed).

In this model, the initial investment is split across the purchase or raising of quality plants, land preparation and planting. Tea is a perennial plant that takes time to come to maturity. Under ideal conditions first plucking may be attempted at three years while full maturity in Georgia may take anywhere between seven and nine years to become fully productive. Thus, there is no income for four years (one year in nursery and three in the field) and full income is reached in Year 9.

Considering the conditions found in Georgia we can expect the first plucking to take place in the field at four years while full maturity may require nine years. Up-front capital costs and initial delay in income gives tea growing a long time to break even. On the other hand, tea is a long-lasting plant. Some gardens in Darjeeling have large areas of bushes planted in the 1850s that are still being grown commercially. The typical working life for modern tea plants around the world, however, is 50 to 80 years for seedling tea.

It is noticed that seedling tea plants are more resistant to pest attack as compared to clonal tea plants.[23] However, plucking cycles are longer in the case of seedling plants, and the productivity is lower at 4000 kg/ha, as against 6000 kg/ha in clonal plants.[24]

Overall, in spite of the potential for achieving higher yields and improving the long-term profitability of tea, new plantations present several key disadvantages that require attention.

First, full productivity is expected to occur on average two years later for new tea plants (Year 9) in comparison to rehabilitated plants (Year 7).

Second, in the case of a new plantation, there are additional costs linked to labour for weeding while the plants are small, in addition to some formative pruning. Once bushes are mature, providing that they have been planted at sufficient density, their canopies will merge and will serve as a natural protection against weeds. Thereafter labour inputs are the same as for a rehabilitated plantation.

Model 5

Green tea leaves production with improved agronomic practices and using mechanization.

Among all operations involved in tea production, plucking is one of the most labour-intensive ones. In turn, labour is the single highest production cost for tea, not only in Georgia, but also in most key producing countries globally. However, most of these countries (India, Sri Lanka, Kenya, China) rely on the low cost of labour in order to be internationally competitive.

In Georgia, between 60 and 90 percent of total person-days (labour) spent in the field are dedicated to plucking/harvesting and between 55 (Model 1) and 80 percent (Model 2) of total labour costs are related to the cost of plucking. In key tea-producing countries where hand pluckers' daily wage rate is around USD 1 to USD 1.50, low labour costs mean that investment in mechanization, which also leads to a deterioration in quality, is not an attractive investment for producers even if it allows for cutting harvesting costs by half. However, considering that labour costs are considerably higher in Georgia (pluckers' daily wages are around USD 7 or GEL 20), the potential for savings through mechanization is even higher. Thus, cost-cutting measures in this part of the operation would significantly reduce the total COP, and mechanization is one of the effective alternatives that should be carefully considered as a measure for reducing these costs.

23 Tea plants can be grown using both seeds and cuttings (it is called vegetative propagation). The seed pods are produced during the season following the tree blooming and take as long as two months to germinate. Once germinated, it takes another two to three years for the tea tree to be ready for harvest. Plants raised from cuttings are called clonal seedlings. They are true to type and contain same qualities as that of their mother plants.

24 For further information, see: Bore, J.K.A.; Ngetich, W.K. and Njugma, C.K. 1998. Performance of clonal tea in rehabilitated and replanted field: 2. yields. http://agris.fao.org/agris-search/search.do?recordID=KE1999042765

The limitation to this approach is the effect of mechanization on product quality but, wherever it can be introduced to save labour without loss in quality of either green leaf raw material or final tea product, it should be implemented.

From the harvesting standpoint, a two-man machine can manage 1500 kg of leaf per day. Furthermore, and this is especially true for green tea, it is possible to use various harvesting mechanisms on the same field with only a minor disturbance to quality.

For this reason and given the need for Georgia to increase quality, it is suggested that the very first crop (first flush) and perhaps the second crop (second flush) be hand plucked to build true specialty styled teas that can be built into GI/Origin marketing strategies.

After these two harvests of well managed two leaves and a bud "fine plucking," the field would revert to machine harvesting until the autumnal reduction in growth gives the opportunity for a final round or two rounds of hand plucking to create autumnal specialty teas.

With the use of harvesting machinery, green leaf cannot be harvested with a quality good enough to manufacture high-end/specialty black tea. In China the high quality first or spring flush is harvested by hand while autumn flushes are machine harvested.

This difference in quality is reflected at the price level. Prices for black made tea from machine-harvested leaf could be as low as USD 1.4–USD 2 per kg compared to USD 150 to USD 450 per kg for hand plucked specialty teas. Such high prices, however, are the exception and not the rule and are merely used to illustrate the potential that even mechanically harvested tea can have on international markets, if the quality and marketing are right. Box 4.2 further describes the potential of mechanization for green tea production and provides reasons why it is not really an option for the production of Orthodox black teas.

BOX 4.2

WHY IS MECHANIZED HARVESTING NOT AN OPTION FOR BLACK TEA PRODUCTION?

To make good quality black tea it is important that tea leaves be harvested and delivered complete and whole to the factory for processing. Why is this important? In the black tea production process, the enzymes are deactivated at the end of the process after about 18 hours following harvesting. Therefore, if farmers or processors cut or bruise the leaf at the beginning of the process, the oxidation would start earlier as opposed to after the rolling process under a normal production process. An early oxidation results in uneven, softer, less bright and flavourful tea cups.

In green processing the deactivation step occurs immediately on entering the factory, so using harvesting techniques that cut the leaf is not nearly as damaging to the eventual quality of the finished product (as long as time to factory is not too long).

For the above reasons, mechanical harvesting has traditionally been restricted to green tea manufacturing origins (Japan, China) and when used for black tea it has resulted in poor liquoring teas (Georgia, Turkey, Argentina).

As labour becomes increasingly expensive for all origins, there has been an acceleration in research to produce better, more selective tea harvesters, which are now being used more and more in the traditional black tea origins. Nonetheless they still do not make good quality Orthodox (leaf) manufacture possible. Another important point is that mechanization remains the method used by the large-scale growers. As regards growers with one hectare or less, most tasks will be manual and will require manpower or some alternative approach for sharing or leasing machinery.
It has been accepted that the cost of tea produced from the hand plucked leaves is going to be high, and will require a strong marketing and communication campaign to reach consumers who are willing to pay a premium.

The company markets its tea as a high-end, fresh Georgian organic tea (with different mixes and flavors), generating sales though its online store and shipping them to customers abroad. A 350 g package, with 8 varieties, costs EUR 95 (GEL 290), not including shipping costs. Just as the example shows, producers of organic tea in Georgia would have to target high-end market segments in developed countries where premium pricing can be achieved. The production of organic tea in the country could also be linked up with agro tourism.

Model 6

Processing

Field visits proved that it is rather difficult to collect any data on the cost of processing of tea, since most companies are reluctant to share information on the subject. With a continuous effort and after two field missions, some benchmark information has been collected for the present study.

Both models represent a small tea processing enterprise; data used in the model is based on the information collected from several operating businesses that were interviewed during the field visit. The financial analysis of the processing activity is meant to illustrate the linkage along the commodity chain (primary agriculture and processing), as well as the financial profitability of such a small investment project from the point of view of the

owner/entrepreneur. In both cases, input quantities are assumed to be from a green leaf base of 10 ha, with an average yield of 6 tonnes/ha, amounting to a total of 60 tonnes of green leaf per year. The made tea output is around 13 tonnes per year.

Final production is split between three main qualities: premium (25 percent), high (50 percent) and low (25 percent). Made tea is sold in bulk at GEL 44 /USD 15 per kg (premium), GEL 15/USD 5 per kg (high) and GEL 5/ USD 1.7 per kg (low). For simplicity's sake and an easier comparison with international prices, the model stops at bulk production and therefore there are no costs associated with packaging factored in.

Model 7

New blueberries plantation

Berry farming is a traditional activity of agriculture in Georgia, common in almost all parts of the country and due to the natural and climatic conditions of the different regions, a great variety of berries are produced in the country. On a large scale, however, blueberries have only recently started to be grown in the last few years as an alternative to tea, and the soil requirements are similar (high acidity).

Investment in a new plantation alone will require about GEL 70 000 (the largest part of the total cost being the cost of seedlings: GEL 24 000).[25] The first harvest is in Year 4; plantation reaches its full development in Year 8; at full development the expected yield is 5.5 tonnes/ha. The farm-gate price for blueberries, when collected in 2019 was around GEL 4/kg if destined for local markets; the price could be higher (8 GEL) if the crop is destined for export.

Model 8

New hazelnuts plantation

A new hazelnut plantation will require an investment of about GEL 19 600 per ha,[26] and four years before the first harvest; full development will be reached in Year 10. At full development the yield per hectare is about 1.8 tonnes/ha, the on-farm production has been valued at farm-gate price (GEL 4/kg) and before de-husking. Net benefit at full development is about GEL 5 700 per year and per hectare.

A more detailed discussion on blueberries and hazelnuts as potential alternatives to tea is provided in the sub-section on tea and its alternatives.

Model 9

Rehabilitated existing tea plantation without any changes in agronomical practices (BAU scenario) Economic analysis.

This model is based on the assumptions of Model 1 and re-calculated using economic values and parity prices. Green leaves are not the commodity that is directly traded on the international market as they have to undergo primary processing before export; therefore the economic value of the tea has been derived from a traded good (made tea).

Economic labour costs were estimated using the price paid for an alternative to tea plucking employment — work in agriculture in Turkey, or work in urban areas (construction or driving a taxi) — that would be about GEL 40/day.

25 Investment costs include the cost of land and irrigation.
26 Including the cost of land.

The parity price at farm gate was calculated. The tea crop has been treated as an indirectly traded export crop that has to be processed before it can be exported. Therefore, the value to the economy is determined by the FOB price, but in order to calculate the export price we factored in the incurred transport costs from the factory to the port, processing costs, and transport from the farm to the factory. The parity price of tea has been estimated at GEL 2/kg, compared to a weighted average of GEL 0.88/kg that is currently perceived by farmers for selling a mixed quality with 80 percent of low quality leaves. The increase in revenues from sales makes this model very profitable despite higher labor costs.

4.4 COST OF PRIMARY PRODUCTION UNDER DIFFERENT PRODUCTION SCENARIOS

Figure 4.4 presents the cost of producing tea leaves per hectare, under different scenarios for primary tea production (models 1-5). For the sake of clearer presentation, investment in land has been excluded (Models 1 and 2 refer to Models 1(b) and 2(b). Costs are presented in terms of key categories: soil preparation, fencing, fertilizers, seedlings (for M4 - new plantation) and labour. Straight line depreciation was applied to materials (fencing) and seedlings; the salvage value was assumed for simplicity to be zero. The cost of land was not depreciated, as it was considered to have an infinite useful life.

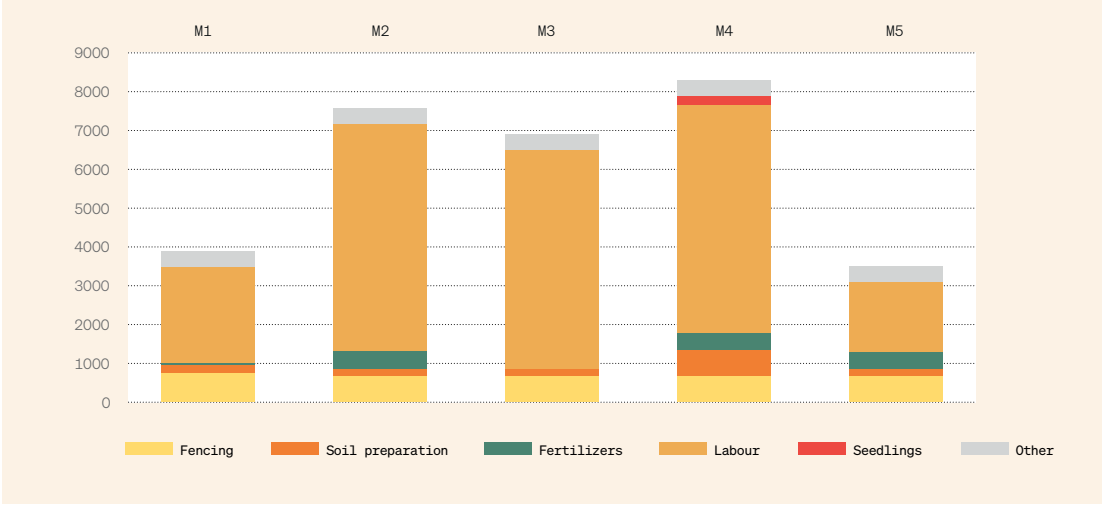

Figure 4.3
Cost of primary production per model (GEL) – Scenarios 1 to 5, Tea, excluding investment in land

SOURCE: Authors' calculations based on field visits, 2019.

The analysis shows that at the primary production level, the largest single expense is the cost of labour. In turn, when looking at the structure of labour costs, plucking accounts for the highest share.

The BAU scenario described in M1(b) presents rather low costs of production for the simple reason that only about 20 percent of leaves are harvested by hand, 80 percent being harvested using sheer plucking machinery. However, as currently applied, mechanized harvest drastically slows the growth process, makes regular and frequent plucking impossible, and therefore has a negative impact on yields and quality. Models 2(b), 3 and 4, where some improved agronomical practices are applied, including hand plucking, nearly double the overall production costs in all cases.

In Model 3, rather low yields (characteristic of organic production) reduce the labour needs for plucking. However, given that no pesticides are used, manual weeding increases the overall cost of labour.

For Model 4, a new plantation will require an increased use of labour for the initial land clearing and planting, compared to the other models.

Model 5 shows the impact of the introduction of both improved agronomic practices and mechanical harvesting on production costs. It is important to mention that for mechanical harvesting not to affect yields and the quality of leaves, it will require better machinery than the one currently being used, as well as fundamental changes in plantation management and attitude towards mechanical harvest. Mechanized harvest is not meant to replace hand plucking on a like-for-like basis; as previously mentioned, our recommendation is that it be used for green tea production, in parallel with manual harvesting of the top-quality flushes used to produce premium black teas.

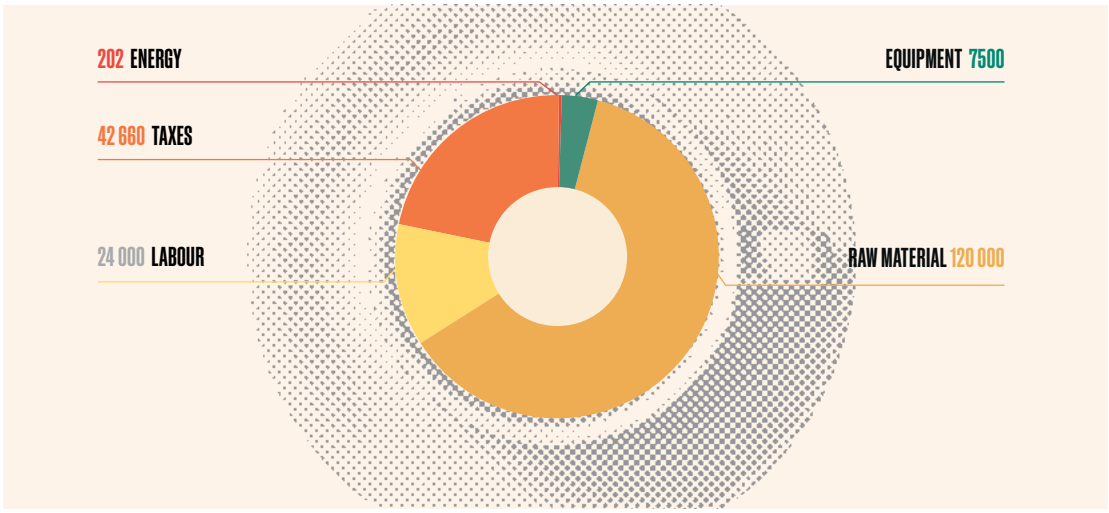

Figure 4.4
Breakdown of processing costs (GEL) – Model 6

SOURCE: Authors' estimates based on field visits, 2019.

4.5 COST OF PROCESSING

The cost of processing is split between equipment, labour, energy costs, tax and raw material. Figure 4.4 gives an overview of each of the categories of production costs involved in the production of made tea.

- In our processing model, we assumed that the processor is purchasing all the raw material (green tea leaves) from neighbouring estates. In such a scenario, this is by far the largest single cost for processors, accounting for almost 60 percent of the made tea production cost. Currently, the average cost of green leaves bought from the farmers is about GEL 0.88/kg (USD 0.34), for the raw material of low quality that contains only 20 percent of 2 L&B. A shift towards higher quality production of specialty tea aiming for high end and niche markets will require a higher quality input and therefore a quality premium for 2 L&B. As per Model 2 (improved production practices and quality), we therefore assume an average raw material price of GEL 2.21/kg (USD 0.75).

- Labour refers to hired employees participating in the production process (from leaves reception to bulk made tea). These costs exclude labour associated with bagging/packaging, as well as sales and administration. The model assumes that three employees would need to be hired full time for four months, and at 50 percent for eight months.

- Equipment (capital machinery) includes allowances for depreciation of factory equipment and supplies for repairs and maintenance. Factory depreciation is calculated based on estimates of the full replacement cost of capital and an average depreciation period of 20 years.

- Tea processing is energy intensive. Withering, drying, grading and packing tea requires 4 to 18 kWh energy/kg of made tea.

- Taxes that were taken into account in the model are: 1 percent property tax and 15 percent tax on profit.

Financial benefits summary

Table 4.2 summarizes the estimated financial benefits for the different production models described above. The calculations are based on 1 ha of land for all models, except for Model 6 (processing) where the gross margin for the entire processing unit was estimated.

As shown, all models present positive returns. However, the annual returns (gross margins) for tea primary production per hectare are low when compared to the monthly salary of an agricultural worker (about GEL 400/month, equivalent to GEL 4800 or USD 1500 annually). Given the relatively small tea plots of each household (often under 1 ha), as well as the very high labour intensity and cost of labour, primary tea production alone cannot fully provide for the households' livelihood. Unless it is vertically integrated or mechanical harvesting is used, the returns of tea production do not make it a financially appealing crop for farmers. This was also confirmed by the

interviews with farmers during the field visits, as it appeared that income from other crops or off-farm income dominated the total income of the households, while earnings from tea cultivation were seen as an additional source of income.

Table 4.2
Summary of financial benefits for different production scenarios of tea and other crops

		Margin		NPV			
Model	Description	GEL/ha	USD/ha	GEL	USD	FIRR	EIRR
M1(a)	Old plantation rehabilitation with BAU production practices scenario **with** investment in land	837	284	-16 102	-5475	-5%	
M1(b)	Old plantation rehabilitation with BAU production practices without investment in land	837	284	-2466	-838	5%	
M2(a)	Old plantation rehabilitation with application of improved agro practices with investment in land	5900	2006	12 778	4344	17%	
M2(b)	Old plantation rehabilitation with improved practices and without investment in land	5900	2006	26 414	8981	44%	
M3	Old plantation rehabilitation and organic certification	3642	1238	-3940	-1340	8%	
M4	New plantation with application of improved agro practices	5319	1808	-18 657	-6343	4%	
M5	Old plantation rehabilitation applying improved agro practices and investing in mechanical harvesting	10 940	3720	40 180	13 661	27%	
M6	Tea processing unit	355 967	121 029	1 485 527	505 079	55%	
M7	New blueberries plantation	28 888	9822	58 203	19 789	17%	
M8	New hazelnut plantation	6206	2110	-11 092	-3771	6%	
M9	Economic calculations / Old plantation rehabilitation with no improved agro practices	3058	1040	-6582	-2238		6%

SOURCE: Authors' calculations based on field visits, 2019.

As shown in Table 3.2, in almost all cases the two main alternative crops to tea in Georgia's tea producing regions — hazelnuts and blueberries — are more profitable than tea per unit of land. However, tea profitability per hectare in Georgia varies considerably depending on the production and harvesting practices adopted. Moreover, our analysis shows that changes in existing practices can considerably improve tea profitability through a careful examination of improvement options on a case-by-case basis (Models 2- 5).

Our NPV and FIRR estimates take into consideration a period of 20 years. As the cost of land at around GEL 15 000/ha, is the single most significant investment cost (when required), it has a serious impact on NPV and FIRR. This is illustrated in sub-models (a) and (b) of Models 1 and 2.

In Model 1 (rehabilitation without changes to current practices) NPV is invariably negative and FIRR is only positive if no investment in land is required. As illustrated in Model 2, improvements in production practices have the potential to significantly improve profitability per hectare due to improvements in quality and higher farm gate prices, with a positive NPV and FIRR in both sub-scenarios (with and without investment in land).

Models 3 and 4 assume investment in land as in the first case where organic certification is sought (subject to specific conditions which might be difficult to achieve in a random plantation) and in the second case where a new plantation is considered. In spite of higher gross margins per ha when compared to the baseline models (M1 a and b) as a result of the investment in land, the NPV is negative in both models over a period of 20 years.

Model 5 elaborates the highest gains through improved production practices and the introduction of mechanical harvesting. Financial gains under this scenario increase, resulting in positive NPV values even when investment in land is included in the calculation. Therefore, a scenario with investment in land is shown, as a lower initial investment would inevitably increase the NPV. In particular, we have assessed that improved agronomic practices and the introduction of mechanization for harvesting has the potential to provide producers with higher gross margins as compared to hazelnuts. However, this model of tea production would also require a significant change in the mindset of producers. Moreover, farmers who are currently focusing on black tea would be required to shift their focus to green tea production.

While our financial benefits summary for different scenarios is only indicative – as such benefits are ultimately farm-specific and depend on a number of variables – it clearly suggests that there is significant potential for improving tea gross margins through changes in production practices combining a lower reliance on manual labour and improvements in quality. Nowadays, tea farmers in Georgia receive higher prices for the green leaf than their peers in India and Viet Nam (as shown in Table 4.3 further below in this section).

In addition, as most of the value added along the tea value chain is created at the processing level in both countries, the picture is very different for processors (Model 6). Assuming processing from own tea production from an estate of 10 ha and a 25 percent share and a price of about USD 15/kg of premium tea output, this model clearly stands out with an illustration of the impact of shifting to higher value-added activities within the chain. The net annual gross margin for the processing unit is estimated at about GEL 356 000 or USD 121 000, thus providing a much higher return on labour than primary production. In this scenario, the estimated IRR over a period of

20 years is 55 percent and the NPV above USD 500 000. The processing model is sensitive to input prices, in particular to the prices of fresh leaves. It is worth noting that the investments would have strong upstream linkages for the creation of a market that would increase the production of the smallholders' fresh tea leaves. Farmers would therefore benefit from a new market opportunity represented by the investments made in their farms. The smallholder farmers would collectively supply of 60 tonnes of leaves per year, equivalent to USD 45 000.

Models 7 and 8, in turn, present the financial benefits for a new blueberry and hazelnut plantation respectively, in both cases taking into consideration investment in land. The financial benefits of blueberries per unit are clearly superior to not only tea but also hazelnuts, and they currently appear to be one of the most profitable crops grown in Georgia; this has also been confirmed in discussions with local farmers. Nevertheless, the investment in a new blueberry plantation per hectare is significant (about GEL 70 000 or USD 24 000) and may represent a financial barrier for most farmers.

An additional primary production model (M9) was developed using economic values to reflect the opportunity cost of main inputs and outputs. As the economic prices for tea leaves are higher than those currently applied by Georgian processors, the profitability of a rehabilitated tea plantation even under the BAU scenario (no changes in production practices) becomes much more profitable than under Model 1. However, blueberries and hazelnuts are still more profitable. In fact, a hazelnut plantation, even when relying on manual harvesting, achieves lower gross margins than a tea plantation using mechanized harvesting. However, this crop might be an adequate alternative to tea in terms of employment generation, with higher returns on labour. Blueberries and hazelnuts, as potential alternatives to tea, are discussed in more detail in the section below.

Table 4.3
Average green leaf price

Origin	Price, USD /Kg
Georgia	0.30*
Azerbaijan	0.64**
Sri Lanka	0.57
India	0.10
Viet Nam	0.09

* Average price for 20 percent of output at GEL 3 (~USD 1.1) and 80 percent at GEL 0.35 (~USD 0.13) depending on quality.

** Average price for 20 percent of output at AZN 1.4 (USD 0.82) and 80 percent at AZN 1 (USD 0.59) depending on quality.

SOURCE: Authors own elaboration.

4.6 TEA PRODUCTION AND ITS ALTERNATIVES

In recent years, a number of farmers in Georgia's tea growing regions have begun to diversify towards other perennial crops such as hazelnuts, blueberries, kiwi and persimmons, whilst a few still continue to produce tea. For the purpose of this study, hazelnuts and blueberries will be considered representatives of the main alternatives to tea.

4.6.1 Blueberries

Berry farming is a traditional activity of agriculture in Georgia is common in almost all regions of the country. Due to the natural and climatic conditions of the different regions a great variety of berries is produced. Blueberry production on a large scale, however, has only recently started in the last few years as an alternative to tea, as soil requirements are similar (high acidity). During assessments carried out by FAO experts in 2019, it was estimated that the total cultivated area for blueberries in Georgia was about 350 ha. Overall, berry production in Georgia has been increasing rapidly and by 2020 intensive berry orchards were expected to cover about 1000 hectares. Existing infrastructures, however, cannot cope with this increase and shortfalls have already surfaced with storing and sorting products.

The state-run project "Plant the Future", launched in 2015 aims to help farmers produce high quality products that can compete with imported products on the local market and increase the export potential of Georgia's agricultural products. The project provides subsidies for investments in blueberry farming. A sub-component of "plant the future" called "berry crops financing" envisages 100 percent funding of cost for purchase and arrangement of seedlings, drop irrigation systems and other necessary materials needed for laying out a small-fruit crops garden, on an agricultural land plot of 0.15ha - 0.5ha.

Blueberries are perennial plants grown in all types of soil, but acidic soil is necessary for maximum harvest (pH should ideally be between 4 and 5); in this respect blueberries are a direct competitor for tea. The harvesting period for blueberries also overlaps with tea as the harvest usually starts in the second part of May. The unique microclimate of Western Georgia facilitates the ripening of berries 40-50 days earlier than in Europe. Georgian natural and climatic conditions are favourable for the crop, but greenhouse cultivation could be considered to ensure the continuity of production.

Georgia was one of the first countries to introduce blueberry production in the region; at present, production as well as logistics and marketing need upgrading as the market becomes more saturated and margins decline. The review focused only on the profitability of a primary production activity, however, a refrigeration facility is important for extending the crop season although it would increase capital costs. An example of a large-scale investment in blueberry production is provided in Box 4.3.

BOX 4.3

INVESTING IN BLUEBERRY PRODUCTION IN GEORGIA

Vanrik Agro Group is the largest producer of fresh blueberries in Georgia. In 2010, the company started with a blueberry plantation on 50 hectares in the Guria region. In 2015 a partnership fund acquired 42 percent of the company and financed expansion on an additional 70 hectares. Currently the company owns a blueberry plantation of 120 hectares, with drip irrigation, modern refrigeration and a processing line (shock cooling and processing of the berries on the "A&B Packing" (United States of America) automated line to achieve the highest quality and best shelf appearance) and Global Gap certificate. The main target markets are Central and Western Europe, and so far, blueberries have been exported to the United Kingdom, Poland, Russian Federation, Azerbaijan and the United Arab Emirates. Total investment is estimated at USD 6.5 million. Vanrik Agro invested USD 3.3 million, the Partnership Fund invested USD 2.2 million and a commercial bank loan for USD 1 million was also used. The Partnership Fund has been seeking long-term private investors interested in buying out the fund's shares in the company. The project IRR is expected to be 19 percent, and the expected payback period is six years.

4.6.2 Hazelnuts

Between 2004 and 2010 Georgian hazelnut areas grew from 5000 ha to over 15 000 ha after the Ferrero company began to invest in the Georgian hazelnut production in 2007. The harvested area seems to have decreased over the past years, most probably due to the arrival of various pests, including the brown marmorated stink bug *(Halyomorpha halys)* that invaded Western Georgia in 2015. Georgia is in sixth place in terms of production volume ninth place in terms of area harvested. In 2017 (latest data available in FAOSTAT), the average hazelnut yields in Georgia were relatively high, close to the yields obtained in United States of America, and higher than in Italy or in Turkey.

Harvested hazelnuts are handled by collectors who retain a margin for providing intermediation services on the market and deliver products to packers. Packers select products based on two distinctive channels: in shell and shelled hazelnuts, for further processing. Although some Georgian hazelnuts could be considered organic, there is no certification of organic production in the country. Georgian production is either shipped to neighbouring Turkey, which is the dominant world producer of hazelnuts, or to European customers.

4.6.3 Discussion

Figure 4.5 compares the costs of producing tea leaves under different scenarios (M1-M5), blueberries (M7) and hazelnuts (M8). Tea leaves, blueberries and hazelnuts are presented before processing. Overall, improved agronomic practices have a positive impact on yields and on the quality of leaves and consequently, on the revenue. Mechanization of the harvesting process (if well conducted) will drastically reduce production costs and increase revenue. Hazelnuts have a slightly lower margin than green leaf, however, their margins could increase if a first processing (de-husking) and grading is conducted on the farm. Blueberries present the highest margin compared to other primary production models. The importance of both crops

has been growing over the past years, with a fast progression for blueberries. However, it is worth mentioning that both crops have recently demonstrated their strong vulnerability to climate change and pests. The relatively low risk of tea due to its ability to withstand relatively severe weather conditions is an additional benefit, safeguarding farmers against bad harvests. That said, made tea (Model 6, not shown in Figure 4.5 for legibility reasons) presents by far the highest margin, which could be considered a minimum given that the model drawn was based on the assumption of a mixture of lower and higher quality output. Focus on niche products and specialty teas oriented towards a high-end market will facilitate an increase the margin.

Figure 4.5
Costs and revenues per Model for primary production (GEL/ha)

SOURCE: Authors' calculations based on field missions, 2019.

The analysis of different production scenarios suggests that even though tea shows a positive net benefit, a standalone tea farming activity does not provide sufficient enough income to become a viable business for farmers. However, processing activity generates larger margins that could be further improved with a focus on quality improvement of made tea.

Looking from the perspective of job creation, the future of the tea sector cannot be found in labour-intensive field activities, although there is significant potential for the generation of employment. While job creation at the processing level will be more modest if based on seasonal operations, processing activities have a potential for expansion and diversification *vis-à-vis* blending and herbal teas, making it a less seasonal activity leading to a more significant impact on rural employment.

4.7 THE INTERNATIONAL COMPETITIVENESS OF GEORGIAN TEA

In this sub-section we look at the three major factors that determine the overall competitiveness of Georgian tea in international markets.

First, we carried out a sensory analysis of several different teas produced in Georgia and assessed them against the main international competitive tea types of different origins, based on an internationally accepted quality score scale that combines a number of sensory quality aspects.

Second, based on the obtained sensory quality scores and several other price determinants, such as leaf score and the presence of defects, we estimated the international price of Georgian teas against other comparable tea types of foreign origin.

Third, we compared tea production costs in Georgia and in major tea producing countries to use as an indicator of international competitiveness. As pointed out in the Tea Financial Profitability section, tea production costs in Georgia are high mainly due to high labour costs, as confirmed by the comparative analysis.

Our findings suggest that, similar to Azerbaijan, parallel improvements in both quality and production efficiency in terms of production costs are required for Georgian tea to be internationally competitive. This confirms our previous recommendations on the need to re-assess harvesting practices through a careful cost-benefit analysis of manual vs mechanized harvesting or a combination of the two, on a case-by-case basis, and to consider a shift towards the production of green tea vs black tea, with a view to improve overall sector competitiveness.

4.7.1 Georgian tea sensory quality in a comparative perspective

The majority of competition in terms of imports, in both Azerbaijan and Georgia, comes mostly from Sri Lanka and to a lesser extent from India. While there are also significant amounts imported from India and Turkey, these are in fact mostly trans-ship points for Sri Lankan and Indian tea. Both origins offer products that are invariably cheaper than both the Georgian and Azerbaijan domestic production.

These major tea producing origins have been producing Orthodox (leaf) teas for over 100 years and have had an historic and successful tea supply relationship with the former Soviet Union. Today Georgia supplies tea to its successor states, which is difficult to compete with.

The quality of their manufacture is different and overall, better as compared to that of Georgia and Azerbaijan for a variety of reasons, which include agro-climatic conditions, leaf stock, leaf handling practices, production equipment/techniques and more pertinent customer demand. Both India and Sri Lanka have for many years been producing quality teas characterized by tight rolled leaves and an amber liquor with medium to thick body, in response to the high volume of demand for such teas in the Russian Federation and the Middle East.

The aforementioned traits that make Indian and Sri Lankan teas so attractive to the United States of America, European Union, Commonwealth of Independent States (CIS) and Middle Eastern consumers alike, were found in our comparative sensory analysis of these origins against the Georgian and Azerbaijani tea samples analysed. Georgian teas were evaluated against relevant international competitors who were chosen based on their dominance of the Orthodox category within the Georgian market. A similar analysis was conducted with Azerbaijani teas and facilitated a comparison between the two Caucasus tea producers (for the scores of Azerbaijani teas, see Annex III).

The evaluation methodology used is a sensory enumerated evaluation of the described characteristics through various consumer packaged goods studies, to represent the most important attributes to the consumer, which are:

BRIGHTNESS
reflective quality
of the cup visually

COLOUR
The intensity of liquor colour
in a spectrum from yellow to red

IMPACT
The intensity of expected
positive characteristic of the
tea type tested

BODY
Viscosity

ASTRINGENCY
Positive acidity
on the palate

All the above characteristics depend on the processing of tea leaves and the storage conditions of finished tea. They are good indicators for optimizing processing.

Figure 4.6 summarizes the results of the analysed samples of Georgian origin against Sri Lankan and Indian teas (Ceylon Pekoe and Assam Pekoe) as the main competing origin on the Georgian tea market in addition to Kenyan and Vietnamese origins.

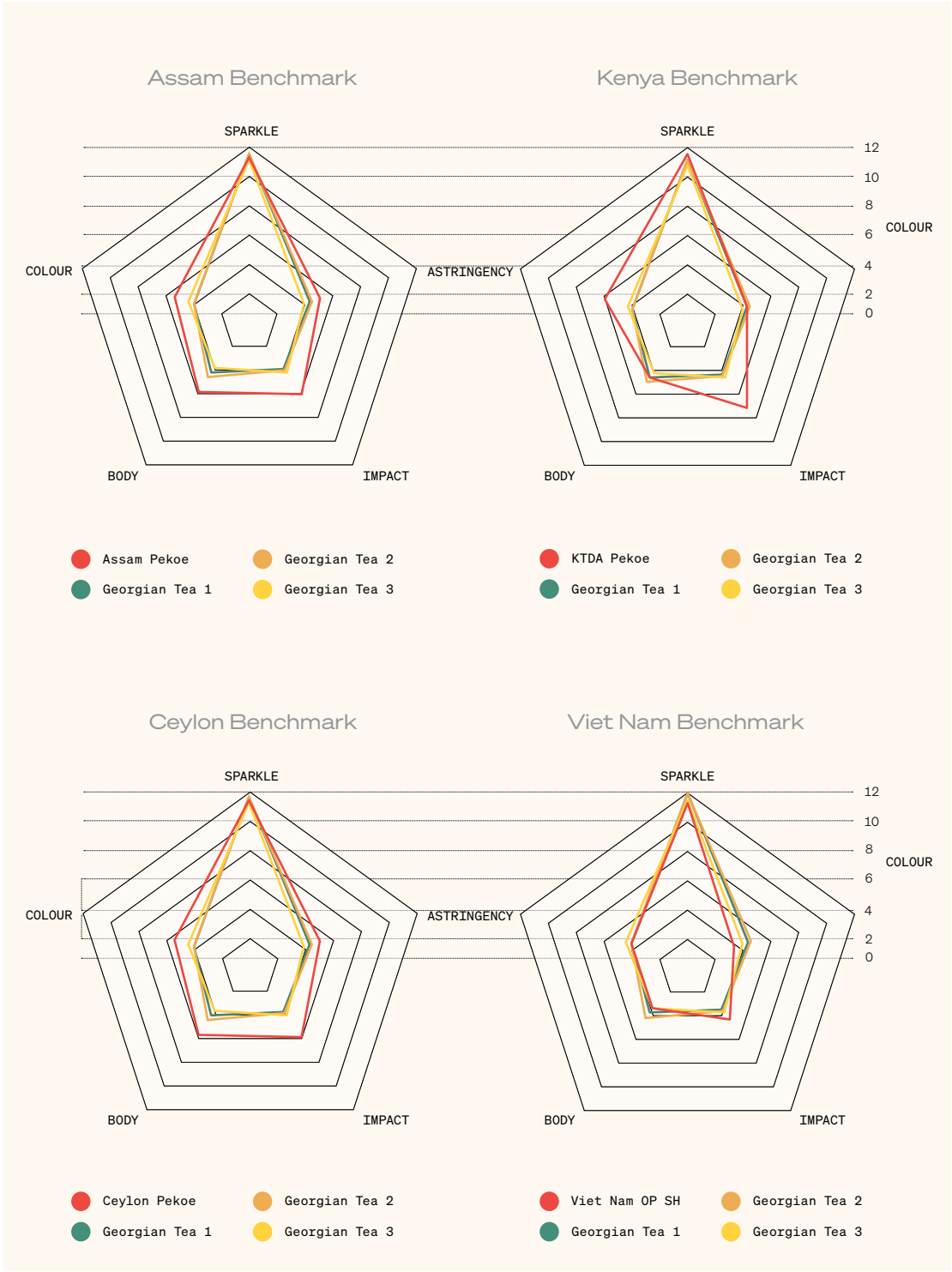

Figure 4.6

Tea sensory analysis comparison between Georgian teas and teas of other origins

SOURCE: Authors' own elaboration.

As seen in Figure 4.6, the top two origins (Sri Lanka/Ceylon and India) have significantly better developed characteristics than the domestic production while Viet Nam is similar, indicating the potential value of these teas on the international market in bulk form.

Although this is a small sample, we consider it to be an overall representation of the main differences that exist in terms of quality between imported and domestic teas. Overall, Georgian teas can be qualified as light liquoring with relatively underdeveloped characteristics. The output is not competitive in comparison to international imports, both in terms of quality and price. The high price driven by the cost of green leaf coupled with the need for significant improvements in quality calls into question the sustainability of the industry in its current state.

4.7.2 International price estimates

Our evaluation of the international price of the analysed Georgian teas is based on their quality scores (based on the aforementioned five criteria) and adds several other criteria that determine the value of a tea in the international market.[27]

- **leaf score:** the consideration of leaf from the perspectives of attractiveness, evenness, colour, make and fit for purpose. In fact, this is probably the most important factor in the evaluation of tea;
- **defects:** on top of the five sensory attributes scored, teas should exhibit sound manufacturing practices which will impact their performance consistency and their shelf life, as well as consumers' tastes. This criterion looks at all the defaults, wherever generated;
- **market weighting:** this looks purely at the supply and demand of the overall type and quality offered. A tea may be an example of good manufacture but be of a grade and quality that is in over supply, or it may be in a balanced market category but simply not as desirable, overall, as the competitive incumbents. The weighting given to each of these three criteria is gleaned from market data collected each week from the relevant markets, which analyzes relative value against auction scores. This is delivered to clients from the following firms:

Tea-Link (Colombo) pvt Ltd	Sri Lanka
PurbaTea (Export) pvt Ltd	India
MJ Clarke Ltd	Kenya
Van Rees Ltd	Viet Nam

These weightings are added to a comparative value from sensory scores. This is done by using average scores for standards, from each auction centre, and their running average prices over one year. This methodology, coupled with their sensory evaluations gives us a reasonable assurance for value of single points (0.1) for brightness, body and astringency of USD 0.10/kg.

These combined factors make up our International Price Evaluation which is summarized in Table 4.4 below. All tea samples were graded in isolation by an international tea expert for their quality, but were then qualified by an independent trading house for value.

27 The weight of each component in can be seen in the file used for this calculation which is enclosed in the annex.

Table 4.4
Calculated values for Georgian and Azerbaijan leaf teas against seven relevant competitive origins (All Producers of orthodox leaf teas)*

Origin	Rate (%)	Market price USD/kg
Kenya	Kericho	3.83
Sri Lanka	Low grown leaf	4.96
Malawi	EP	3.90
Viet Nam	Lamdong	2.18
Argentina	Maingrade	1.91
China	Green steamed	8.25
India	Nilgiri orthodox	5.66
Kenya	KTDA East of Rift	4.40
India	Assam post second flush	
India	Darjeeling	14.60
Indonesia	W Java	3.80
China	Green Pan fired	10.50
Georgia	Georgian Tea A	3.58
Azerbaijan	Azerbaijani Tea A	3.58
Georgia	Georgian Tea B	3.60
Georgia	Georgian Tea C	18.17
Azerbaijan	Azerbaijani Tea B	2.95
Azerbaijan	Azerbaijani Tea C	0.82
Georgia	Georgian Tea D	4.27

*NOTE: For Azerbaijani and Georgian teas, market price is based on valuation by an International Trading house (Van Rees North America, for the teas tested. The other origins are all market contracted prices against which they were vetted.

SOURCE: Tea expert team's estimates.

4.7.3 Cost of production benchmarking

In this section, we consider the COPs of the leading competitive origins in comparison to Georgia as well as Azerbaijani, for which a similar analysis was carried out as part of a separate tea sector review.

Figure 4.7 below is a stark illustration of key tea producing origins and suggests that the practicality of producing black tea in volume and in bulk form for international markets is not realistic for Georgia. In fact, the cost of producing 1 kg of made tea in major tea producing countries appears to be invariably lower than in Georgia.

While it appears that the cost of producing 1 kg of made tea in Georgia (GEL 11.8 or USD 4/kg) is lower than in Azerbaijan (USD 5.3/kg), we also have to bear in mind that this cost does not include packaging, transportation and other costs related to export operations. As already mentioned, Georgian tea's

closest international competitor in terms of quality is Viet Nam. However, this is also reflected in its average export price which is much lower than the actual cost of production estimated for Georgia.

This once again highlights the need for efforts to be undertaken in Georgia to be internationally competitive as a tea exporter. The gap is such that if value addition is to be considered for export, then choosing a format that minimizes the share of tea cost in the total COGs would be a good focus. Therefore, teabags could be given priority over packed/bulk tea, where tea weight and percentage of the COG is lower (30–40 percent for packed tea vs > 60 percent for packets), to mitigate the impact of the cost of tea leaf.

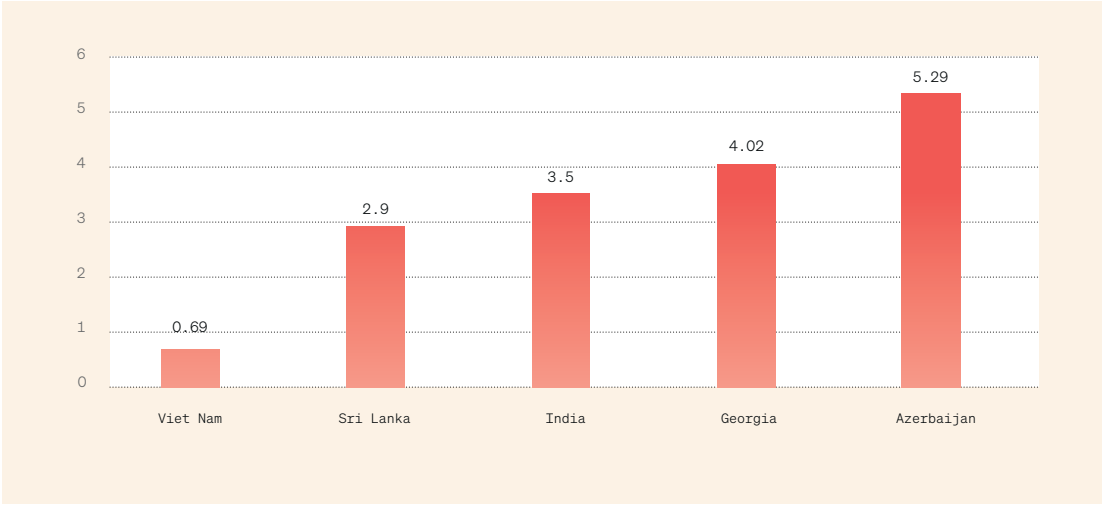

Figure 4.7

Estimated average cost of production for 1 kg of made tea (after processing)

SOURCE: Industry sources and authors' calculations.

Interviews with producers in India, Sri Lanka and Viet Nam confirmed that the differences in cost of production between, on the one hand, Azerbaijan and Georgia and on the other, major tea producing countries, are indeed significant.

As actual COPs are extremely difficult to gather, due to a highly protective and suspicious producer environment, the template delivered to and completed by Viet Nam was not the norm whereby answers could be gathered from Sri Lanka and India. The COP of the two origins were obtained from close discussions with producers in Assam (N.E India) and Ruhuna (Lowgrown S.W region) where the majority of leaf exports are derived. However, each COP obtained was proposed to other producers in each origin to test their validity and is considered an "accurate approximation." The producers interviewed for each origin are:

Warren Tea Ltd	India
Mcleod Russel Ltd	India and Viet Nam
Watawalla Plantations Group	Sri Lanka


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Chapter 5
Environmental sustainability

Tea production in Georgia may be affected by climate change impacts that reduce its potential expansion and/or increase the agriculture footprint of the country. The following sections present the possible adverse and beneficial impacts of climate change on tea production as well as how tea production can impact the environment.

5.1 METHODOLOGY

The information, data and assumptions reported in the present brief derive from:

- **Literature review:** FAO collected and analysed data from scientific publications, project documents related to tea production in Georgia, Turkey, and the main tea producing countries. Concerning climate change priority was given to: (i) national communications to the UNFCCC and others; (ii) national action plans and strategies; (iii) UN assessments and reports; (iv) publications from national institutions and academia (national and international); and (v) bilateral donors' reports/projects. Information on tea and impacts of climate change on tea derives from the review of international scientific publications and national data.

- **GeoSpatial analysis:** As part of its mandate to support member countries, FAO developed a set of tools and methodologies to allow rapid and tailored geospatial analysis. A result of this effort is Earth Map, an open-source application that allows for the interpretation of large remote sensing datasets in near real time. Earth Map is an innovative tool that facilitates and empowers users to perform historical and current climate-environmental analyses for a given area (regional, inter-regional, national, district, and sub-district) through a graphical interface that has been developed by FAO thanks to its partnership with Google.

Data on climate parameters (trends) have been collected via Earth Map accessing the following databases:

- European Centre for Medium-Range Weather Forecasts (ECMWF) climatic grids for Minimum (MIN) and Maximum (MAX) temperatures) (ECMWF, 2019);
- Climate Hazards Group InfraRed Precipitation with Station data (version 2.0 final) for precipitation (rainfall) (Funk, 2015).

The climate change projections in the document were based on the assumptions and data reported by the Republic of Georgia in its National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) (MEPA, 2015a).

5.2 GENERAL OVERVIEW OF CLIMATE CHANGE IN GEORGIA

Georgia encompasses a variety of climate zones with average annual temperatures ranging from 9°–14°C and with precipitation ranging from 300–2700 mm (MEPA, 2015a). The Caucasus prevents the penetration of cold air masses from the north, while the Black Sea causes a distribution of moderate temperatures and large amounts of precipitation (USAID, 2016). Therefore, due to these climatic variations, climate change significantly differs in the country.

The observed climate trends (1960–2015) confirm evident impacts on key ecosystems such as forests as well as on human activities deriving mostly from:

I. increased average temperature by about 2.1°C;
II. increased number of hot days (1986–2010);
III. increased precipitation with a clear pick in Svaneti and Adjara (14 percent);[28]
IV. decreased precipitation along the Likhi Ridge and to the East;
V. decrease in glacier mass by 30 percent; and
VI. increased occurrence of extreme events such as landslides, mudflows, droughts, flash floods.

It is estimated that climate change and climate change induced extreme events cost the country every year between 0.2 percent and 0.7 percent of the GDP.

28 Annual aggregate precipitation growth between two periods (1966-1990; 1991-2015) was the highest in Svaneti low hill zones and Adjara mountain areas (up to 14 percent), growth was significant as well, in Poti and Imereti mountain areas (up to 10 percent) MEPA. 2017a. Climate Change National Adaptation Plan for Georgia's Agricultural Sector. Tbilisi. Similar estimates are provided by World Bank. 2012. Georgia: Climate Change and Agriculture Note. June 2012; World Bank. 2014. Reducing the Vulnerability of Georgia's Agricultural Systems to Climate Change. Impact Assessment and Adaptation Options; World Bank. 2015. Georgia: Country Environmental Analysis: Institutional, Economic, and Poverty Aspects of Georgia's Road to Environmental Sustainability. June 2015; ZOINET/EU. 2017. Georgia Climate Facts and Policy; USAID. 2017. Climate Risk in Georgia, Country Profile Fact Sheet; World Bank. 2019. Climate Change Knowledge Portal: Georgia.

The TNC (MEPA, 2015a) as well as a recent study (USAID, 2016) funded by the project "institutionalization of climate change adaptation and mitigation in Georgian regions" estimate that:

I. average annual temperature will increase by 0.8°/1.4°C by 2050 and by 2.2°/3.8°C towards 2100;
II. precipitation will decrease of up to 24 percent by 2100 with increased amount and intensity of daily rainfall;
III. number of hot days will increase;
IV. more frequent heat waves in June–August; and
V. by 2160 complete loss of Georgia's 734 glaciers.

Recent climate change vulnerability assessments of Georgia concur in identifying an alarming trend of:

I. shift of agroclimatic zone to higher altitudes;
II. increase in water demand for irrigation;
III. increased erosion phenomena and risk of landslides/mudslides;
IV. Introduction of new diseases and pests and;
V. Increased incidence of forest fires (USAID, 2017; WB, 2015; Matsiakh, 2016).

Concerning the impacts and vulnerability of the agriculture sector, contributing to the national GDP by 7 percent (2018), Georgia is still largely dependent on this climate sensitive sector and about 42 percent of Georgia's population lives in rural areas (UNDP, 2019). Agriculture still accounts for about 52 percent of the country's labour force while 98 percent of farm workers are considered self-employed (FAO, 2019). Climate dynamics already exacerbate soil erosion and damage crops through heavy precipitation events, flooding and land- and mudslides in the western regions and droughts in the eastern regions.[29] According to USAID (2016):

> "temperature increases will have varying impacts: higher altitudes will be able to support a wider range of crops and enjoy a longer growing season (as is the case for potential yield increases in corn, tomato and wheat in the eastern mountain region); however, higher temperatures may translate into decreased yields in the rest of Georgia."

29 According to USAID the severe drought of 2000 caused wheat yields to decline by 56 percent compared to the previous year (USAID, 2017).

As in the case of hazelnut production (Bosco, 2017; NFA, 2017), higher temperatures can also increase the spread of crop diseases and pests, particularly for citrus crops and possibly all the other annual and perennial crops. As climate change moves agro-climatic zones to higher elevations, production areas can also shift and furthermore induce increased deforestation and land degradation, magnifying the already evident impacts of climate change.

As reported by IFAD and the Ministry of Environmental protection and Agriculture: "Change of agro-climatic zones against the background of the temperature increase and change of precipitation is one of the highest risks caused by climate change for the agriculture sector" (MEPA, 2017a). Reduction or growth of the agro-climatic zones requires significant changes in agricultural practices and strategies and increased climate change mainstreaming across the sector. In fact, according to the ND-GAIN country index (Chen, 2017), Georgia is still facing adaptation challenges, but the country is well positioned to adapt.[30] Nonetheless, despite the efforts of the Ministry of Environmental Protection and Agriculture and the recent publication of the National Adaptation Plan of the Agriculture Sector in Georgia (MEPA, 2017), climate change related technical knowledge still requires specialized support. As highlighted in the (Intended) Nationally Determined Commitment (I)NDC (MEPA, 2015) and identified as a strong need in the national communications to the UNFCCC and national strategies (e.g. agriculture (MEPA, 2015c) and rural development (MEPA, 2017b), Georgia requires additional financial and technical support in order to ensure stable climate finance for climate action (OECD, 2018). Without this support, monitoring processes as well as actions to operationalize climate-smart identified agriculture approaches (e.g. ClimatEast, 2016) and increase preparedness among stakeholders may hardly come to execution.

Georgia's GHG profile is dominated by the energy sector (54.7 percent). Waste, agriculture, and industrial processes contribute by 7.4 percent, 15.2 percent, and 22.7 percent, respectively (MEPA, 2015a). Total emissions accounted in 2015 for about 14 MtCO2e (2.34 tonnes/CO2e per capita yearly) while land-use change and forestry (LUCF) removed 4.1 MtCO2e (MEPA, 2016) and, if supported in their natural growth and managed sustainably, are expected to sink an additional 2 MtCO2 by 2030 (MEPA, 2015b). The country plans to reduce unconditionally its GHG emissions by 15 percent below the BAU by 2030 and up to 25 percent in the case of technical cooperation, access to climate finance and technology transfer (MEPA, 2015b).

Although climate change is a transversal issue affecting each sector of the country, the Ministry of Environmental Protection and Agriculture is responsible for developing the policies and guidelines. Within the ministry, the Climate Change Service acts as coordinator and the National Environmental Agency as the source for climate data (MEPA, 2015a). The Climate Change Service assesses climate change risks and impacts, coordinates the preparation/implementation of adaptation strategies and action plans and liaises with other departmental ministries (energy, agriculture, labour, health and social affairs) for the assessment of various sectors' vulnerability to climate change. Georgia actively cooperates at a regional level on climate

30 According to the ND-GAIN indicator, Georgia is the 84th least vulnerable country and the 34th most ready country (Chen, 2017).

change issues, and is involved in the EU ClimaEast project among others. The main climate change (agriculture) documents and policies for Georgia are:

- Third National Communication to the UNFCCC (GoG-2016);
- Intended Nationally Determined Contribution (GoG-2015);
- Climate Change National Adaptation Plan for Georgia's Agriculture Sector (GoG-2017);
- Roadmap for EU approximation in environment and climate action (GoG-2015);
- National Climate Vulnerability Assessment (CFE-2014);
- The Georgian Road Map on Climate Change Adaptation (USAID-2016);
- Financing Climate Action in Georgia (OECD-2016).

5.3 THE IMPACT OF CLIMATE CHANGE ON TEA

Tea production is limited to a few agro-climatic zones in 58 countries around the world and it is highly sensitive to changes in growing conditions. The scientific community, as well as the Working Group on Climate Change (WGCC) of the IGG on Tea, consider that "climate change will have a significant impact on future tea production, independent from the geographic distribution of the tea crop" (FAO, 2015) and will mostly affect small producers (Ochieng, 2016). Literature on the subject thoroughly describes the implications of climate change for tea (*Camellia sinensis*) and the top tea producing countries where increasing temperatures have been identified (MIN-MAX), change in relative humidity, hours of sunshine and changing precipitation patterns as the main drivers of impacts on tea production (Ochieng *et al.,* 2016; Werner, 2017; ITC, 2014; UNCTAD, 2016).

"The possible fallouts of climate change are already witnessed in the loss of yields and increased management costs for developing coping strategies" (FAO, 2016a). Increased temperatures are shifting the suitable agroclimatic zone to higher altitudes and causing an increase in water demand. Changing precipitation patterns and the increase of extreme weather events such as droughts, hail storms, floods, frosts, extreme rainfall will have repercussions on production costs (need for irrigation), water availability, soil quality and stability and tea quality (Ahmed, 2014; Ahmed *et al.*, 2019). Nonetheless, according to WGCC- IGG/Tea: "A more serious problem, however, is the increased incidence of new pests and diseases that attack tea bushes" (FAO, 2015). This will mostly be due to the environmental conditions that facilitate pest and diseases, resulting in the collapse of the natural boundaries of pest and diseases.

Indirectly, the described changes in temperature and precipitation may result in additional indirect adverse impacts (e.g. deforestation, land use changes,

reduced biodiversity) owing to the establishment of new plantations in more suitable areas (ITC, 2014; FAO, 2015). Additionally, due to changes in precipitation patterns there will be more uncertainty caused by the application of fertilizers and pesticides and consequently, tangible adverse impacts on yields and tea quality (ITC, 2014). Therefore, as highlighted in literature:

> Knowledge of potential distributions and habitat preferences of tea (*Camellia sinensis*) under current and future climate conditions are vital for policy makers and stakeholders to develop suitable adaptation measures to mitigate against any detrimental effects of climate change
>
> [Jayasinghe, 2019].

5.4 CLIMATE CHANGE AND TEA PRODUCTION IN GEORGIA

Tea was introduced in western Georgia in the 19th century and by the 1980s tea plantations occupied over 65 000 ha in the regions of Adjara, Guria, Samegrelo and Imereti (ISET-PI, 2015; MEPA, 2017a). After independence from the Soviet Union, tea production drastically declined and most of the tea factories were abandoned (ISET-PI, 2015). Owners of privatized land plots started to eradicate tea plantations while the remaining tea plantations generally were abandoned and therefore uncultivated. Currently, productive tea plantations account for about 1800 ha and recent studies have assessed that some additional 6000 ha could possibly be put back into production (ISET-PI, 2015).

Reportedly, "Guria and Samegrelo are home to most of the plantations (each accounting for 36 percent of the total) and Guria is the leading region in terms of the area of productive plantations (accounting for 46 percent of total productive plantations in Georgia)" while about 60 percent (2014) of tea plots are owned and operated by smallholders (ISET-PI, 2015). This is clearly visible (see Figure 5.1) in a rapid assessment of the most recent aerial and satellite pictures of the four regions carried out by FAO for the purposes of this brief.

Region	Imereti
Municipality	Tskaltubo
Latitude	42°21'30.20"N
Longitude	42°43'20.80"E
Plot size	0.11 ha

Figure 5.1

2010–2018 evolution of a smallholder tea plantation in the Imereti region of Georgia

SOURCE: Pictures taken from Google Earth Pro.

As tea is native to the humid tropics and subtropics, the available literature on climate change impacts on *Camellia sinensis* focuses mostly on the varieties (e.g. sinensis and assamica) from the top producing countries (Werner, 2017).[31] Allegedly, although nine varieties result as cultivated in the county, Georgia's tea production is mainly possible thanks to locally developed tea hybrids/cultivars[32] (Georgia hybrid NO 1, NO 2 and NO 8[33]) that tolerate cold and are drought-resistant (ISET-PI, 2015). Unfortunately, there is not enough scientific data on the phenology of such hybrids and therefore on potential climate change impacts on Georgian's tea. Therefore, comparable production areas such as Turkey[34] or other crops with the same temperatures and water requirements (i.e. tangerine [MEPA, 2017a]) will be used as proxy.

The four Georgian regions where tea production is still marginally ongoing are excellent representations of the national climate scenario and of the described changes in temperature (MIN and MAX) and precipitation (rainfall). Reportedly, MIN and MAX temperatures are increasing in each district while precipitation (annual rainfall), although highly variable, is generally stable apart from the Samegrelo region where annual rainfall appears to be decreasing (Table 5.1). As for the national scenario, projections forecast further increases in temperature and rainfall reduction in each region.

31 China, India, Kenya, Sri Lanka.
32 Due to lack of scientific literature, it was not possible to determine if the reported Georgian tea plants are hybrids or new cultivars.
33 Hybrid NO 8 is also known as "Winter Hero" thanks to its capacity to withstand frost, cold and drought.
34 Although Turkish tea plantations are made largely by the Assam and sinensis varieties,Turkey started tea production with the Georgian seeds imported to Rize in 1927.

Table 5.1
Temperature and rainfall* trends/projections (+ Increase; - Decrease)**

	Temperature (trends) 1989–2016		Temperature (projections) 2021–2100		Precipitation (trends) 1981–2018	Precipitation (projections) 2021–2100
Region	Annual min	Annual max	Annual min	Annual max	Annual rainfall	
Adjara	+ (1.069 C)	+ (0.08 C)	+ 2.2°/3.8°C (TNC 2016) +/- with a constant decrease reported in July and August - with a constant decrease reported in July +/- with a constant decrease reported in March		+/- with a constant decrease reported in August	-14% (TNC 2016)
Guria	+ (1.022 C)	+ (0.443 C)			+/- with a constant decrease reported in July and August	
Samegrelo	+ (0.665C)	+ (0.280 C)			- with a constant decrease reported in July	
Imereti	+ (0.716 C)	+ (0.507 C)			+/- with a constant decrease reported in March	

*Rainfall in the four regions shows high levels of variability.

** Sources for trends: Climate Hazards Group InfraRed Precipitation with Station data and The European Centre for Medium-Range Weather Forecasts for temperatures. Sources for precipitation (rainfall): Third National Communication (TNC) to the UNFCCC calculated using Climate Wizard4.

SOURCE: Consumption estimates for the former USSR are based on FAOSTAT food balances standardized data from 1985. FAOSTAT. 2020. [online]. Food Balances. www.fao.org/faostat/en/#data/SCL.

As reported in the previous sections, the registered increase in temperature (MIN-MAX) and changes in precipitations' patterns are causing the shifting of agroclimatic zones, in addition to other phenomena. According to the Climate Change National Adaptation Plan for Georgia's Agriculture Sector (MEPA, 2017a), the country can be divided into three agroclimatic zones (see Figure 5.2) where conditions for tea production are: (i) favourable; (ii) possible if irrigated; and (iii) not suitable.

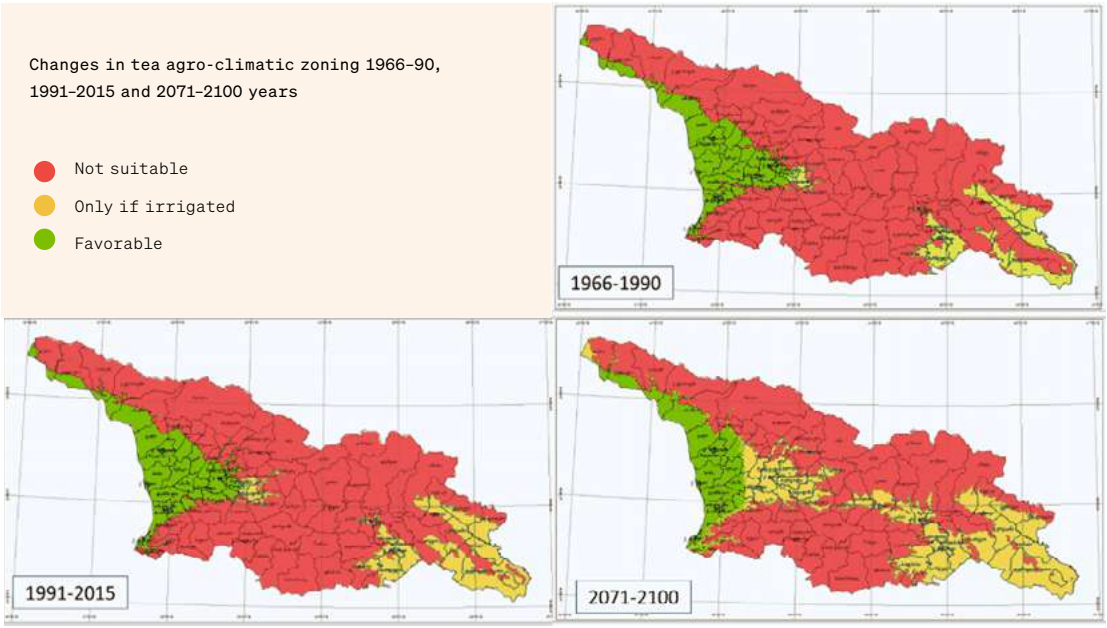

Figure 5.2
Changes in teas agro climatic zoning 1966-2100*

SOURCE: Adapted from MEPA. 2017. Climate Change National Adaptation Plan for Georgia's Agriculture Sector. Figure 7.1.

NOTE: The agro-climatic zones shifting was evaluated, according to changes of the following agro-climatic parameters: total of active temperatures, precipitation in the vegetation period and average absolute minimal temperature. These are the parameters used for agro-climatic zoning of Georgia for the first time in 70s.

*The values presented here refer to the declared export value per kg for black tea in packages of more than 3 kg (bulk), equivalent to Harmonized System (HS) code 090240, as reported by the National Statistics Office of Georgia through TDM.

Analysing the available literature and applying a conservative and precautionary approach, it is possible to assume that (Table 5.2): (i) the exposure of tea production to climate change in Georgia is medium high;[35] (ii) due to the lack of research and development (R&D) investments in the sector in the past 20/30 years and to the smallholding reality of the production the sector is vulnerable; and (iii) possible impacts may include reductions of yields and quality of Georgian tea.

35 Especially assuming an expansion to past scale of production.

Table 5.2

Reported exposure, vulnerability and impacts in Adjara, Guria, Samegrelo and Imereti

Variable	Exposure	Main drivers of vulnerability	Possible adverse / beneficial impacts	Rationale
Temperature	Medium	**Scattered distributions of remaining tea plots and severe adaptation deficit of the sector.** Lack of R&D in the tea sector in Georgia has not improved or adapted to existing varieties or production practices. Tea production in Georgia is still largely dominated by smallholders lacking the financial and knowledge and capital to address climate change or to move towards climate-smart approaches to tea production, as well as to coordinate preventive and proactive integrated pest management practices.	**Reduced resilience** of current varieties leading to reduction of yields and quality. Nonetheless, the increasing temperatures are opening new areas favourable for tea production (ref: Figure 2)	The existing Georgian tea plants were developed to grow in cold climates during the 1930s [ISET-PI, 2015]. Although reported trends and projects are within the limits of tea growth parameters (Nair, 2010), the registered and projected increase in temperatures may reduce the resilience of plants and potentially their productivity in existing areas, but the areas where tea production is possible if irrigated could also expand.
Precipitation	Medium		**Need of irrigation** technologies to face water stress.	Current trends describe a situation where rainfall is sufficient for tea production. While existing varieties were designed to resist droughts, projections indicate that rainfall will decrease, thus increasing the areas requiring irrigation. This might reduce the opportunity cost of investing in restoring tea fields and/or initiate new plantations.
Pest and diseases	Very high		**Reduce yields** and quality of productions.	There is sufficient evidence in literature to assume that damages from pests and diseases will be magnified and intensified by climate change. Although tea is not a major crop in Georgia, pests and diseases that are currently affecting neighboring countries (e.g. Turkey and Iran) could easily move to Georgia with more favourable temperatures and humidity.
Extreme events	High			Although hail-related damage is registered in more often eastern Georgia, the risk of hail events in western regions of the country may increase due to high climatic variables. Tea productivity and quality could be severely affected by extreme events such as hail, which would negatively affect tea production in Georgia.

SOURCE: Authors' own elaboration.

5.5 ENVIRONMENTAL IMPACT OF TEA PRODUCTION IN GEORGIA

The main adverse environmental impacts of tea production[36] depend mostly on: (i) land use and land cover changes (Yuksek, 2009); (ii) cultivation and management practices (FAO, 2016); (iii) geographical position and (iv) processing technology (Munasinghe, 2017; Allen, 2019). On the other hand, as *Camellia sinensis* is a perennial plant, tea production may also benefit farmers as well as have positive returns when plants are located in areas subject to erosion and instability, and if planting/cultivation/management/processing of tea is done adopting precise non-intensive, climate-smart (Tran, 2019; Reay, 2019) and organic protocols (Seyis, 2018; Qiao, 2015; Doanh, 2018; FAO, 2016b; Kamau, 2015).

Allegedly, Georgian tea is a quasi-organic crop because the remaining farmers are not applying mineral inputs nor are they using any specific farming machinery. A small group of local producers founded the Georgian Organic Tea Producers Association that aims at formalizing the local tea production practices to establish a precise protocol to reach niche markets outside Georgia. The organization involves only 16 families out of an estimate of over 150 (ISET-PI, 2015), therefore the "close to organic" production methods appear to be a consequence of the limited relevance of tea production within the overall agriculture economy of the country rather than a precise strategy of farmers.

On the contrary, transportation from the field to the remaining factories as well as the processing and packaging of leaves is still being done using outdated technology and unsustainable sources of energy (fossil fuels and fuelwood) with probable adverse impacts on the environment. Table 5.3 reports the main recorded adverse and beneficial impacts linked to tea production in Georgia, taking into consideration both a stable and expanding situation.

36 Cradle to Gate approach including production/purchase of raw materials, cultivation, waste and processing analysed with LCA approaches (Doublet, 2010).

Table 5.3

Main known environmental impacts of tea production based on tea farming and processing steps

	Activity	Adverse impacts		Beneficial impacts
From nursery to harvest	Planting	Low	Due to seedlings' preparation and hardening in nurseries. Impact may become medium/high depending on inputs management at the nursery. In the case of new plantations and/or revitalization of abandoned ones the impact is to be considered potentially high. Due to land cover changes, loss of biodiversity and reduced resilience of the ecosystem. Additionally, in the analyzed regions new plantations might conflict with the existing system of protected areas and park that is particularly extended in these regions. Additionally, in the case of aging and/or abandoned tea plantations soils' PH tends to be further lowered restricting the use of possible alternative crops (Goss, 2014) or the need of applying PH regulators such as lime with additional potential adverse impacts.	Establishing tea plantation on agriculture lands in slopes prone to soil instability and erosion and landslides may contribute in reducing the risk of land and mudslides and in increasing carbon removals.
	Manuring	Medium / high	Depending on inputs origin (organic vs mineral) and management. The use of mineral fertilizers can pollute soils and water resources with major adverse impacts on ecosystems and human/animal health.	To be determined case by case depending on agriculture practices and processing technologies, tea production **may increase carbon removals.**
	Irrigation and drainage	Medium / high	Depending on water sources (e.g. surface vs ground water) and water management strategy, and irrigation/drainage technology. The use of irrigation may modify the soil structure and composition and may affect the capacity off unexperienced farmers to apply inputs such as fertilizers.	
	Pest/ Diseases control	High	Depending on inputs origin (mineral vs organic) and management (e.g. conventional vs integrated), pests and diseases control can have severe adverse impacts on biodiversity, water resources and human/ animal health.	
	Weed Control	High	Depending on inputs origin (mineral vs organic) and management, weed control can have severe adverse impacts on biodiversity, water resources and human/animal health.	
	Pruning/ Skiffing/ Plucking	Low/ medium	Depending on technology (machine vs workers), source of energy and maintenance can have adverse impacts on biodiversity, water resources and human/animal health.	
Transport and Processing	Transport	Low / medium	Depending on technology (in farm), transport type and distance to processing (off farm) can have adverse impacts on biodiversity, water resources and human/animal health.	
	Withering			
	Rolling/ Fermentation/ Drying/ Sorting			

SOURCE: Mukhopadhay, M. and Mondial, T.K. 2017. Cultivation, Improvement, and Environmental Impacts of Tea. In: *Environmental Science*. 22 pp. Oxford University Press, 2021.

5.6 TEA AND POTENTIAL COMPETING CROPS IN TARGET AREAS

While tea production in Georgia declined, other cultivations slowly developed and started to "encroach" many of the tea areas. Reportedly (Goss, 2014), citrus (i.e. tangerine), blueberries, hazelnut and feijoa are now the main potential competitors of tea. As reported in the previous sections, the lack of available literature on specific crops, their climate change exposure/vulnerability and their impact on the environment does not allow for a comparative analysis. Nonetheless, although detailed studies are recommendable and assuming that: (i) all the alternatives will be organic; (ii) alternatives do not imply land cover land use changes; (iii) alternatives are not intensive or semi-intensive; and (iv) alternative substitute plantations located on soils on slopes: the differences in terms of exposure and impacts may be marginal (Table 5.4).

Table 5.4
Comparative hypothetic impact scenario between tea and its competitors in target areas

Indicator	Exposure	Citrus (Tangerine)	Blueberry (highbush cultivars)	Hazelnut	Feijoa
Possible Exposure to reported and projected climate change impacts (+Temperature/-Precipitation/+Hail/+Pest and Diseases)	Medium / high	High. It requires pollinators to fruit and the erratic patterns of rainfall may affect the pollination. Fruits are highly delicate and may be severely affected by hail, strong winds and other hazardous weather events (e.g. frosts, heat waves). Increasing temperatures may require irrigation as well as increase the risk of damages from pests and diseases.	High. It requires pollinators to fruit and the erratic patterns of rainfall may affect the pollination. Fruits are highly delicate and may be severely affected by hail, strong winds and other hazardous weather events (e.g. frosts, heat waves). Increasing temperatures may require irrigation as well as increase the risk of damages from pests and diseases.	High. Fruits may be severely affected by hail, strong winds and other hazardous weather events (e.g. frosts, heat waves). Increasing temperatures may require irrigation as well as increase the risk of damages from pests and diseases.	High. It requires pollinators to fruit and the erratic patterns of rainfall may affect the pollination. Fruits are highly delicate and may be severely affected by hail, strong winds and other hazardous weather events (e.g. frosts, heat waves). Increasing temperatures may require irrigation as well as increase the risk of damages from pests and diseases.
Possible Adverse Environmental Impacts (as per Table 3.1)	Low / medium	Low/medium. If the assumptions are confirmed, the impact of citrus farming is mostly linked to the reduced biodiversity and reduced resilience of the ecosystem.	Low/medium. If the assumptions are confirmed, the impact of blueberry farming is mostly linked to the reduced biodiversity and reduced resilience of the ecosystem.	Low/medium. If the assumptions are confirmed, the impact of hazelnut farming is mostly linked to the reduced biodiversity and reduced resilience of the ecosystem.	Medium. If the assumptions are confirmed, the impact of feijoa farming is mostly linked to the reduced biodiversity and reduced resilience of the ecosystem. To be considered that feijoa is a recent introduction in Georgia [45;46].
Possible Beneficial Environmental Impacts (as per Table 3.1)	Low / medium	Medium/high. If the assumptions are confirmed, citrus plantations may contribute to carbon removals and consolidation of soils on slopes. Also, citrus does not require processing to be consumed reducing the cradle to gate and cradle to shelf approach.	Low/medium. If the assumptions are confirmed and if the high bushes varieties are used, blueberry plantations may contribute to carbon removals and consolidation of soils on slopes. Also, blueberries do not require processing, but cold storage for consumption, reducing the cradle to gate and cradle to shelf approach.	Medium. If the assumptions are confirmed, hazelnut plantations may contribute to carbon removals and consolidation of soils on slopes.	Low/medium. If the assumptions are confirmed, feijoa plantations may contribute to carbon removals and consolidation of soils on slopes. Also, feijoa fruits do not require processing, but possibly cold storage for consumption, reducing the cradle to gate and cradle to shelf approach.

SOURCE: Authors own elaboration.

5.7 CONCLUSIONS AND RECOMMENDATIONS

Tea production in Georgia is indeed vulnerable to climate change, but not to the same extent as in other tea production regions such as Kenya, Sri Lanka, India and China. While changes recorded or projected may not result in immediate adverse impacts, in areas potentially suitable for tea production the vulnerability of current productions, as well as of future expansion, should not be underestimated. The described trends and projections may reduce the overall resilience of tea mostly because of increased demand for water (especially in potential expansion areas), and increase exposure to new pests and diseases. Although Georgia claims that its tea production is not facing pest and diseases problems now, the country does not appear ready or equipped to cope with the risk of outbreaks similar to those currently affecting Turkey. Addressing the issues caused by these types of bottlenecks will reduce the overall risks involved in cultivating tea and expanding its production. Therefore, tea expansion in the country will require parallel investments in research and development, as well as water management initiatives to prepare for adverse impacts and to ensure that the irrigation required for tea in new areas will not adversely affect water resources.

Concerning the general environment, the adverse impacts on the current tea cultivation in Georgia appear to be limited or minimal for existing farms and moderate to high in the case of new plantations. On the contrary, assuming there is or will be no land use change; tea cultivation is an effective way to protect mountainous soils from erosion and instability. Nonetheless, the overall impact of tea processing should be considered moderate to high due to the obsolete technologies and energy sources currently in use. Therefore, tea expansion in Georgia is feasible, assuming that appropriate safeguards are in place and that environmental impacts from cultivation to processing are limited or neutralized. This point is of particular importance, as the expansion of the sector may possibly cause conflicts with the current network of protected areas and national parks, and reduce the chances to access niche markets such as the organic and carbon neutral ones. Finally, as climate change and environmental concerns may negatively impact tea production, to ensure its long-term environmental and economic sustainability the country should secure adequate investments in:

- ensuring a precise mapping of past, existing and suitable areas for tea production;
- ensuring research and development investments in the sector;
- enhancing the capacity of institutional and private stakeholders to identify and address pests and diseases events and to act preventively;

- supporting organic,[37] carbon neutral and climate-smart agriculture (CSA) practices of tea production[38] and promoting in particular a mixture of cropping and agroforestry to ensure shading of tea plants against increasing temperatures and protection from hail;
- ensuring certification protocols and training programmes for farmers and entrepreneurs interested in organic and carbon neutral productions;
- supporting the academia in resuming its work related to tea to ensure long-term resilience of the sector.

37 References to incentives to enhance organic tea farming are sufficiently described in literature and it is worth mentioning that in Turkey, where similar climate and environmental conditions are available, during the period 2008-2016 organic tea processing grew from 361 tonnes per year to over 22 000 per year (Seyis *et al.*, 2018. *Organic Tea Production and Tea Breeding in Turkey: Challenges and Possibilities. Ekin.* Journal of Crop Breeding and Genetics, 4(1):60- 69). Although these issues are still a topic of debate among practitioners, various case studies from Turkey, China (Qiao *et al.*, 2015. Assessing the social and economic benefits or organic and fair trade tea production for small-scale farmers in Asia: A comparative case study of China and Sri Lanka. In: *Renewable Agriculture and Food Systems.* 12 pp.) Viet Nam, (Doanh, *et al.*, Impact of Conversion to Organic Tea Cultivation on Household Income in the Mountainous Areas of Northern Viet Nam. In: *Sustainability, 10:4475.*) Sri Lanka (FAO,2016b. Report of the Working Group on Organic Tea. Committee on Commodity Problems. Intergovernmental group on Tea), and Kenya (Kamau *et al.*, 2015. Prospects for organic tea farming in Kenya: Two case studies. Tea Research Foundation of Kenya.) indicate that organic tea production requires lower investments (key point for smallholders), but requires more labour and - potentially - yields less than conventional tea. In general, for the reported case studies, the price premium of organic tea compensated for the extra labour input and lower yield.

38 Although the available literature considers that further studies on the use of organic fertilizers on tea are needed, various authors suggest that – considering the overall ratio between adverse and beneficial impacts of using mineral fertilizers versus organic ones – organic fertilizer may be more efficient in the long run (Islama *et al.*, 2017. Effect of Organic Fertlizer on the Growth of Tea (*Camellia sinensis* L.). In: *Journal of Basic and Applied*; Gerbrewold, 2018. *Cogent food & agriculture, 4:1).*


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Chapter 6
Consumption

CONSUMPTION TRENDS

Based on our estimates, total tea consumption in Georgia is about 1560 tonnes per year, with an approximate total value of GEL 88.5 million (or USD 31.5 million; Table 6.1). According to the National Statistics Office of Georgia, only about one-quarter of tea is consumed within households, and the remainder is consumed at the workplace or in the HoReCa sector, which includes consumption by tourists and other visitors. This means that per capita the consumption is around 400 grammes per year, of which about 100 grammes are consumed by households while the rest is consumed in the HoReCa sector. Per capita, consumption is close to the EU average and much lower than in neighbouring Azerbaijan, Turkey or Russian Federation, which all have strong tea-drinking cultures. While Georgia has been a traditional producer of tea, it does not have the strong tea-drinking tradition found in most countries in the region (Figure 6.1).

Table 6.1

Georgia: key tea consumption indicators

Average total yearly consumption (T)**	1564
Average per capita yearly consumption (kg)**	0.42
Average per capita yearly consumption within households (kg)**	0.10
Averge yearly consumption in households (T)*	355
Average yearly consumption per household (kg)*	0.34
Weighed average price per kg (GEL)*	56.6
Total tea market value (million GEL)**	88.5
Weighed average price per kg (USD)**	20.1
Total tea market value (million USD)**	31.5

SOURCE: *Geostat. 2019. Data taken from the National Statistics Office of Georgia. [online]. www.geostat.ge/en.
**Author's calculation.

Regarding prices, tea prices for both loose tea and teabags have shown an upward trend in Georgia, with an increase in the weighted average price of both types of 40 percent between 2012 and 2018 (Figure 6.2). As of 2018, the average consumer price for loose tea was GEL 38/kg (USD 14/kg) and GEL 64/kg (USD 23/kg) teabags. According to local experts, 30 percent of the tea consumed in Georgia is loose tea[39] and 70 percent is in the form of teabags. The average price of a 50 g package of 25 teabags was about GEL 3.3/kg (around USD 1.1/kg) in 2018 (Geostat). Although more tea is consumed during winter, the price of tea is not affected by seasons and remains stable throughout the year.

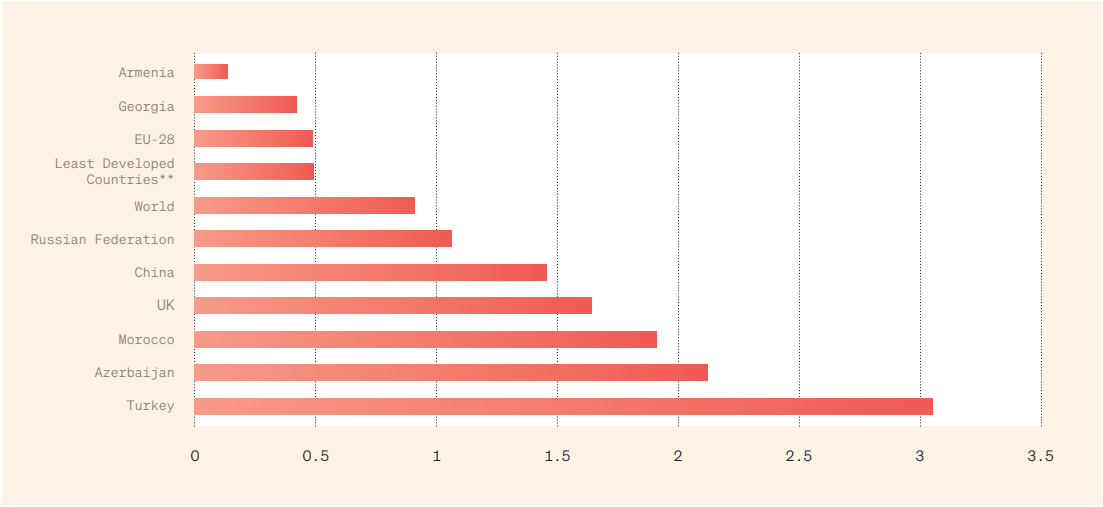

Figure 6.1
Average yearly per capita tea consumption (kg)

SOURCE: Geostat, 2019 for Georgia; Azerbaijan Statistics Office, 2018 for Azerbaijan; FAOSTAT, 2017 for other countries. www.geostat.ge/en,www.stat.gov.az/?lang=en, www.fao.org/faostat/en/#home.

39 Most of the loose tea is consumed by the Muslim population of Georgia.

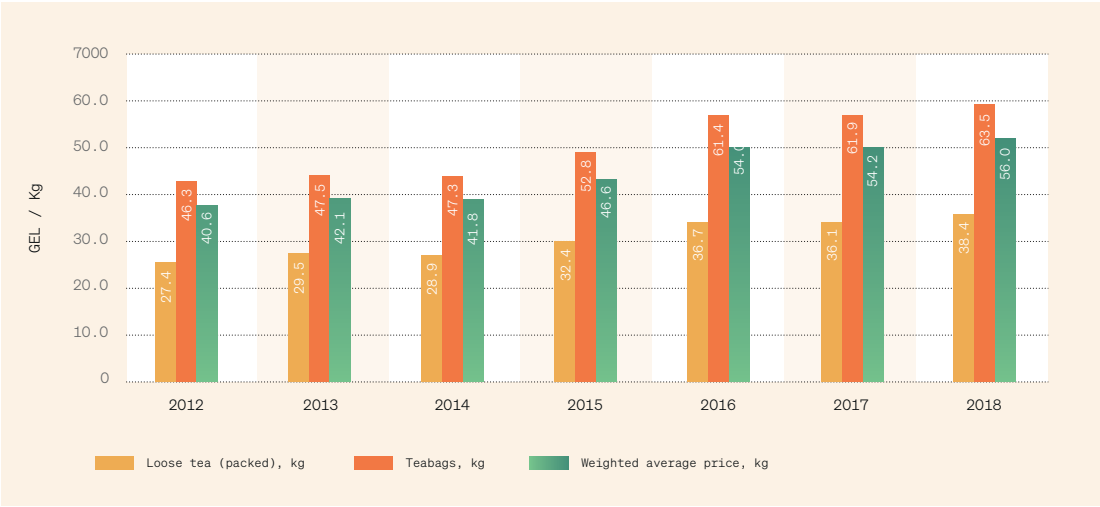

Figure 6.2

Retail prices of tea in Georgia (2012–2018)

SOURCE: Geostat. 2019. Data taken from the National Statistics Office of Georgia. [online]. www.geostat.ge/en. Inflation adjusted (coefficient used for weighing: 30 percent loose tea and 70 prcent teabags).

On a global scale the price elasticity of tea demand is relatively low and differences in consumption are influenced significantly by local culture and tradition. While there is no data on tea demand elasticity in Georgia, FAO estimates that global demand elasticity for black tea varies between -0.32 and -0.80, which means that a 10 percent increase in black tea prices leads to a decline in demand for black tea between 3.2 percent and 8 percent, revealing the relative lack of elasticity of demand for black tea. In fact, FAO statistics show that per capita tea consumption in less developed countries[40] is slightly higher than in the European Union, which is due to long-standing consumer preferences ingrained in the local culture.

While rising incomes in Georgia might open up opportunities for high-end niche products, such as specialty or health and wellness teas, a focus on quality should be a priority not only with a view to reach lucrative export markets, but also in terms of domestic marketing due to the limited size and growth potential of the national market. The limited size of the domestic market makes the issue of mixing Georgian-grown tea with imported, often low-quality tea, and marketing it as "Georgian tea", all the more problematic. The effect of such practices on the evolution of consumer preferences both domestically and in key export markets could be significant, as consumers believe that the characteristics of the tea they are accustomed to are typical of Georgian tea, while in fact they are consuming mostly imported tea. The introduction of rules of origin or geographic indications coupled with parallel efforts to educate consumers about the unique characteristics of tea grown in Georgia are a possible basis for the creation of more discerning tea markets, not only domestically but also in key export destinations.

40 As per the 2018 UN Department of Economic and Social Affairs definition, please see www.un.org/development/desa/dpad/least-developed-country-category/ldcs-at-a-glance.html

Chapter 7
Trade

7.1 TEA TRADE POLICY

Georgia has a free trade agreement with a number of trading partners, including the European Union (summarized in Table 7.1). It should be mentioned that in Turkey and Iran, tea imported from Georgia has higher tariffs than tea exported to Georgia.

Table 7.1
Trade arrangements with key Georgian tea trading partners

Country	Trade rule	Export duty to	Import duty from	Non-tariff barriers
Iran	No Free Trade	Green Tea (090210, 090220) – 20%* Black Tea (090230, 090240) – 0%, but Black Tea bag (09023010) – VAT (9 %) and 55%* **Total customs duty and commercial benefit, based on trade agreement between Iran and Georgia.*	12% of trade value. **Tax code of Georgia Article 197: import duty rates.* https://matsne.gov.ge/en/document/view/1043717?publication=148	
Turkey	Free trade	Ad Valorem duty for Green Tea (090210, 090220) and Black Tea (090230, 090240) – 145% **WTO Tariff data.* http://tdf.wto.org/default.aspx	12% of trade value. **Tax code of Georgia Article 197: import duty rates.* www.matsne.gov.ge/en/document/view/1043717?publication=148	
Russian Federation **Free trade agreement between Russian Federation and Georgia.* www.matsne.gov.ge/ka/document/view/1211507?-publication=0	Free trade	0%	0%	
Azerbaijan **Free trade agreement between Azerbaijan and Georgia.* www.matsne.gov.ge/ka/document/view/1211460?-publication=0	Free trade	0%	0%	
European Union **Free trade agreement with the European Union.* www.dcfta.gov.ge/ge/agreement	DCFTA	0%	0%	1. Certificate of origin —issued by revenue service; valid for 4 months.* *Free trade with the European Union.* 2. Phyto-sanitary certificate - Issued by National Food Agency

SOURCE: Authors' own elaboration.

7.2 TEA TRADE BALANCE AND PRICE

The loss of the Soviet market following the collapse of the USSR in the early 1990s is largely responsible for the decline of the Georgian tea sector. In fact, at its peak in the mid-1980s, the bulk of Georgia's tea production of 150 000 tonnes mainly supplied other Soviet republics, accounting for up to almost two-thirds of the total tea consumption in the USSR at the time.[41] By 2006, Georgia had become a net tea importer and its exports stagnated at around 2000 tonnes/year until 2016 when they slowly started picking up again (Figure 7.1).[42]

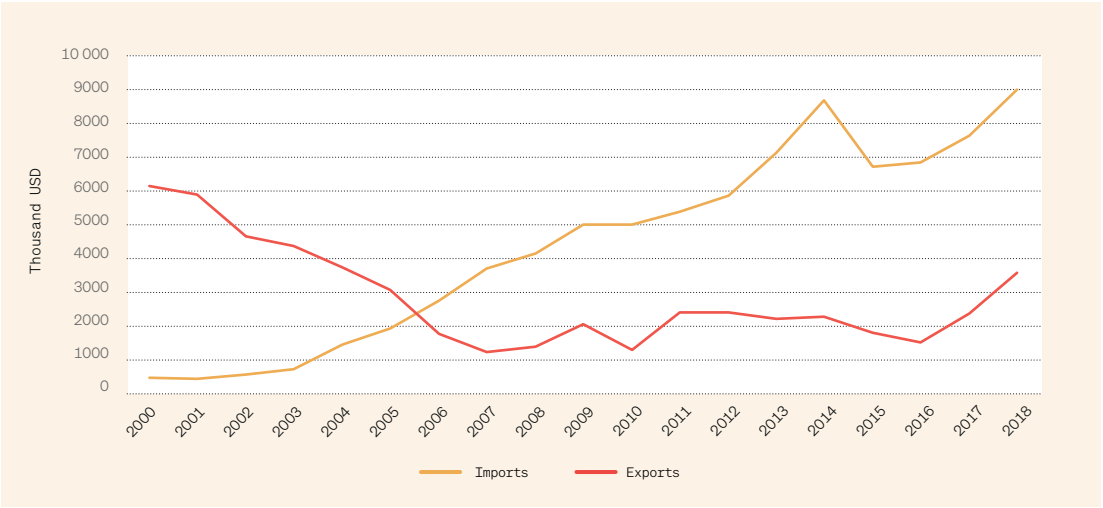

Figure 7.1
Tea trade in Georgia (value in USD thousand)

SOURCE: Geostat, 2019. Data taken from the National Statistics Office of Georgia.

However, if we look at the volumes of export-import, the negative trade balance is less than the balance in terms of value (2.5 times more import than export). The import volume was 1.2 times more than the export volume on average in 2014–2018. This means that the unit price of exported tea is 2–3 times lower than the unit price of imported tea (albeit this gap is shrinking from 3.3 in 2016 to 1.9 in 2018).

On a more positive note, it is important to highlight that in spite of the decreasing trend in tea prices internationally, the average price of tea exported from Georgia has increased from USD 1/kg in 2010 to around USD 2.5/kg in 2018–2019 (Figure 7.2).

41 Consumption estimates for the former USSR are based on FAOSTAT food balances standardized data from 1985.
42 Exports reached an historic minimum of 1600 tonnes in 2016.

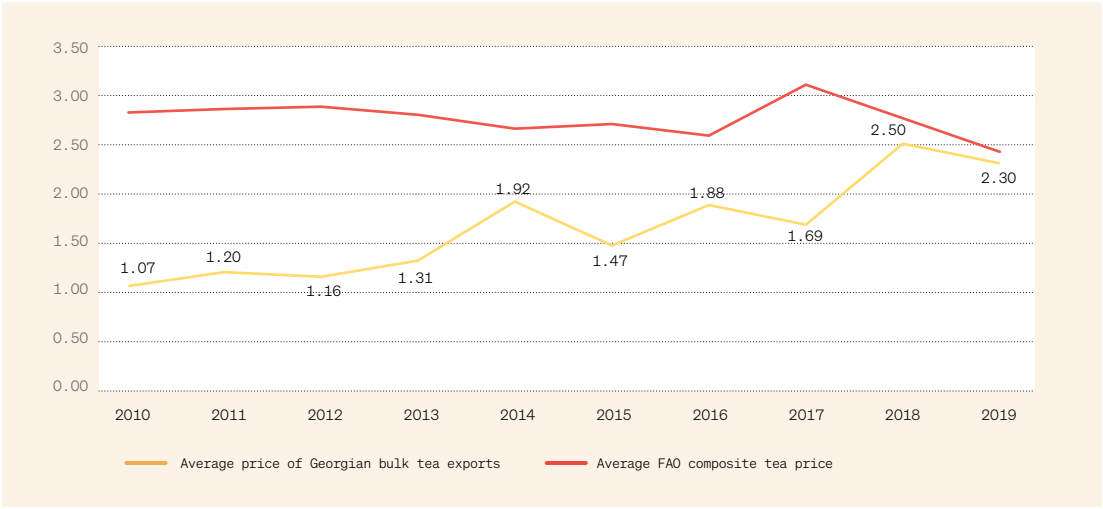

Figure 7.2
Evolution of international and Georgian export price

SOURCE: FAO Food Price and Monitoring tool for the FAO Composite Tea Price* and TDM for the average price of Georgian bulk tea exports**.

*The FAO Tea Composite Price is a weighted average of weekly auction prices of four major markets for Black Tea: Mombasa, Colombo, Kolkata and Kochi. The yearly averages presented here are based on the arithmetic mean of the 12 monthly values for each year.

**The values presented here refer to the declared export value per kg for black tea in packages of more than 3 kg (bulk), equivalent to HS code 090240, as reported by the National Statistics Office of Georgia through TDM.

7.3 TEA IMPORTS

Figure 7.3 shows the average tea import value, volume and price in Georgia for its main import origin countries for the period 2014-2018. According to trade volume, the main exporters to Georgia were Turkey, Azerbaijan and Sri Lanka, while in terms of trade value the main ones were Azerbaijan, Sri Lanka, and Russian Federation.

Since 2017, Georgian tea imports have averaged around 2500 tonnes per year with half of them accounted for by black tea in bulk. In turn, these were mostly constituted by low-value (USD 0.2/kg) imports from Turkey (50 percent) and higher-value imports from Sri Lanka and India (around USD 2.3/kg). The other half were imports of packaged tea, mainly from Azerbaijan and Russian Federation, with an average import value of USD 6/kg and above. Green tea imports were marginal (less than 3 percent of total volumes).[43] The import value of each type of tea is summarized in Table 7.2.

43 Data on volumes and prices refers to 2019 (TDM).

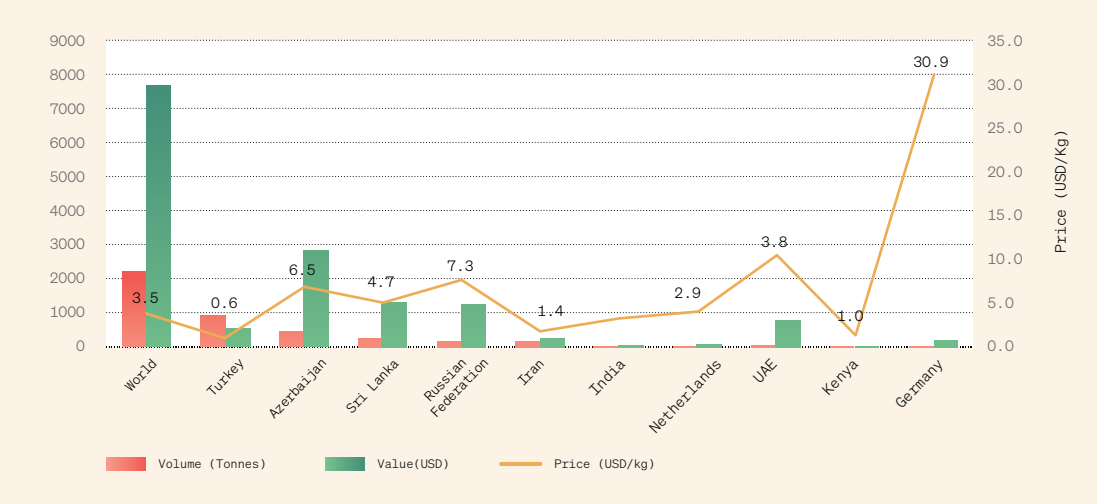

Figure 7.3
Georgian tea imports by country (volume in tonnes, value in USD thousand and price in USD), 2014–2018 average

SOURCE: International Trade Centre. 2014. [online]. www.trademap.org/.

Table 7.2
Value of imported tea by categories (in USD thousand)

Code	Product category	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
090210	Green Tea (packing in <= 3 kg)	274	300	270	300	459	507	513	554	536	579
090220	Green Tea (packings in > 3 kg)	37	16	26	25	34	58	32	54	364	35
090230	Black Tea (packing in <= 3 kg)	4668	4344	4604	4781	5632	6480	5438	5329	5728	6870
090240	Black Tea (packing in > 3 kg)	6	322	463	710	915	1528	678	834	911	1389
	Total	4985	4982	5363	5816	7039	8573	6661	6771	7540	8873

SOURCE: International Trade Centre, 2019. Trade Map: Trade statistics for international business development.

Considering that domestic tea consumption is estimated at around 1500 tonnes/year, it is likely that a significant share of bulk tea imports caters to the Georgian tea processing industry, which subsequently re-exports them under its various brands.

7.4 TEA EXPORTS

Figure 7.4 shows the average figures of the value of Georgian tea exports, their volume and price according to the main destination countries. According to trade value, the main importers are Mongolia, Azerbaijan, and Turkey, while in terms of trade volume the main ones are Mongolia, Russian Federation, and Turkey. As far as the exported tea price is concerned, the weighted average export price of Georgia's tea is 1.1 USD/kg. The least expensive tea exports went to Kazakhstan (USD 0.5/kg), Mongolia (USD 0.6/kg), and Russian Federation (USD 0.7/kg), while Azerbaijan (USD 4.9/kg) purchased the most expensive tea from Georgia.

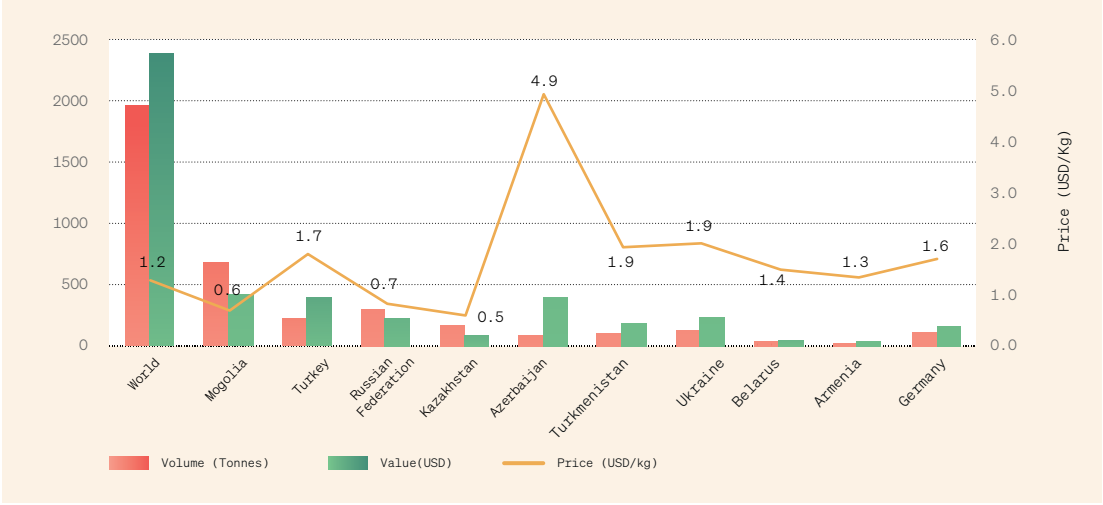

Figure 7.4
Georgian tea exports by country (volume in T, value in USD thousand and price in USD), 2014–2018 average

SOURCE: International Trade Centre. 2019. [online] www.trademap.org.

In terms of volume, Georgia's tea exports are dominated by green tea, either packed as a final product (HS 090240), or in bulk in packages weighing more than 3 kg (HS 090230) (Figure 6.7). However, in terms of USD value, black tea dominates exports as it can fetch a higher price (Table 7.3 and Figure 7.5). The price difference between two categories of green tea is not significant, while the price of the final black tea product (HS 090230) exported from Georgia is 2–3 times more expensive than the price of black tea exported in bulks (HS 090240).

Table 7.3
Value of imported tea by categories (in USD thousand)

Code	Product category	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
090210	Green Tea (packing in <= 3 kg)	174	230	270	300	459	507	513	554	595	369
090220	Green Tea (packings in > 3 kg)	564	357	658	821	695	434	264	393	756	657
090230	Black Tea (packing in <= 3 kg)	27	89	563	309	352	127	259	261	410	1417
090240	Black Tea (packing in > 3 kg)	1347	685	647	687	728	1250	735	432	654	1141
	Total	2112	1361	2445	2458	2278	2329	1856	1573	2415	3583

SOURCE: International Trade Centre. 2019. [online] www.trademap.org.

Georgia has a different approach *vis-à-vis* neighbouring Azerbaijan, in that it has diversified its tea exports both in terms of types of tea and export markets (Figure 7.5). In 2019, around two-thirds of the total exported volumes were comprised of green tea, mostly exported to Central Asia (Mongolia, Kazakhstan and Turkmenistan). This is a significant shift from Soviet times, when Georgia almost exclusively exported black tea to other Soviet republics. Black tea is now exported mostly to neighbouring Turkey (in bulk) and Azerbaijan (in packs of less than 3 kg). Most of the export value was created in the packed black tea sector, which represents only 12 percent of tea exports in volume terms but accounts for almost half of their USD value.

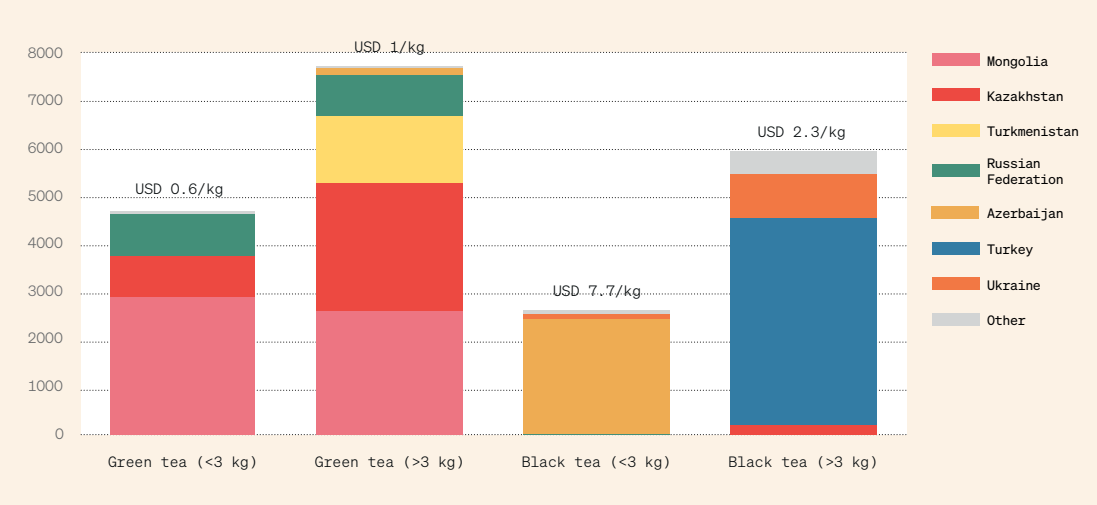

Figure 7.5
Distribution of Georgia tea exports and average price, 2019 (volume in tonnes, price in USD)

SOURCE: Trade Data Monitor (TDM). 2020. [online]. www.tradedatamonitor.com.

However, the average Georgian green tea leaf production for 2016–2018 translates into a made-tea production of about 600 tonnes from locally produced tea leaves, which barely reaches a third of exported volumes. In addition, taking into account domestic consumption, it is highly likely that the majority of Georgian tea exports are made of processed foreign teas and not of domestically grown tea, which are blended or packaged by the Georgian tea processing industry. As previously mentioned, tea of blended origins, sometimes containing minimal amounts of Georgian-grown tea, is often exported under the "Made in Georgia" brand.

Overall, domestic consumption and external trade patterns suggest that, subject to achieving adequate levels of efficiency and product quality, a focus on export markets could be a cornerstone in the revival of the Georgian tea sector, as this represents a promising opportunity for further value addition. In addition to the traditional production of black tea, the production of quality green teas may be an interesting avenue to explore in more depth in this context.

Chapter 8
Policy

The current state policy on the tea sector is focused on the rehabilitation of the already existing tea plantations established during the Soviet Union under the 2016 Georgian Tea Rehabilitation Program. There is currently no state policy to support the establishment of new plantations. It has been estimated that a tea plantation that already exists can be brought to a fully rehabilitated state for about 27–30 percent of the establishment cost of a new one in Georgia (cost of establishing a new tea plantation in Georgia could equal approximately GEL 30 thousand/ha (USD 10.7 thousand). Furthermore, a rehabilitated plantation can reach full fruition in a little over three years, whereas a newly established tea plantation will not start bearing fruit until after five years on average. A more detailed account of the support measures foreseen by the programme is provided in the following section.

8.1 THE GEORGIAN TEA REHABILITATION PROGRAM

8.1.1 Objectives of the programme

In an effort to revive its once thriving tea sector, in 2016 the Georgian government adopted a Tea Rehabilitation Program subsidizing weeding, pruning, and other operations[44] with the objective of rehabilitating up to 7000 hectares of abandoned tea plantations over the next years. The programme is managed by APMA and disburses funds to its beneficiaries to be spent on the rehabilitation of old tea plantations.

The main stated objectives of the programme are:

- maximize the potential of Georgian tea and promote high-quality tea production, including the production of organic tea, thus increasing tea self-sufficiency and export capacity;
- privately owned as well as state owned abandoned tea plantations to be rehabilitated and modern tea processing units to be established;
- increase employment in rural areas and improve the socioeconomic situation of local populations.

8.1.2 The funding amount

One of the specificities of this support mechanism is that the amount granted by the government is a share of an estimated average cost of rehabilitation of GEL 2500 (USD 910) (including VAT) per hectare.[45] The share of this amount that an applicant will receive depends on land ownership and legal status and ranges from 60 percent for physical persons producing on their own land, to 90 percent for cooperatives producing on leased, state-owned land (this is summarized in Table 8.1). These grants are only accessible to farms between 5 and 300 ha, and applicants need to purchase a small processing plant if they do not own one already in order to benefit from them.

Table 8.1

Portion of the GEL 2500 paid by the programme depending on farm type

Beneficiary	Own land	Lease of State-owned land
Cooperatives	80%	90%
Other than cooperatives	60%	70%

SOURCE: MEPA. 2016. Georgian Tea Plantation Rehabilitation Program. https://mepa.gov.ge/En/Projects/Details/18.

44 The following rehabilitation works are being carried out through co-financing: plantation weeding, processing of heavy and/or semi-heavy pruned materials at the plantation area or their removal, inter-row tillage, applying fertilizers and chemicals, cleaning of drainage channels (if necessary), primary hoeing (if necessary), secondary hoeing (if necessary).

45 Equivalent to GEL 2050 (USD 747) after VAT (net).

As per these conditions, the maximum grant amount can never exceed GEL 2250/ha (90 percent of 2500 for a cooperative leasing state-owned land). Our estimates, however, show that the estimated amount of GEL 2500/ha for the rehabilitation of 1 ha of abandoned tea plantation is only about half of the actual required amount which comes closer to GEL 5000/ha (Table 8.2) if no fencing is involved.

The list of works to be carried out for rehabilitation of tea plantations specified in the programme are: cleaning (from trees, metal and concrete waste); heavy or regenerative pruning of the plantation; arrangement of drainage channel; inter-row tillage/loosening (surface tillage of 15–20 cm depth); purchase of fertilizers and agricultural inputs (including organic) in the first year. The cost of each of these operations is summarized in Table 8.2.

Table 8.2
Estimated average actual cost for rehabilitating a 1 ha tea plantation

Cost category for rehabilitation 1 ha (1st year)	Cost (GEL)
Heavy pruning	2000
Cleaning the plantation from the pruning	500
Inter-row tillage	500
Applying fertilizers (NPK)	
Nitrogen (N)	240
Phosphorus (P)	600
Potassium (K)	280
Transportation	75
Applying cost	50
Cleaning from weeds	500
Miscellaneous (5%)	237
Sum Total	**4982**

SOURCE: Authors' estimates based on field visits.

However, in a significant number of cases fencing the plantation would be required to limit livestock access to the tea plants, otherwise it runs the risk of being damaged or destroyed by animals. We estimate that fencing 1 ha of plantation costs about GEL 3500 (including fencing materials, labour and transport costs), making in the single most costly rehabilitation operation and bringing the total cost of rehabilitation to over GEL 8000/ha. Thus, if fencing is included in the rehabilitation cost, grants under the tea rehabilitation programme would represent only between 17 and 26 percent of the actual rehabilitation cost incurred by farmers.

8.1.3 Preferential state-owned land lease terms

Within the scope of the programme, the lease of existing tea plantations on state-owned land at a low cost to a physical or legal entity (including a cooperative) without an auction is foreseen in order to stimulate investment in existing but abandoned tea plantations. State-owned tea plantations may be granted leases under the following conditions and subject to approval by the Government (in this case by APMA):

- lease duration – 25 years;
- annual cost – GEL 50 per ha (about USD 15/ha);
- cost of the lease may be reviewed in the fifteenth year after signing a lease agreement and every five years thereafter;
- the right to a lease may be conceded to any third person, with the prior consent of APMA, provided that the new lessee fulfils the former lessee's obligations to the lessor and APMA;
- the area of a state-owned tea plantation to be received on lease by an agricultural cooperative shall not be more than the area of a tea plantation owned by the agricultural cooperative.

The ability to lease existing tea plantations for a small fee (USD 15/ha per year) from the state means that the 5 ha minimum plantation size requirement should not, in theory, represent a significant obstacle for smallholders to engage in the rehabilitation programme.

However, beneficiaries are also required to either have a processing plant or alternatively, they must buy or build one using their own funds. There are no policy support measures for new tea processing units. As access to credit for smallholders is difficult, this may represent a significant obstacle for them to actively participate in the programme.

Before deciding whether to award the grant to a particular applicant, its application and the condition of the tea plantation in question are evaluated. The- "Anaseuli Laboratory" in Ozurgeti (Guria region) does a preliminary analysis of the soil and plantations of the areas that applicants to the programme propose to rehabilitate. Afterwards, and before the grant is awarded, the Scientific Research Center (SRC) of MEPA confirms the validity of the results. The laboratory analysis becomes the basis on which a decision (whether to award the grant or not) is taken.

8.1.4 Results of the programme

Between 2016 and 2018 the programme had 49 beneficiaries from Imereti, Guria, and Samegrelo regions. A total of more than 1000 ha of the tea plantations was rehabilitated, out of which 39 percent were privately owned and the remaining 61 percent were on land leased from the state. The total amount of funds disbursed is about GEL 1.8 million or about USD 630 000. The main results of the programme are summarized in Table 8.3.

Table 8.3
Tea Rehabilitation Program results (2016–2018)

Region	Total area (ha)	Private (ha)	State (ha)	Number of beneficiaries	Cost of rehabilitation (GEL)	Co-financing from the State (GEL)
Georgia	1023.8	402.0	621.9	49	2 553 517	1 776 613
Imereti	327.1	79.7	247.3	20	823 936	595 725
Guria	203.4	37.6	165.8	13	494 310	358 161
Samegrelo	493.3	284.6	208.7	16	1 235 271	822 727

SOURCE: MEPA. 2019. Georgian Tea Plantation Rehabilitation Program. https://mepa.gov.ge/En/Projects/Details/18.

As previously mentioned, the 49 rehabilitated plantations had an average size of 21 ha, bringing the total number of productive plantations in Georgia to 222 and increasing the average productive plantation size considerably from 4.6 ha to 8.2 ha. This demonstrates that the tea rehabilitation programme has mostly benefitted large farms and could be attributed to the conditions for rehabilitation (described above), which make it more difficult for smaller farmers to benefit from state support.

In addition to this sector-specific programme, there are other non-sector specific government support mechanisms, from which tea producers can benefit, such as the "preferential agriculture credit", "co-financing of agricultural processing and storage enterprises", and "Produce in Georgia" programmes. Past government initiatives in the tea sector are summarized in Box 4.4.

BOX 8.1

PAST GOVERNMENT INITIATIVES IN THE TEA SECTOR

As mentioned above, the Tea Rehabilitation Program that started in 2016 is the most recent government initiative related to the tea sector one. However, it is far from being the first one and in order to mitigate the decline of the tea sector after the collapse of the Soviet Union, the Georgian government has undertaken a number of measures with varying degrees of success:

- allowing factories to sell tea below cost. Before 1995 tea factories were subject to a price floor equalling the production cost at which the tax authority taxed the factories;
- exempting sales of tea from excise tax in 1995;
- different types of subsidies at various points in time (e.g. credit with a low interest rate, provision of fertilizers, energy);
- the Ministry of Agriculture has organized numerous exhibitions in countries like United States of America, Japan, Latvia and Ukraine to promote Georgian tea in the past.

8.1.5 Challenges and gaps in the tea rehabilitation program

While the programme is already showing results in terms of the expansion of the productive tea area, a number of weaknesses were identified by our study that may represent a challenge to its economic and social sustainability. In particular, they are related to: the insufficiency of the funding amount per hectare, processing overcapacity, land identification, and the absence of a baseline or impact evaluation studies. Below is an overview of the main challenges and gaps in the programme that were identified.

The funding amount. The amount covered by the programme might not be an accurate reflection of what it would really cost to rehabilitate the plantations, especially once the cost of fencing is taken into consideration. Animals frequently pass through and eat tea leaves in plantations, and even by merely passing through the plantations animals can damage the leaves. This raises the need to build fences around at least the smaller tea plantations, which cover areas below 20 to 25 hectares. Large plantations spanning several dozen (or several hundred) hectares do use watch-houses with guards to secure the plantations instead of fences. For smaller tea plantations, building fences would be more sensible. The cost of building a fence depends on the quality of material used, as well as the location and topography of the terrain. In general, rehabilitation works could vary depending on the condition of the tea plantation at hand.

It has been estimated that the real cost of rehabilitation could amount to over GEL 8000/ha valued at USD 2900 in Georgia (ENPARD, 2015). Meanwhile, some farmers noted that GEL 2500/ha could cover only heavy pruning activities. Moreover, many of the activities, such as weeding and pruning, need to be undertaken on a regular basis until the plant reaches its maximum yield, and the initial investment therefore needs to be supplemented by annual expenditures.

Processing overcapacity. Each beneficiary is requested to purchase a small processing plant if he or she does not own one already. If we compare this to the Soviet period, according to our estimates only about one large tea processing factory (for mass produced tea) and two mini-factories were built per one thousand hectares of tea plantations. Building one processing plant per beneficiary under the current programme may lead to processing overcapacity in Georgia, even if the plants are used to produce high-quality tea and have a low processing capacity. This issue has also been raised by the farmers during field visits. The cost of a single tea processing equipment line (Chinese made), which should be sufficient for a plantation under 10 ha, would at best cost about USD 20 000 (GEL 54 700). A plant that includes a factory building, would thus cost a minimum of USD 37 000 (GEL 100 000). Considering that on average 70 percent of the GEL 2050 /ha is funded by the programme (or GEL 1435/ha), a beneficiary would need to rehabilitate up to 70 hectares of plantations under the programme to arrive at a 50/50 cost share ratio. This would make it difficult for smaller farmers with limited financial capacity to participate, considering difficulties in access to financing for smallholders.

Baseline study and impact evaluation. According to one of the findings, the information used to develop the outline of the project and to write its provisions had been collected without an in-depth sectorial and statistical study, mostly from the offices of the Information Consultation Centers of MEPA and from past research results. Therefore, baseline sectorial information and the basis on which the programme has been initiated and designed is of limited reliability. The absence of a baseline study would make it problematic to evaluate the exact results that the intervention has helped to deliver.

Land identification. The issue of land identification has been raised by nearly all stakeholders. There is no official updated information about the area, location and condition of tea plantations in Georgia. The head of the Georgian Tea Producers Association suggested that it would be a good idea for the state to dedicate funds for the registration of all tea plantations (the so-called "passportization"). This would help create a complete image of the tea sector in general. Furthermore, leasing state-owned plots on which tea plantations are located is a tedious process, due to the lengthy bureaucratic processes involved in dealing with the National Agency of State Property. The problem is exacerbated in the Martvili municipality of Samegrelo region (one of the top-tea production areas of the country), where out of 400 ha of tea plantations 80 percent has been legally categorized as "forests" or "pastures". This makes leasing the land plots for rehabilitation of tea plantations difficult and provides a disincentive to investment in the sector. Categorization of land plots with tea plantations should change to make them available for rehabilitation. Country-wide identification and passportization of tea plantations should help make this possible.

8.2 POLICY ON MARKETING PRACTICES

Another direction which might need to capture the attention of the state is tea marketing and labelling. As discussed in previous sections, the lack of regulation with regard to quality and labeling of tea could leave consumer rights unprotected and local tea producers exposed to unbalanced competitive environment.

Governmental decree number 420 adopted in 2010 addresses the question of determining a country of origin to engage in trade.[46] The country of origin should be determined by the origin of the inputs used in the process of production or processing. If the product is a mixture of input materials from different countries, the country of origin should be the same as the origin of the inputs with more than 50 percent share in the finished product (or with the largest share). However, there is no requirement to indicate the exact ratio of the domestic to imported tea and there are reports that this rule is, in practice, neither followed nor enforced in a lot of cases.

That said, if a given brand claims a geographic indication (GI), like "Tkibuli Mountain Tea" for example, the producer is not permitted to mix its tea with any other types of tea.[47]

46 Decree 420 lays our requirements for determining a country of origin, certificate of origin and standards for filling and issuing such a certificate.

47 Tkibuli mountain tea is harvested from Tkibuli in Imereti and is categorized as a GI, produced by Tkibuli Tea Ltd.

In addition to this decree, another governmental decree on tea regulation was being developed in 2015, however, it has not yet been implemented and is not enforced in practice. The decree was intended to regulate business processes relative to tea production, processing and marketing, with the main aim to protect consumer rights, establish hygiene standards and to ensure compliance to the standardized norms of production.

8.3 POLICY RECOMMENDATIONS

Based on the above analysis, some recommendations concerning policy and the strategic directions for the development of the tea sector in Georgia are summarized below:

Identification of tea plantations. As suggested above, passportization of tea plantations throughout the western part of Georgia should help create an updated and complete picture of the state of the sector as a whole. This will also make it possible to do baseline studies for the future tea rehabilitation programmes, on which subsequent impact evaluations could be based. The identification of tea plantations can also serve as groundwork for granting a status of an "agricultural land" to the plots where plantations are located, instead of keeping them as "forests" or "pastures", making it possible to lease them out to potential beneficiaries. The process of passportization should include the following for each tea plantation in Georgia: (i) identification of location; (ii) area; (iii) description of the condition of the plantation; (iv) results from soil analysis; and (v) information on what activities have to be carried out to rehabilitate.

Evaluation of Tea Rehabilitation Program. As mentioned above, the Georgian Tea Rehabilitation Program is a positive step towards supporting the tea sector in general. However, based on the gaps and challenges identified above, it is recommended to conduct an evaluation of the first phase to assess its impact. Based on the findings, the criteria and provisions of the programme can be redesigned.

Mitigation of processing overcapacity. In order to avoid possible processing overcapacity, and to make the programme more accessible to smaller farmers, it would be advisable to explore alternatives to requesting a processing plant per beneficiary. For example, one of the requirements to participate in the programme could be an obligation for a potential beneficiary to present an official purchase order (PO), or a letter of intent from an already existing processor factory, confirming that the factory intends to purchase the harvested tea leaves from the beneficiary. This would redirect the funds to rehabilitating more areas and to alleviating the possible underutilization of processing capacities. Large areas of operational tea plantations combined with maximization of processing capacity utilization are needed to achieve economies of scale, and drive unit production costs down to make Georgian tea more competitive.

Labelling requirements. As per labelling requirements to protect consumer rights, it would be sensible to do periodic laboratory analysis of samples taken from imported tea to make sure the information included in the labelling corresponds to reality. Furthermore, the labelling requirements might have to be enforced with domestic tea producers that mix domestic with imported processed tea and package them as a Georgian product.

Supporting organic production. All of the interviewed stakeholders suggested that producing high quality tea, and possibly even organic tea aimed at reaching high-value added developed export markets, is the only possible direction for a sustainable development of the Georgian tea sector. Having been free, for the most part, from chemicals and concentrated fertilizers for approximately 30 years, rehabilitating tea plantations presents an opportunity to initiate the production of organic tea, commanding higher prices than average tea. The abandoned tea bushes have not been affected by diseases or pests throughout the years. A local organization — Caucascert Ltd. — conducts organic certification for tea in Georgia, which is recognized by the states of the European Union and Switzerland. As stated by MEPA, it would be perfectly feasible to obtain an organic certificate within two years. A good example is an Estonian investment covering 47 hectares of rehabilitated tea plantations (See Box 3.1).

Trainings to improve quality. To produce high quality tea, a number of additional investments that are not currently foreseen by the programme will be required. One of these could be related to a vocational programme to train workers on methods of selective harvesting of tea leaves. If tea bushes are overharvested chaotically, or if portable harvesters and equipment are used without prior training, losses in quality will be highly likely. Training of in-field foremen (to supervise the work in plantations) and the establishment of quality control systems will be necessary to maximize the quality and reduce the amount of low-grade tea.

Export licensing requirements. To penetrate high-end segments of foreign markets and command premium pricing for Georgian organic tea the quality of exported Georgian has to be controlled. The purpose would be to improve and protect the image of Georgian tea abroad, similarly to the way this is being done with Georgian wines. There are currently no export standards set by the Georgian government to protect the image of quality of the Georgian tea. Licensing requirements to export Georgian tea were abolished by the government and certificates of origin can be issued by any laboratory licensed by “Sakstandard”.[48]

48 Sakstandard: Georgian National Agency for Standards and Metrology.

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Annexes

Annex I
In-depth interviews with stakeholders

Name	Position	Date of interview
Levan Urotadze	Head of Tea Rehabilitation Project "Georgian Tea"	30.04.2019
Tengiz Kalandadze	Head of Sectorial Policy Unit at Ministry of Environmental Protection and Agriculture	08.05.2019
Omar Katcharava	Adviser to the minister at Ministry of Environmental Protection and Agriculture	08.05.2019
Tamaz Kuntchulia	Author of the book "Georgian Tea" – Adviser to the minister at Ministry of Environmental Protection and Agriculture	08.05.2019
Tengiz Svanidze	Head of the Association of Tea Producers in Georgia	09.05.2019
Goneri Salia	Tea producer, Ltd Lazi	12.05.2019
Kakhaber Sokhadze	the Head of the National Food Agency	24.05.2019

Annex II
Regional coverage of the Tea Plantation Rehabilitation Program

TEA PLANTATION REHABILITATION PROGRAM (SINCE 2016)					
Total Area (ha)	Private (ha)	Leased from the State (ha)	Region	Cost of rehabilitation (GEL)	APMA Funding (GEL)
1023.8	402.0	621.9	49	2 553 517	1 776 613
53.60	-	53.60	Guria	120 765	84 536
10.48	10.48	-	Imereti	25 725	20 580
10.30		10.30	Imereti	25 750	23 175
8.00	-	8.00	Guria	20 000	13 995
17.33	17.33	-	Imereti	42 140	33 591
6.85	6.85	-	Guria	16 150	12 920
5.70	-	5.70	Guria	14 250	12 825
34.80	-	34.80	Samegrelo	87 000	60 900
29.00	-	29.00	Guria	72 500	50 750
24.78	-	24.78	Guria	61 950	43 365
15.10	15.10	-	Imereti	37 735	30 188
97.84	-	97.84	Samegrelo	244 600	171 220
7.04	7.04	-	Imereti	17 599	14 079
15.00	-	15.00	Imereti	37 500	26 250
6.54	-	6.54	Samegrelo	16 350	11 445
9.05	9.05	-	Imereti	22 500	18 000
20.00	20.00	-	Samegrelo	50 000	40 000
3.92	-	3.92	Samegrelo	9800	8820
18.42	-	18.42	Imereti	46 050	32 235
15.50	-	15.50	Guria	38 750	27 125
24.34	-	24.34	Imereti	60 850	42 595
18.20	-	18.20	Guria	45 500	31 850

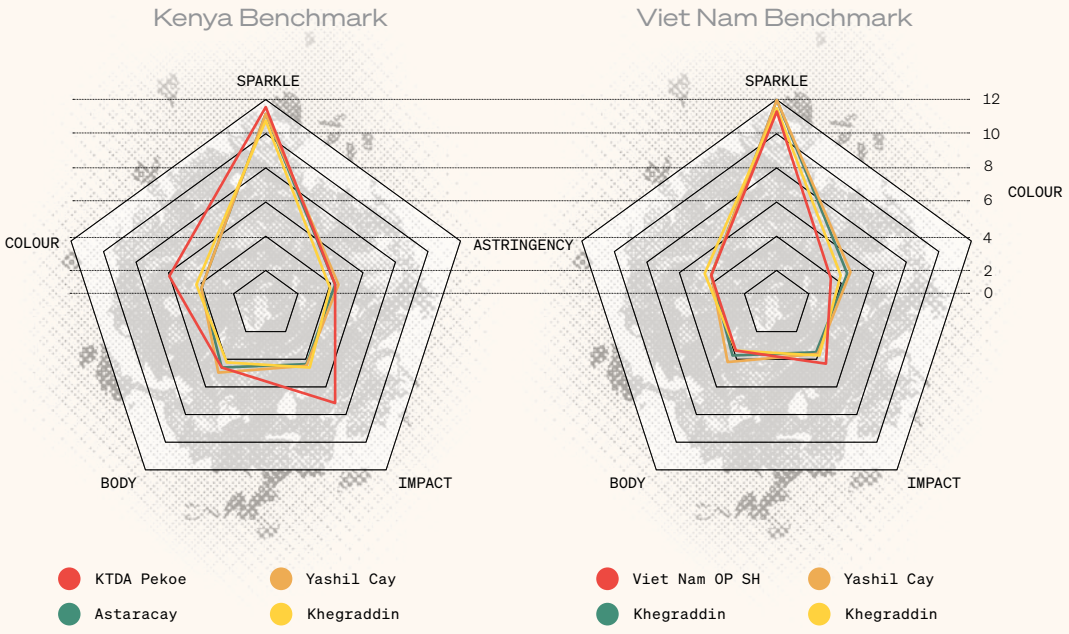
19.10	-	19.10	Imereti	47 750	33 425
24.79	24.79	-	Samegrelo	61 991	49 593
33.90	-	33.90	Imereti	84 750	59 325
38.27	38.27	-	Imereti	95 673	57 404
16.00	-	16.00	Imereti	48 000	28 000
44.05	44.05	-	Samegrelo	110 124	66 075
15.00	-	15.00	Imereti	37 500	26 250
56.55	-	56.55	Imereti	141 375	98 963
18.30	-	18.30	Samegrelo	45 750	32 025
15.96	15.96	-	Guria	39 900	31 920
5.97	-	5.97	Guria	14 933	10 453
30.55	30.55	-	Samegrelo	76 372	45 823
82.96	82.96	-	Samegrelo	207 400	124 440
5.07	-	5.07	Guria	12 675	8873
19.21	-	19.21	Imereti	48 025	33 618
5.06	5.06	-	Imereti	12 640	10 112
14.30	-	14.30	Samegrelo	35 741	25 018
9.27	-	9.27	Imereti	23 185	16 230
10.06	10.06	-	Samegrelo	25 150	20 120
33.00	-	33.00	Samegrelo	82 520	57 764
5.00	5.00	-	Imereti	12 500	10 000
10.26	-	10.26	Imereti	25 642	23 078
9.62	9.62	-	Guria	24 062	19 250
10.69	10.69	-	Imereti	26 720	16 032
8.50	8.50	-	Samegrelo	21 251	12 750
25.47	25.47	-	Samegrelo	65 550	39 330
5.15	5.15	-	Guria	12 875	10 300

Annex III

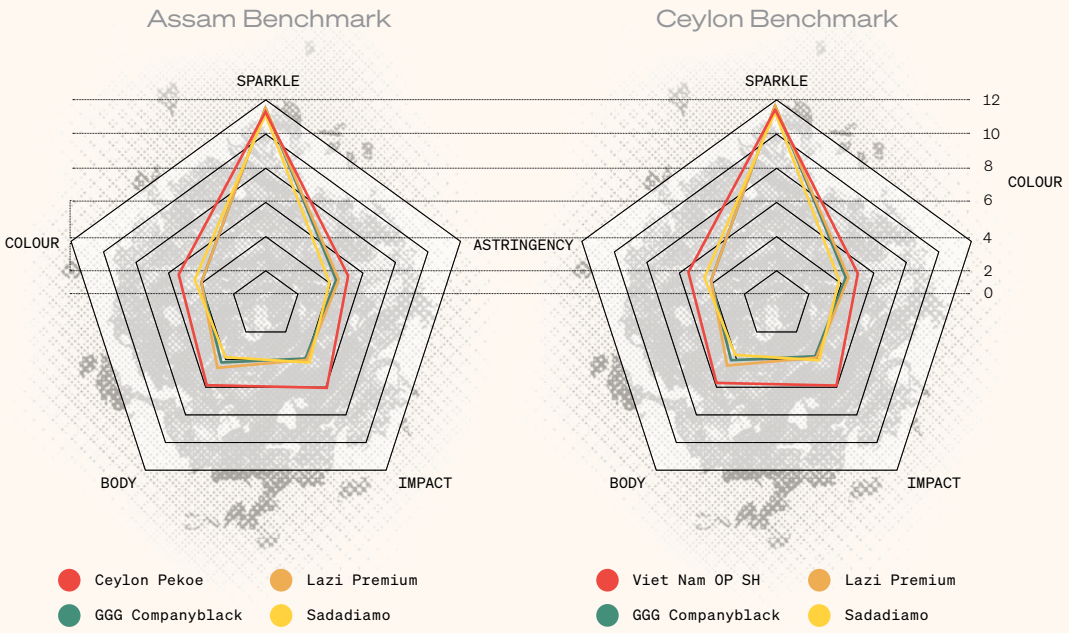
Comparative sensory tea analysis

Comparison of Azerbaijani teas vs teas of main competing origins (same methodology as for Georgia).

Azerbaijan



Georgia



Glossary

Term	Definition
Adaptation	The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to the expected climate and its effects.
Adaptive capacity	The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
Blending	The process of putting teas of different characteristics together to form a final product. The golden rule of tea blending is to achieve consistency in taste, while reflecting nuances of its different components. Classically, tea blending is associated with black tea production.
Business-as-usual	The state against which change is measured. In the context of transformation pathways, the term 'baseline scenarios' refers to scenarios that are based on the assumption that no mitigation policies or measures will be implemented beyond those that are already in force and/or are legislated or planned to be adopted.
Climate	Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the climate system.
Climate change	Climate change refers to a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer.
Climate impacts	Information about the observed impacts of climate variability and change on socioecological systems, e.g. number of people displaced due to floods, to help track the climate context where adaptation strategies are being implemented.
Climate parameters	Information about observed climatic conditions, e.g. temperature, rainfall, and extreme events, that help track the climatic context where adaptation strategies are being implemented.
Climate projection	A climate projection is the simulated response of the climate system to a scenario of future emission or concentration of greenhouse gases (GHGs) and aerosols, generally derived by using climate models. Climate projections are distinguished from climate predictions by their dependence on the emission/concentration/radiative forcing scenario used, which is in turn based on assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realized. See also climate scenario.
Climate scenario	A plausible and often simplified representation of the future climate, based on an internally consistent set of climatological relationships, which has been constructed for explicit use in investigating the potential consequences of anthropogenic climate change, often serving as input to impact models. Climate projections often serve as the raw material for constructing climate scenarios, but climate scenarios usually require additional information such as the observed current climate. See also baseline/reference, emission scenario, mitigation scenario, Representative Concentration Pathways (RCP) scenario, shared socioeconomic pathways, socioeconomic scenario, SRES scenarios, stabilization, and transformation pathway.

Climate-smart agriculture (CSA)	An approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate. CSA aims to tackle three main objectives: sustainably increasing agricultural productivity and incomes, adapting and building resilience to climate change, and reducing and/or removing greenhouse gas emissions, where possible [FAO, 2017].
CTC Tea	CTC or Crush, Tear, and Curl production is one of the two main methods of tea manufacture together with Orthodox tea manufacture. All five steps of Orthodox processing are performed, but much more rapidly and in a limited fashion. CTC was invented specifically for the black tea industry, in an effort to save time (a single batch of tea otherwise can take over a day to produce) and money, but produces teas of lower quality.
Deforestation	Conversion of forest to non-forest. For a discussion of the term forest and related terms such as afforestation, reforestation and deforestation, see the IPCC Special Report on Land Use, Land-Use Change, and Forestry (IPCC, 2000). See also information provided by the United Nations Framework Convention on Climate Change (UNFCCC, 2013) and the report on Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegetation of Other Vegetation Types (IPCC, 2003).
District	Azerbaijan is administratively divided into the following subdivisions: 59 districts (districtlar; sing.– district); 11 cities (şeherler; sing.– şeher); 1 autonomous republic (muxtar respublika). The districts are further divided into municipalities (Belediyye).
Drought	A period of abnormally dry weather long enough to cause a serious hydrological imbalance.
Drying	Drying is the final stage of manufacturing of tea. During drying the moisture is removed from the fermented leaf particles in a suitable chamber by vaporization of water in a stream of hot air as the carrier fluid.
Exposure	The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources; in addition to infrastructure or economic, social, or cultural assets in places and settings that could be adversely affected.
Extreme weather event	An event that is rare at a particular place and time of year. Definitions of rare vary, but an extreme weather event would normally be as rare as, or rarer than the 10th or 90th percentile of a probability density function estimated from observations. By definition, the characteristics of what is called extreme weather may vary from place to place in an absolute sense. When a pattern of extreme weather persists for some time, such as a season, it may be classed as an extreme climate event, especially if it yields an average or total that is itself extreme (e.g. drought or heavy rainfall over a season).
Fermentation	This is the process of oxidizing green tea leaves to make black and oolong teas. The green leaves are spread out and exposed to the air for three to four hours. During this chemical process, the leaves turn red-brown — this gives fermented tea its dark appearance. All fermented teas undergo a similar enzyme-oxygen reaction; however, the duration and temperature a t which the reaction occurs are critical to the final product. Fully oxidized (“fermented”) leaves become black tea, whereas partially oxidized (“semi-fermented”) leaves produce Pouchong and the various Oolong styles of tea.
Green tea leaf	The “raw” tea leaf before it is processed into black, green or other types of tea (the latter being referred to as made tea).
Greenhouse gas (GHG)	Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the earth’s surface, the atmosphere itself, and by clouds.

Impacts (consequences, outcomes)	The consequences of realized risks on natural and human systems, where risks result from the interactions of climate-related hazards (including extreme weather and climate events), exposure, and vulnerability. Impacts generally refer to effects on lives, livelihoods, health and well-being; ecosystems and species, economic, social and cultural assets, services (including ecosystem services), and infrastructure. Impacts may be referred to as consequences or outcomes, and can be adverse or beneficial.
Infilling	The process of increasing field densities by adding bushes to fields already planted with tea.
Land use	Land use refers to the total of arrangements, activities and inputs undertaken in a certain land cover type (a set of human actions). The term land use is also used in the sense of the social and economic purposes for which land is managed (e.g. grazing, timber extraction, conservation and city dwelling). In national greenhouse gas inventories, land use is classified according to the IPCC land use categories of forest land, cropland, grassland, wetland, settlements, and other.
Life cycle assessment (LCA)	Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product or service throughout its life cycle. This definition builds from ISO (2018).
Made Tea	Tea that has undergone processing (either black, green or any other kind).
Mitigation (of climate change)	A human intervention to reduce the sources or enhance the sinks of GHGs.
Orthodox tea	Orthodox tea refers to loose-leaf tea that is produced using traditional (or Orthodox) methods of tea production, which involve plucking, withering, rolling, oxidation/fermentation and drying. It is the dominant processing method in Azerbaijan and Georgia.
Representative concentration pathways (RCP)	Scenarios that include the time series of emissions and concentrations of the full suite of GHGs and aerosols and chemically active gases, as well as land use/land cover.
Representative concentration pathway 6.0 (RCP6)	A pathway that describes trends in long-term, global emissions of GHGs, short-lived species, and land-use/land-cover change leading to a stabilization of radiative forcing at 6.0 Watts per square meter (Wm−2) in the year 2100 without exceeding that value in prior years [Masui 2011].
Representative concentration pathway 8.5 (RCP8.5)	One high pathway for which radiative forcing reaches greater than 8.5 W m-2 by 2100 and continues to rise for some amount of time (the corresponding ECP assuming constant emissions after 2100 and constant concentrations after 2250).
Resilience	The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation (Arctic Council, 2013).
Rolling	This process twists and breaks the leaves to release the natural juices. This action activates enzymes that help to initiate fermentation. Rolling also gives the leaves a curled appearance.
Sorting	Tea sorting can help remove physical impurities, such as stems and seeds. Using sorting equipment to improve tea production efficiency is very common in tea processing plants, especially in black tea processing. A colour sorter may also be used to classify final product grades according to colour and shape.
Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.
Withering	The process of allowing the fresh leaves to dry. Some producers have special withering rooms, whereas others wither their tea in the open air.

This study was produced under an FAO-EBRD Cooperation project on reviewing the development potential of the tea sectors of Azerbaijan and Georgia. As a result of the joint research in the two countries carried out as part of the project, a similar separate review of the Azerbaijani tea sector was also published under the FAO Investment Centre's Knowledge for Investment (K4I) programme. Tea has a long tradition of cultivation in Azerbaijan and Georgia, dating back to the 19th century. The structural changes that followed the collapse of the Soviet Union in the early 1990s led to a dramatic decline of the two countries' tea sectors. However, interest in tea production in Georgia and Azerbaijan has increased in recent years and, in an effort to revive their once thriving tea sectors, governments have adopted sector development programmes that provide for support to primary tea production. In spite of the long tradition and accumulated know-how of tea production and processing, there is little doubt that investments in both technology and knowledge will be required for the Azerbaijani and Georgian tea sectors to grow in a successful and sustainable way. Production focused on efficiency and quality and mindful of shifts in consumer preferences on global markets, but also of potential environmental risks, will be critical in achieving this goal. This publication is part of the Country Investment Highlights series under the FAO Investment Centre's Knowledge for Investment (K4I) programme.

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