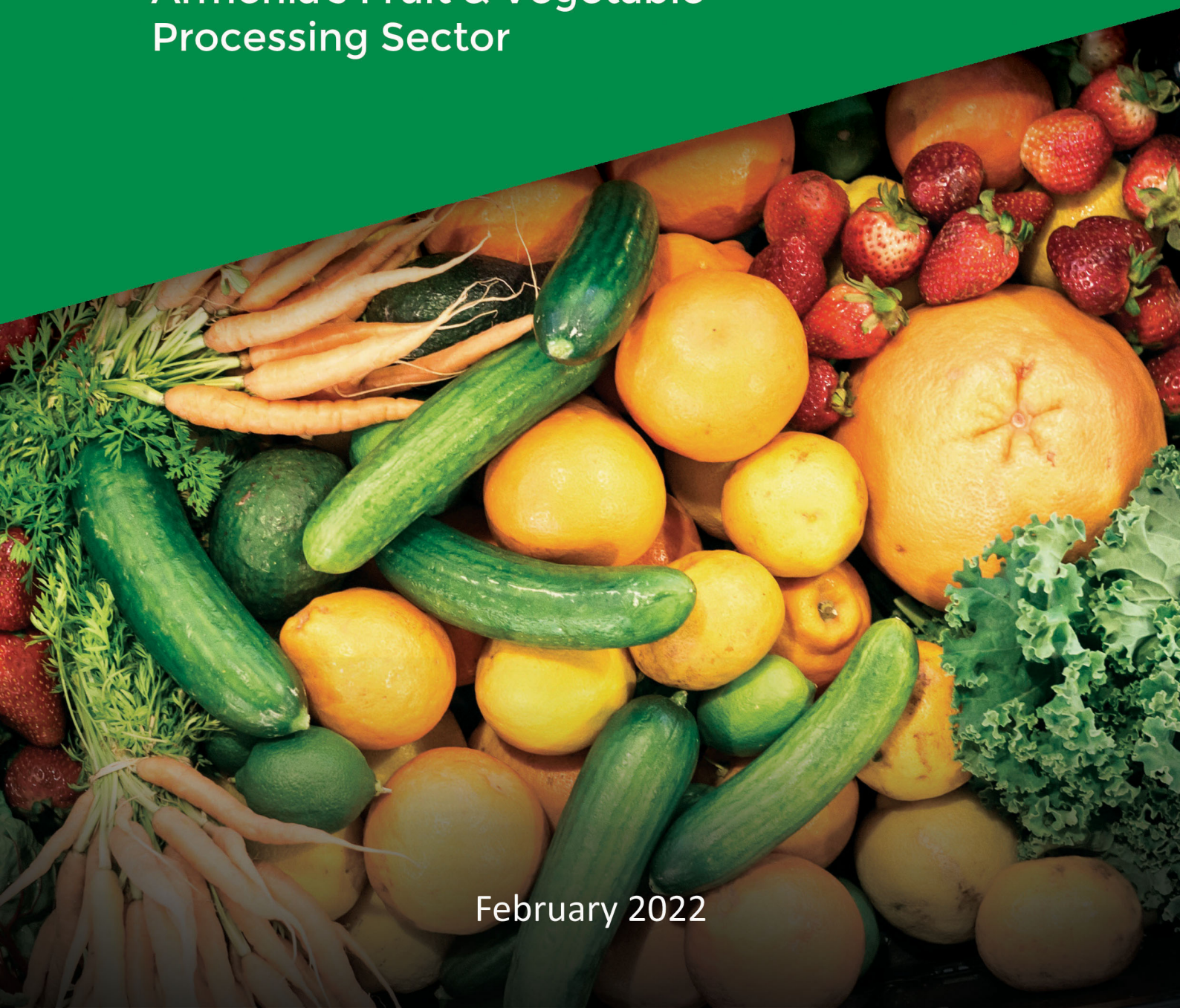
REPUBLICAN UNION OF EMPLOYERS OF ARMENIA

MARKET SYSTEMS ANALYSIS

Armenia's Fruit & Vegetable Processing Sector



February 2022

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Armenia's Fruit & Vegetable Processing Sector

Developed with the support of the International Labour Organization.

Part 2 of the consultancy assignment to identify productive inclusion and economic empowerment strategies in the food processing industry in Armenia and Georgia based on a Rapid Market Assessment and Value Chain Analysis

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Executive Summary

Given the growth of the food and drink industry in Armenia and the potential for the fruit and vegetable processing value chain, **an analysis was conducted to identify opportunities to develop the value chain in Armenia,** identifying potential to improve opportunities for decent work through value chain upgrading. The Market Systems analysis was conducted as a qualitative study based mainly on key informant interviews and desk research. The quality of the information gathered may have been limited because **the lead consultant and author** could not travel to Armenia due to pandemic-related travel restrictions and therefore **did not meet the stakeholders or visit the sites in person**.

The Market system for fruit and vegetable processing in Armenia has many players including farmers and other input suppliers, resellers, wholesale markets, processors, distributors, international importers, wholesale, retail and foodservice providers on the one hand and a variety of private sector representatives, Governmental agencies, development partners, support services and education and research institutions on the other who enable or provide the supporting functions and rules that help the value chain function.

The **main product groups** considered are **preserved vegetables, preserved fruit & nuts, juices, jams, sauces, pickled vegetables and IQF fruit & vegetables**. Products are sold in Armenia and exported to many countries, predominantly Russia, USA, Georgia and the United Arab Emirates.

Opportunities for the value chain include:

- ✓ strong international *market potential*, particularly in the Eurasian Economic Union;
- ✓ *comparative advantage* in fruit and vegetable production, especially apricots, due to favourable soil and climatic conditions;
- ✓ an overall *favourable business enabling environment*; and
- ✓ *general progress in upgrading the value chain*.

The main **constraints** in the value chain include

- ➢ <u>supply-side challenges</u> such as
  - *unsustainable farming* due to climate change and vulnerability,
  - poor integration of climate policy, high water stress and inadequate mechanization.
  - *inferior quality of fruit and vegetables* due to fragmented farming, a lack of certified agricultural inputs, sub-optimal technical capacity, skills gaps in farming, insufficient agricultural extension services and the absence of farming standards
  - *high post-harvest losses* due to inadequate cold storage, transport and post-harvest handling;
  - *lack of entrepreneurship* due to subsistence farming and poor start-up support;
  - and *weak contract farming* due poor farmer understanding, price-driven processors and a weak culture of dialogue.
- ➢ <u>Challenges at the processing stage</u> include
  - *weak technical capacity* due to issues accessing finance, poor industry knowledge and weak procurement skills;
  - *insufficient human capital* due to outdated university curricula, insufficient capacity building and information services and youth and women not attracted to the industry
  - *poor compliance with standards* due to lack of capacity to comply, low capacity for implementing legislation and poor quality infrastructure.
- ➢ <u>Demand-side challenges</u> include
  - *low export capacity* due to weak trade relations with neighbours, low export and market knowledge, poor marketing skills and a need for an export support desk; and
  - the logistical issue of having only *one land route to Russia.*
- ➢ Some <u>underlying causes</u> to many of the challenges are
  - *access to finance issues*

- *lack of stakeholder dialogue.*

Recommendations to maximize on opportunities and overcome challenges include

1. the development of an *action plan for climate smart agriculture*;
2. a programme of *education and information* supporting the ongoing modernisation of university curricula and improving capacity building, introducing farmer certification, company twinning and improving extension services and R&D;
3. *social reform* to improve working conditions;
4. improvement of *quality infrastructure* concerning certification of agricultural inputs, use of farming standards, implementation of food safety legislation and international accreditation;
5. improvement of *physical infrastructure* – water, wholesale markets and cold storage;
6. enhanced *financial investment & support mechanisms* to encourage start-up investment, and continue support for existing business and attract investment;
7. promotion of *stakeholder dialogue* for ongoing resolution of issues and promotion of contract farming;
8. facilitation of *increased farm sizes* to increase productivity; and
9. *provision of and export desk* to help exporters.

The implementation of recommendations requires the commitment and cooperation of many stakeholders. RUEA has an important role to play in bring stakeholders together and providing a platform for dialogue and exchange as well as in advocating for the implementation of recommendations. The ILO can support RUEA in its work but also has an important role in implementing social recommendations. The main Government partner should be the Ministry of Economy.

Constraints	Root Causes	Recommendations
Supply Side Challenges 1. Unsustainable Farming	*a. Climate Change and vulnerability of farmers to its effects* *b. Climate Change not integrated into Government policy* *c. High level of water stress* *d. Outdated machinery and technology*	**1. Action plan for Climate Smart Agriculture** **2. Education and Information** a. *Ongoing modernisation of University Curricula* b. *Farmer certification* c. *Capacity Building programmes* d. *Company twinning programme* e. *Enhanced Agricultural extension* f. *Research and Development* **3. Social Recommendations** a. *Assessments to improve inclusion in the value chain* b. *Training materials on workplace hazards* c. *Policy improvements for better working conditions* **4. Quality Infrastructure** a. *Certification of agricultural inputs.* b. *Use of farming standards* c. *Capacity building* d. *Improvement of the implementation of legislation and enforcement of food standards* e. *Local provision of international accreditation services* **5. Physical Infrastructure** a. *Water infrastructure* b. *Market infrastructure* c. *Cold storage expansion*. **6. Financial & Investment support mechanisms** a. *Encourage start-up investment* b. *Continued funding to facilitate investment* c. *Develop a database of green fields* **7. Promotion of stakeholder dialogue** a. *Facilitate roundtables to address issues in the chain* b. *Support to associations to foster dialogue in the chain* c. *Support to Contract Farming processes* **8. Promotion of the increase of farm sizes** *a. Review of land tenure* *b. Sensitization of farmers and investors on land tenure* **9. Provision of an export desk**
2. Inferior quality of fruit and vegetable raw materials	*e. Small Scale Farming* *f. Lack of certified agricultural inputs* *g. Sub-optimal technical capacity* *h. Skills & Information gaps in farming* *i. Insufficient Agricultural extension services* *j. No farming standards*	
3. High post-harvest losses	*k. Inadequate cold storage facilities and transport* *l. Poor post-harvest handling know-how*	
4. Poor market infrastructure		
5. Lack of entrepreneurship	*m. Traditional farming for subsistence rather than a business* *n. Lack of start-up support and loan-guarantee mechanisms*	
6. Weak Contract Farming	*o. Lack of farmer understanding of benefits of contract farming* *p. Processors focussed on price rather than quality* *q. Weak culture for stakeholder dialogue.*	
Processing stage 7. Technical Capacity	*r. Access to Finance issues* *s. Poor general industry knowledge- few qualified specialists* *t. Weak Procurement Skills*	
8. Human capital	*u. Outdated university curricula and need for capacity building* *v. Capacity Building and information services* *w. Youth not attracted industry and low female participation*	
9. Compliance with standards	*x. Low awareness and capacity for compliance* *y. Insufficient capacity for implementing food safety legislation*	
10. Processing Waste	*z. Poor quality infrastructure*	
Demand Side Challenges 11. Low export capacity	*aa. Weak trade relations with neighbouring countries* *bb. Lack of knowledge of export and markets* *cc. Poor marketing skills* *dd. No export desk to support and advise exporters*	
12. One land route to Russia		
Underlying causes 13. Low Access to Finance/ Investment	*ee. Lack of financial supports for start-ups.* *ff. Lack of information for investors:* *gg. Red Tape*	
14. Weak Stakeholder dialogue	*hh. Lack of associations specific to the value chain.* *ii. General cultural aversion to working collectively*	

Abbreviations

ADB	Asian Development Bank
AMD	Armenian Dram
ANAU	Armenian National Agrarian University
CARD	Centre for Agribusiness and Rural Development
CARMAC	Community Agricultural Resource Management and Competitiveness Project
CEPA	Comprehensive and Enhance Partnership Agreement (EU-Armenia)
CSA	Climate Smart Agriculture
EBRD	European Bank for Reconstruction and Development
ECA	Eastern Europe and Central Asia
EU	European Union
EU GAIA	European Union Green Agriculture Initiative in Armenia
EUR	Euro
FAO	Food and Agriculture Organization of the United Nations
GAC	Green Agriculture Centre
GAP	Good Agricultural Practice (Global agricultural accreditation for food safety)
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH, German Cooperation
GOST/ ГОСТ	Food Safety Standard in the Commonwealth of Independent States
GSP	Generalized Scheme of Preferences
ICT	Information and Communications Technology
IDPs	Internally Displaced Persons
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFS	International Featured Standards
ILAC	International Laboratory Accreditation Cooperation
ILO	International Labour Organization
IQF	Individually Quick Frozen
ISO	International Organization for Standardization
MSA	Mapping Systems Analysis
MSME	Micro- Small and Medium sized Enterprises
MTAI	Ministry of Territorial Administration and Infrastructure
NCCC	National Communication on Climate Change
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organization

R&D	Research and Development
RUEA	Republican Union of Employers of Armenia
Russia	The Russian Federation
SMEs	Small and Medium Enterprises
UAE	United Arab Emirates
UN	United Nations Organization
UNDP	United National Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
USAID	United States Agency for International Development
USD	United States Dollars
VC	Value Chain
W/S	Wholesale

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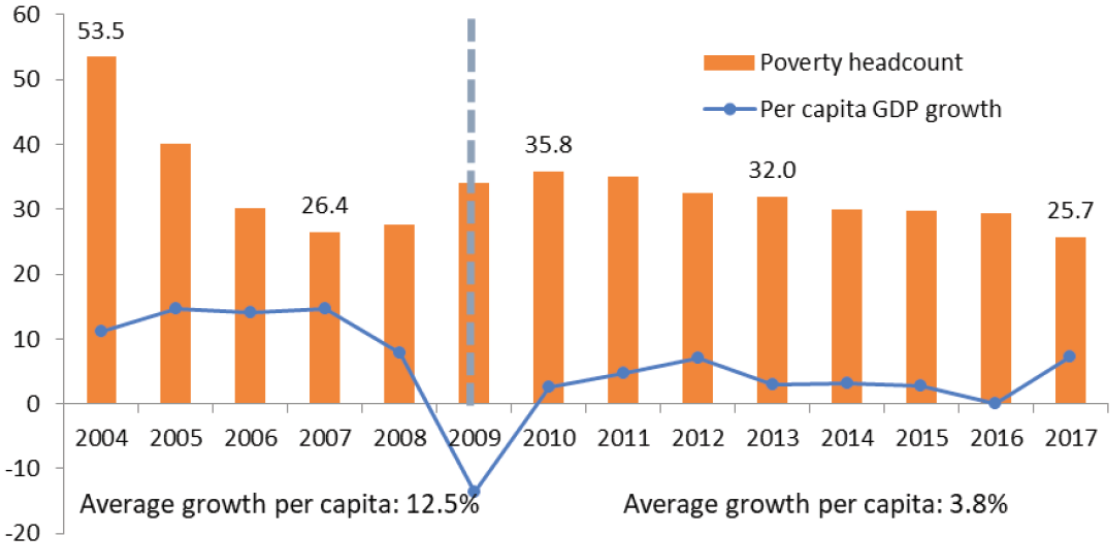
Chapter 1: Introduction

Background

Armenia is a landlocked country in the South Caucasus, struggling with poverty on the one hand and achieving economic growth on the other hand as it recovers from the effects of Soviet rule, independence and the financial crisis of 2008/9 as well as dealing with the economic and social effects of the current pandemic.

Situated in the lower Caucasus region, bordering Turkey, Iran, Azerbaijan and Georgia, Armenia is a land-lock nation of 3.25 million people, of which 98% are ethnic Armenian. With a GDP of 12.6 billion USD or 6 trillion Armenian Dram in 2020 and GDP per capita of 4,267 USD, Armenia is considered an upper middle-income country[1]. With an estimated diaspora of seven million people, remittances account for 10.4% of GDP[2]. The economy is based on agriculture, mineral exploitation, hydroelectricity, telecommunications, jewellery and tourism[3].

Figure 1: Poverty and growth in Armenia, 2004-2017



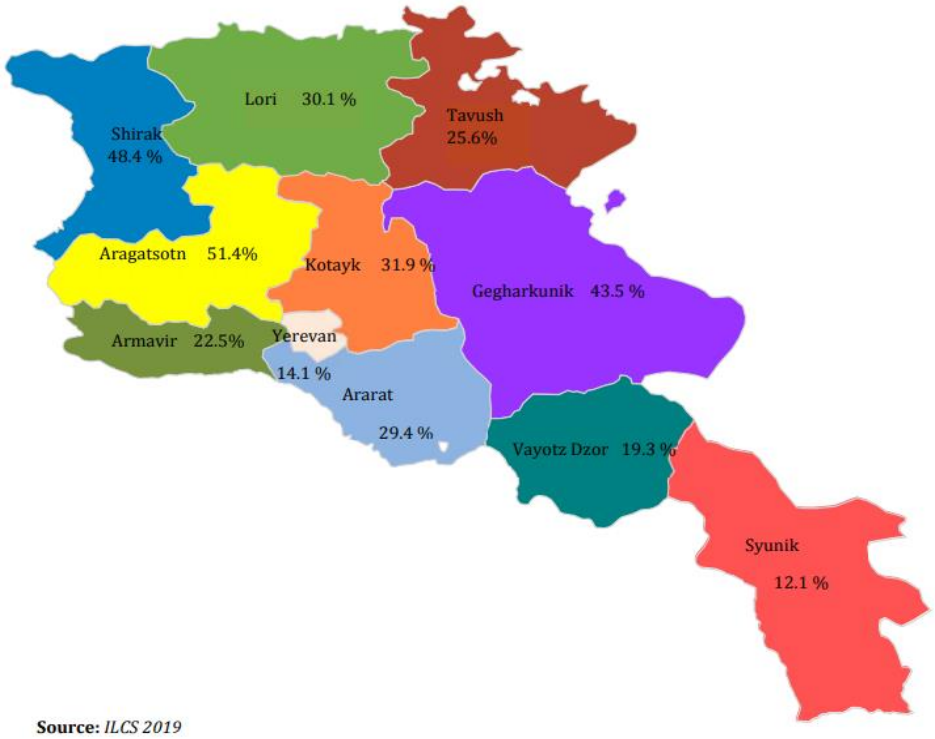
Source: World Bank

Armenia's recent economic history starts with gaining independence and building new state structures in the 1990's. Despite growth at the start of the new millennium, the economy suffered badly from the global financial crisis of 2008-9 and the Russian federation crisis of 2014-15. The Global Financial crisis brought an increase in the number of people living in poverty and had a more profound effect on Armenia than on other countries in Europe and Central Asia[4]. However, the picture has not improved much. Unemployment in Armenia reached 20.21% in 2020 and has been rising on average since 2013[5]. The structure of Armenia's economy has shifted from industry to services, with services accounting for 60% of GDP in 2017[1].

Armenia is broken down into administrative divisions called marzes with varying industry and productivity. The capital, Yerevan is the centre of activity.

[1] Sources: World Bank Group
[2] Source: https://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS?locations=AM
[3] Source: https://santandertrade.com/en/portal/analyse-markets/armenia/economic-outline
[4] Source: Work Bank Group, 2019, Work for a better future in Armenia An analysis of job dynamics.
[5] Source: https://www.statista.com/statistics/440639/unemployment-rate-in-armenia/

Figure 2: Poverty rate by administrative division (marz)



Source: *ILCS 2019*

Armenia's economy faces a number of challenges. Firstly, an aging population puts pressure on the working age population to maintain and improve the overall wellbeing of the population. This means there is a need for higher productivity jobs. Secondly, as a transition economy, Armenia's economic reform is ahead of most former Soviet states but lagging behind EU member states. World bank diagnostics identify lagging private sector development, productivity and competitiveness as the root causes of many of Armenia's socio-economic challenges. The structure of employment needs to shift from lower productivity to more productive sectors, which requires an expansion of the "modern" private sector for the creation of decent jobs[6]. To stimulate this expansion, innovation, international integration, economic diversification and competition are needed. Furthermore, the STEP household and employer surveys indicates severe skills mismatches and skills gaps in the economy. On the one hand, many workers find themselves overeducated relative to job requirements, while on the other hand, employers complain of challenges finding workers with the right skills.

The Government of the Republic of Armenia is guided by its Government Programme 2021-2026, which considers security and foreign policy; economy; Infrastructure; Development of Human Capital; Law and Justice; and Institutional Development. The Strategy of the Main Directions Ensuring Economic Development in Agricultural Sector of the Republic of Armenia for 2020-2030 guides the agriculture sector with a focus on increasing agricultural production and competitiveness and helping rural development. In terms of Labour and Social affairs, a labour market strategy 2019-2024 exists but a comprehensive "Labor and Social Protection Strategy is planned for 2022 to fulfil the Government programme[7]. In terms of Environment, the Republic of Armenia is actively involved in the topic internationally, having submitted four national communications and made commitments on Nationally Determined Contributions until 2030.

[6] Source: World Bank, 2017
[7] Source: UNICEF https://www.unicef.org/armenia/en/stories/armenia-set-comprehensive-labor-and-social-protection-strategy-2022

Agriculture and Food Processing Overview

The food industry in Armenia was chosen as an attractive sector to support due to its economic growth potential and potential to create decent jobs that are located across the country and build on an existing sector. The food industry also provides a natural progression from on-farm to off-farm jobs.

Armenia's food processing sector comprises 1600 enterprises estimated to be involved in the agri-food sector. Agricultural inputs play a significant role in income and employment in the sector. 260,000 people are estimated to be involved in agriculture and food & drink processing in Armenia, which is equivalent to approximately 25% of all employment. In the past five years in Armenia, Agriculture has accounted for approximately 14% of GDP and Agro-Processing for 11% of GDP[8]. Exports of food and agriculture-based products were 314 million USD in 2020, making up 12% of the country's total exports[9].

The Ministry of Economy of the Republic of Armenia divides Agri-processing into sixteen areas. Some of the more significant sectors include Grape Processing; Confectionary and Pasta production; Meat processing; and Flour millers and Bread baking. Grape Processing focusses mainly on Armenian Brandies, which are the major export of the food and beverage industry at almost 202 million USD in 2020. Other value chains important to the sector are Fruit and vegetable processing; milk processing; mineral, drinking water and non-alcoholic beverages; and dried fruits and spices production**.**

Armenia's main export markets are dominated by the Russian Federation, followed far behind by Ukraine and the USA, with Belarus, Georgia and Kazakhstan next in importance. The Armenian Diaspora of 7 million compared to just over 3 million living in the country is an important market segment for Armenian foods. Armenians live in more than 100 countries around the world, with the largest communities in Russia, the USA and France.

The Government of Armenia is working to create a favourable business enabling environment and has enacted reforms in this regard, investing in infrastructure, providing preferential financing and establishing an "open door" environment for investment.

Major challenges that remain to enable the food processing sector in Armenia include:

- **Human Capital:** A severe lack of skilled resources means lower ability to improve the quality of food and drink products through better technology and know-how as well as lack of suitable support for farmers to upgrade quality at their end.
- **Technical Capacity:** Reliance on outdated equipment in processing and old farming techniques as well as inferior/ outdated food safety systems are issues that are compounded by the shortage of qualified personnel to lead the way in upgrading techniques and technology.
- **Infrastructure:** Insufficient cold storage is contributing to post-harvest losses, while a gap in wholesale markets and road infrastructure challenges in the region limit access to markets.
- **Information and Services infrastructure**: There is a clear gap in information regarding prices and markets to help the agriculture and agro-processing sectors gain better access and prices on international markets.
- **Supply-side challenges**: Not only does agriculture suffer from human and technical capacity challenges but also small farm size (1.48ha on average[10]) make procurement complicated and render investment in technology not feasible. Other issues include a short harvesting season for apricots and reliance on imported animal feed.
- **Market-related challenges** include dependence on Russia for exports, poor political relations with Turkey and Azerbaijan preventing trade, bureaucracy at border crossings and creating awareness of Armenian Food and Drink products on international markets.

[8] Source: Ministry of Economy, 2021
[9] Source:ITC Trademap
[10] Source: mineconomy.am

- **Access to Finance:** The government of Armenia is striving to tackle issues of access to finance but of course, finance is often a root cause of other challenges such as access to storage, lack of investment in infrastructure etc. and is particularly problematic for SMEs.

Fruit and Vegetable Processing Overview

A rapid market assessment that preceded this Market Systems Analysis identified Fruit & Vegetable Processing as a value chain with significant potential for upgrading and in need of support. This value chain selection took into account export growth and perceived domestic and export market potential; potential for environmental sustainability; potential to create better jobs; and the level of Government support as well as the absence of projects specifically supporting the value chain. Sectors such as milk and meat processing were eliminated based on environmental impact and difficulty in complying with standards, while wine and brandy already receive significant support and value chain analyses have already been conducted. The analysis does not cover dried fruit processing and grape processing as they are separate economic sectors in the Republic of Armenia as defined by the Ministry of Economy[11]. Focussing on the sector as defined by the Government allows for better planning of interventions.

Internationally, the fruit and vegetable processing sector growth is based on international consumer trends in the food industry, which centre around sustainability, health and transparency[12]. The rise in plant-based diets is linked to sustainability and health, which, of course, is favourable for fruit and vegetable value chains. Demand for "superfoods", an ambiguous term which encompasses various and changing food items is a central driver. From greens and cabbages to mushrooms, seeds, avocadoes, superfoods also generally include berries, pomegranate and ginger. Juices, jams, compotes, sauces made from superfoods or indeed other fruits are therefore perceived as premium and healthy and are in high demand.

This analysis of the market system for fruit and vegetable processing describes the market system and analyses the opportunities and constraints in the value chain as a basis for making recommendations for upgrading fruit and vegetable processing in Armenia and the systems that surround it. In an effort to be brief, the report is solutions- focussed and does not dwell on the detail of the market system but endeavours to understand the dynamics driving or hindering it.

Objective

The overall objective of the assignment was "to identify the main challenges to productivity increases and stronger export performance in the food processing industry in Armenia and Georgia, as well as to identify opportunities to develop a specific food value chain that would benefit from better processing."

The objective of the Value Chain Analysis/Market Systems Analysis in Armenia is therefore to identify opportunities to develop the Fruit & Vegetable Processing value chain in Armenia, identifying potential to improve opportunities to create decent work through value chain upgrading. More specifically, this means mapping out key constraints and root causes of the bottlenecks to the creation of decent jobs in these chains in order to understand how to increase income and the availability of better jobs, while minimizing other social and environmental hazards in these value chains.

[11] Source: Ministry of Economy https://mineconomy.am/en/page/1327

[12] Sources for food trends include https://www.edlong.com/top-7-food-industry-trends-for-2021/

Chapter 2: Methodology of the Market Systems Analysis

Methodology

The Market Systems analysis is a qualitative study with some quantitative data collection and analysis.

Research Questions

In order to achieve the research objective of identifying opportunities to improve the Fruit & Vegetable Processing Value Chain, a set of Economic, Social and Environmental Research Questions were outlined to guide the information to be gathered. These were not the direct questions asked to the final stakeholders. The questions asked of stakeholders and the answers given were used to form opinion and analysis in order to answer the overall Research Questions.

The detailed research questions are included in the analysis. Below is a summary.

Economic Questions

1. What are the characteristics of the value chain?
2. What is the market potential of the value chain?
3. What are the opportunities and limitations in the value chain?
4. What are the recommendations of the value chain operators to improve the value chains?

Social Questions – Focus on decent work

5. What type of social groups are involved in each stage of this value chain?
6. How can upgrading the value chain reduce poverty and vulnerability to poverty?
7. What are the main occupational safety and health hazards of the value chain affecting workers?
8. What opportunities are there to improve working conditions and create decent work?
9. What is the social impact of the value chain?
10. What are the preferences/ wishes of the groups to improve their situation?

Environmental Questions

11. What negative or positive effects does this value chain have on the environment?
12. Is there potential to reduce carbon emissions in this value chain or as a result of value chain activities?
13. How is this Value Chain affected by Climate Change?

Methods

The value chain analysis was ‘quick and dirty’ i.e. a lot of information was gathered in a short space of time in order to provide insights into the situations at hand and provide realistic recommendations for feasible interventions to create jobs considered as “decent work”.

As such, it was not a deep study but was expected to give good quality and representative results. The techniques used are characteristic of rapid appraisals. The research questions guided the data needs to be collected.

The main methods of data collection were

- *Literature review:* Gathering secondary data from existing research.
- *Questionnaires:* Gathering basic quantitative and qualitative data from fruit and vegetable processing companies.
- *Key Informant Interviews* with Value Chain operators (micro-level) (At each stage: Farm, greenhouses, warehouses, processors, distributors, International buyers), service providers (meso level) and national stakeholders that influence and/or promote the value chain (macro level).

Sampling
The data collection was characterised by the *snowball sampling technique*. This means setting out a basic sample of stakeholders to be interviewed and then expanding the base according to referrals from initial stakeholders and the need to dig deeper into certain topics. Considering the Market Systems approach, this means starting at the core of the system to understand the issues being experienced by the value chain operators and then moving out to the support functions and rules to dig deeper to find root causes and solutions.

Therefore, the interviews started with the different types of fruit and vegetable processors: general processors, juice processors, dried fruit producers and IQF processors and moved on the different stages of the value chain before following the issues to discuss with value chain enablers.

Limitations of the research
The following issues were the main limitations to the research:

- Due to pandemic-related travel restrictions, the international consultant was unable to travel to Armenia and conduct interviews in person. This risked the quality of the analysis but was mitigated by close collaboration with the local consultants and conducting interviews online.
- Pandemic related restrictions also meant that local consultants were required to conduct interviews on the phone and/or online. No factory visits were possible. This limited the amount of informal conversation and opportunities to talk with employees and thus the quality of the information gathered.

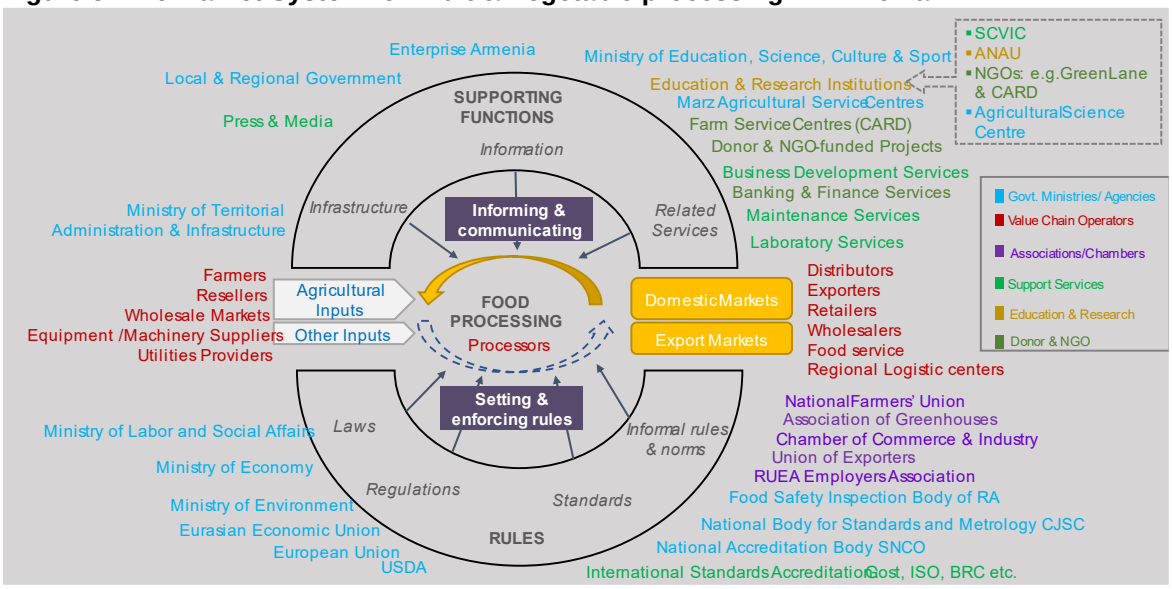
Chapter 3:

The Market System for Fruit and Vegetable Processing in Armenia

This Market Systems analysis looks at the entire market system for fruit and vegetable processing in Armenia. This means not only studying the value chain from Input production and supply through processing and distribution to import and export markets and output value chains, but also studying the environment in which this value chain sits: the rules (Laws, regulations, standards and informal rules & norms) and the supporting functions (Infrastructure, information and related services) that surround, support and enable or hinder the functioning of the value chain.

The figure below depicts the Market System for fruit and vegetable processing in Armenia and the players involved. At the value chain level are the suppliers, of which farmers and the fruit and vegetables that they supply as inputs are crucial to the operating of the chain; the processors, who transform the fruit and vegetables into juice, jams, sauces, canned foods, pickled vegetables and frozen fruit & vegetables among others; the various players in distribution of the products to domestic and international markets; and the final sellers in retail or food service. Surrounding the value chain operators are the enablers. They include Government Ministries and agencies including national food and standards agencies and Enterprise Armenia (Investment and Export promotion; private sector associations; Donor and NGO-funded projects and programmes; private sector services; and Education and Research Institutions. The role of the various stakeholders will be examined in the Stakeholder Analysis section below.

Figure 3: The Market System for Fruit & Vegetable processing in Armenia



Products of the Value Chain

Before examining the value chain itself, it is important to understand the products involved. The main products of the fruit and vegetable processing value chain in Armenia are Fruit & Vegetable juices; Jams, Jellies and Preserves; Sauces, Frozen Fruit & Vegetables; Pickled vegetables; and other preserved foods. In 2020, Processed fruit and vegetables accounted for 33.8 million USD in exports with 24% annual growth from 2016 to 2020. Main Export partners are Russia (23 million USD), USA, Georgia, and the United Arab Emirates (UAE). While separate facilities may exist, generally, processors produce multiple product types.

Table 1: Processed Fruit and Vegetable Products

Product (numbers refer to HS[13] codes)	**Exports 2020[14]**	**Export partners**	**Typical varieties**	
Preserved vegetables (2005 &2002)	15m USD	Russia (11.6m), USA, Georgia, EU	Tomatoes, Mixtures, eggplant, peppers, onions, carrots, cauliflower, peas	
Preserved Fruit & Nuts (2008, 2006)	10.8m USD	Russia, USA, Georgia	Compotes of apricots, peaches etc. Glaceed cherries	
Juices (2009)	2.8m USD	Russia (1.9m), Kazakhstan, USA	Apricot, cherry, pomegranate, apple, tomato, peach, orange	
Jams, Jellies, Preserves (2007)	2.7m	Russia (1.7m), Ukraine, UAE, USA	Apricot, cherries, strawberry, figs	
Sauces (2103)	2m USD	Russia (1.5m), USA, EU	Tomato ketchup, other tomato-based sauces, ragout, eggplant-based sauces, pastes, marinades.	
Pickled Vegetables (2001)	1.9m USD	Russia (1.3m), USA, Belgium	Pickled cucumbers, peppers, green beans.	
Frozen Fruit (0811) **& Veg** (2004)	558,000 USD	Russia (505k), Ukraine, Saudi Arabia	Peppers, carrots, sweet corn, cauliflower, berries, cherries	

Preserved Vegetables

Preserved vegetables is the biggest exported processed fruit and vegetable category in Armenia with exports worth 15 million USD in 2020, mostly to Russia. Peeled plum tomatoes, grilled vegetables, peppers, peas and chillies and excluded pickled vegetables (preserved in vinegar). Products are packaged in jars with sizes ranging from 270g up to 1kg. There are also peas and sweetcorn in tins.

[13] HS codes are based on the international Harmonized system for identifying products for customs purposes and help this analysis in measuring levels of trade.

[14] All export figures have been calculating using data for 2020 from ITC's Trademap.org

Some exports were also made to the USA, Georgia and the EU. Exports of preserved tomatoes were 3.6 million USD and there is also a large domestic market for preserved vegetables.

Preserved Fruit and Nuts

Another large export category is preserved fruit and nuts with exports in 2020 of 10.8 million USD, mainly to Russia and also to the USA and Georgia. Preserved fruits include apricots in syrup, compotes of peach, blackcurrant, blackthorn, feijoa, cherries, berries and quince among others. These products are also in demand on the domestic market. Compotes are typically in 1L glass wide-necked bottles with fruit in syrup packaged in jars from 300-800g.

Juices

Fruit and vegetable juices in Armenia include freshly squeezed juices, usually in glass bottles; Juices made from concentrate (mainly in Tetra-pak); and nectars, also typically in tetra-pak. Varieties include apple, tomato, peach, sea buckthorn, cherry, pomegranate, quince, apricot, orange, rosehip and multifruit among others. Pack sizes vary from 200ml to 1 litre. Exports of juices from Armenia were worth 2.8million USD in 2020 of which 1.9 million was exported to Russia. Other key markets were Kazakhstan and the USA.

Jams, Jellies and Preserves

Jams, Jellies and preserves accounted for 2.7 million USD in exports in 2020, mainly to Russia (1.7 million), Ukraine, UAE and USA sold to Turkey, Russia and Germany. They are produced and packaged in 200-500g jars targeted at retail markets. There are many varieties from apricots, walnut, cherries, quince and berries to rose petal and pumpkin preserves. One of the more popular products is apricot jam.

Sauces

Sauces account for a large sub-sector of fruit and vegetable processing. Although domestic sales are significant, export sales were worth 2 million USD in 2020 and went to Russia (1.5 million), USA and smaller amounts to the European Union. Tomato-based sauces account for a significant proportion of production. Other vegetables used in sauces include, peppers, eggplant, onions and carrots. Sauces include also pastes and purees. One challenge in this sector is that some of the sauces that are also native to Armenia, have the names of their Georgian counterparts such as Ajika and Ajapsandal. This is because Georgian cuisine is well known across the former Soviet Union and the sauces became known by their Georgian names. However, Georgia does not allow Armenian products into the country with Georgian names. This is a big problem because to export by land to the main export market, Russia, the products must pass through Georgia. Sauces are packed in glass jars from 210g to 1kg

Pickled Vegetables

Pickled Vegetables preserved in vinegars and packaged in glass jars. The main products are cucumbers and peppers. Overall, the products are mainly destined for the domestic market with exports of 1.9 million USD mainly to Russia (1.3 million) the USA and Belgium in 2020. Similar to preserved vegetables and sauces, pickled vegetables jar sizes vary with many around 500g.

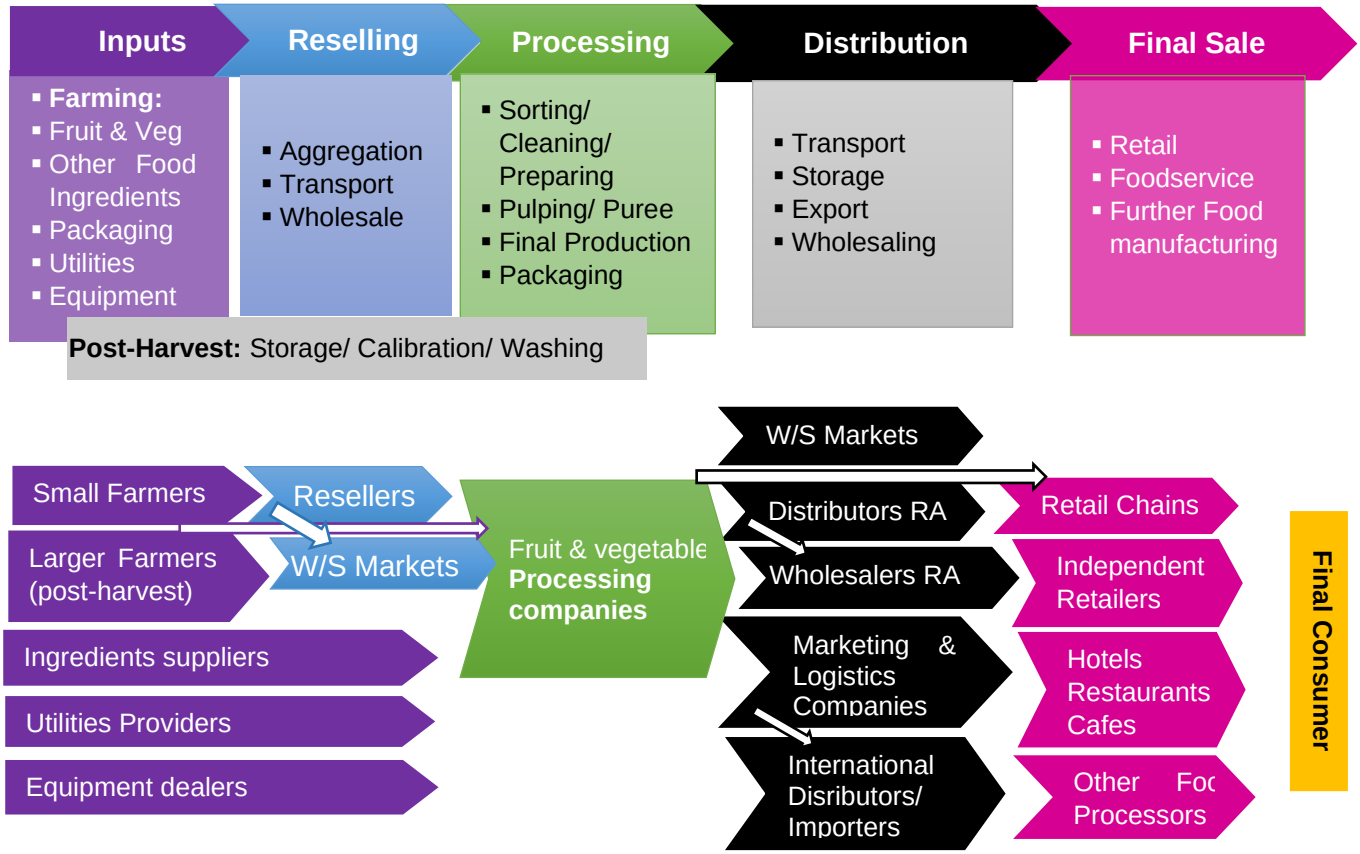
Frozen Fruit and Vegetables

Processors of frozen fruit and vegetable included Tamara Fruit CJSC, the first company in Armenia to produce these products. There are two or three more companies in this sub-sector. Exports in 2020 were more than half a million USD, mostly to Russia, with frozen vegetables only exported to Russia. Other markets for frozen fruit were Ukraine and Saudia Arabia. Products are packed in plastic film (bags) and include peppers, corn, cauliflower, berries and cherries among others as well as mixes.

The Value Chain Map

The fruit and vegetable processing value chain in Armenia has five main stages: primary production of fruit and vegetables, trading, processing, distribution and final sale. While there are sometimes more than these steps in the chain and, of course, input value chains occur before this value chain starts and there are output value chains for frozen fruit and vegetables, these are the main transactions.

Figure 4: The Value Chain stages, function and operators



The **input stage** has many aspects. Firstly, farmers grow and harvest fruit and vegetables in various regions of Armenia, some produce being better suited to specific regions such as the lowlands of the Ararat valley. Farmers produce both on the land and in greenhouses and sell their produce into the fresh fruit & vegetable value chains and also into the processing value chain. Normally lower quality product is sold for processing. Fruits that are processed include apricots, pears, apples, berries, cherries, melon, peaches, figs and pomegranate. Vegetables that are processed include tomatoes, carrots, cucumbers, onions, green leaves, cauliflower, peppers (capsicum), eggplant, garlic, broccoli, pumpkin and herbs. Processors also use some potatoes and nuts in this value chain. Other food ingredients include imported concentrates, sugar and food additives. Further inputs to the value chain are the machinery and equipment used in processing and utilities that provide energy and water.

Farmers sell their fruit and vegetables to **resellers, to wholesale markets**(W/S Markets) or directly to processors, mainly depending on their size and proximity to markets and processors. Resellers will often sell to the wholesale markets and the processors buy the produce from there. Processors choose to buy from wholesale markets as it saves in logistics costs but they also buy directly from farmers, especially if a contract exists. Processors and resellers use their own transport to collect the raw materials. Larger farmers often have contracts with processors and honour them. Smaller farmers may also have contracts with processors but these are often not honoured, probably because the farmer needs to sell stock for an emergency cash injection or finds a buyer that will offer a better price. With smaller farmers spot contracts are common, often paid in cash. For larger farmers with longer term relationships and contracts, payment is made via bank transfer, according to the agreement.

An important stage between farm production and processing is **post-harvest handling**. It is depicted here across the input, resale and processing stages because grading, sorting and cleaning can happen at any of these stages. There is, however, no purchase and sale of inputs involved. Farmers own or rent facilities to store, calibrate, wash and package fruit and vegetables before selling to processors or processors have storage facilities. However, there are limited cold storage and transport facilities in Armenia.

The central stage of this value chain is processing. Processing steps vary depending on the product but the basic steps are receiving, input storage, initial processing (peeling, pitting, squeezing, etc), boiling/pasteurisation/sterilization, bottling/canning/packing and output storage before distribution and sale. The level of initial processing to be done depends on the level of post-harvest handling i.e. how well the fruit and vegetables have been sorted, graded, washed and stored. There are many people involved in the stages including warehouse workers, initially processors, machine operators, Food technology and Quality Assurance and -maintenance services. Most employees (est. 75-80%) are women

The **distribution stage** of the value chain can involve few or many transactions. Larger processors may sell directly to retail chains and independent operators in Armenia or to customers worldwide, paying for logistics services. International customers could include retail chains like X5 Group in Russia, wholesale distributors or downstream manufacturers e.g. for frozen fruit and vegetables. Processed products from smaller processors may pass through one or more wholesale markets, independent distributors and wholesalers before arriving at the final point of sale in retail or foodservice.

The **final sellers** of Armenian preserved vegetables and fruit; juices, sauces, pickled vegetables and frozen products are in the retail and food service industries. Retailers in Russia and Asia include retail chains, and independent shops, while products may be sold in specialist online or offline retailers and in Armenian restaurants in the USA. Full service and specialist wholesalers also carry the products. In the USA, the online retailer My little Armenia sells a range of sauces, preserved vegetables, jams and preserves from Armenian manufacturers directly to consumers across the country.

Stakeholder Analysis

The table below lists the various stakeholders involved in the Fruit & Vegetable Processing market system and outlines their roles. The core value chain actors have already been discussed but the various roles of the supporting function are many and broad.

Table 2: Stakeholders of the Market System and their roles

Stakeholder	**Role in fruit & vegetable processing**
Core Value Chain Actors	
Small Farmers	- Production of fruit and vegetables
Larger Farmers	- Fruit & Vegetable production, warehousing, aggregation, post harvest activities
Resellers	- Buy from farmers an sell to wholesale markets or processors
Wholesale markets	- Aggregation of fruit and vegetable sales from farmers to processors - Sale of processed fruit & vegetables to domestic wholesalers, retail and food service operators
Ingredients suppliers	- Local and international suppliers of food ingredients to processors
Equipment Dealers	- International suppliers & local importers of agricultural and processing equipment
Utilities providers	- Provision of water and energy for processing
Fruit & Vegetable processors	- Companies transforming fruit & vegetables into finished products
Distributors & Exporters	- Companies trading and transporting processed fruit & veg products
Wholesalers & Importers	- Companies importing and selling products in final markets
Retailers	- Final sellers of retail products to consumers
Foodservice operators	- Sellers of meals/drinks including processed fruit & veg products

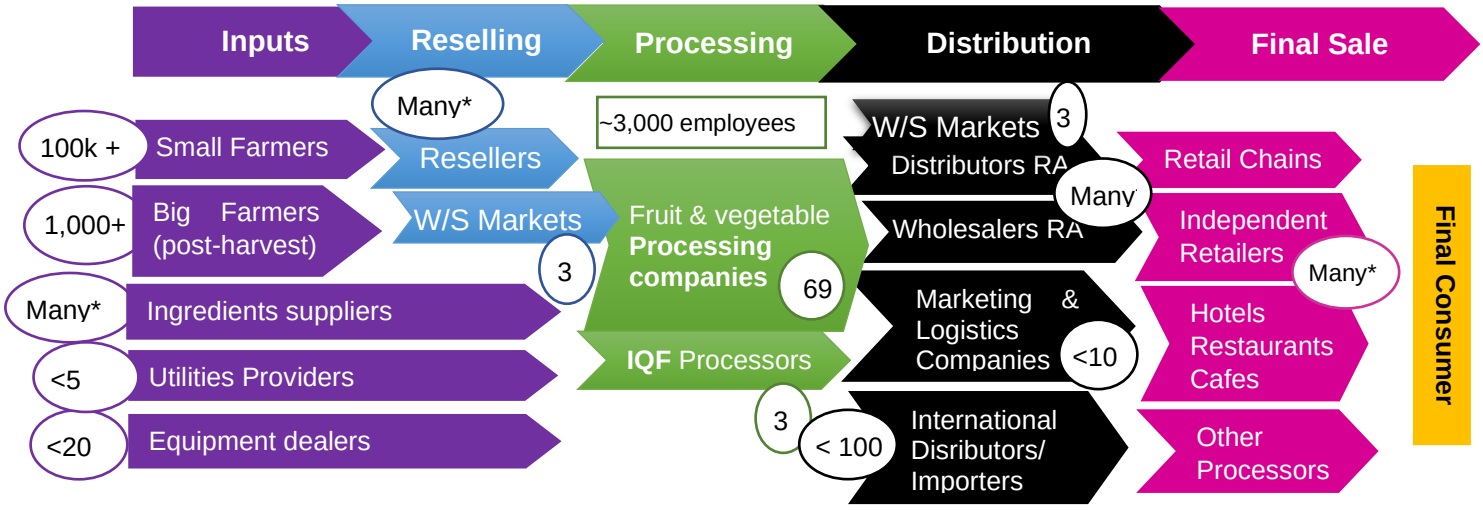
Stakeholder	Role in fruit & vegetable processing
Public Institutions and Agencies	
Ministry of Labor and Social Affairs	- Food safety policy and regulation - Labour policy and regulation - Social protection of workers
National Food Safety Inspection Body	- Implementation and enforcement of food safety policy.
National Accreditation Body	- Accreditation for food standards compliance
National Body for Standards and Metrology	-
International Standards – ISO, IFS, BRC, GOST etc.	- International food standards accreditation
Ministry of Economy	- Agriculture Policy - Policy for food processing - SME Development and Policy - Grant schemes for SMEs in agriculture and food processing - Support projects
Enterprise Armenia	- Investment and Export Promotion Agency (mainly investment)
Marz Agricultural Service Centres	- Regional provision of extension services and training
Ministry of Environment	- Environmental policy incl. adaptation and mitigation
	-
Ministry of Territorial Administration and Infrastructure (MTAI)	- Agricultural infrastructure incl. water (irrigation and drainage) and roads - Utilities management issues for food processing companies
Local and Regional Government	- Policy implementation, Engagement with private sector - Infrastructure and utilities maintenance
Ministry of Education, Science, Culture and Sport	- Education Policy
Eurasian Economic Union	- Information on standards and compliance - Trade facilitation among member states
Private Sector Associations	
Republican Union of Employers in Armenia (RUEA)	- Representative body for employers in general. - Advocacy for economic and labour reform
National Farmers' Union	- Represents all farmers. Role in advocacy for agricultural reform.
Association of greenhouses	- Represents greenhouse owners - Role in advocacy, sensitization and exchange of information
Exporters' Union	- Represents some larger fruit & veg processors - Advocacy and exchange on economic and export issues
Chamber of Commerce & Industry	- Support to industry and trade through training and business forums - Information and advocacy
Public & Private services	
Education and Research Institutions	- Formal education for agriculture, food processing and business operation - Training and upskilling programmes - Agricultural research - Input into public policy-making
Armenian National Agrarian University	- Primary educator for agriculture and food processing. Undergoing major reform and modernisation
Green Lane NGO	- Provision of training centres and extension services (3) around the country. Inclusion of women, youth, people with disabilities.
CARD Foundation Farm service centres	- 19 Farm service centres around the country for information, extension and training in agriculture and some agribusiness
Press & Media	- Public awareness of policy and support, Advocacy mechanism

Stakeholder	Role in fruit & vegetable processing
Business Development Services	- Includes consulting, accounting and other management services - Provision of training, advisory and business management services
Banking & Finance Services	- Provision of Loans and savings schemes
Maintenance Services	- Maintenance of agricultural and processing equipment & buildings
Laboratory Services	- Provision of testing, auditing and R&D facilities
Donor/NGO intiatives	
Donor and NGO-Funded Projects	- Many projects exist that support various stakeholders in the market system including general support for farmers and SMEs and also social projects, projects for women entrepreneurs etc. Depending on the intervention, different projects play different roles. Include also Green Lane and CARD Foundation mentioned about
European Union	- Agricultural projects - SME development - Food Safety – Alignment with DCFTA - Policy advocacy
FAO	- Agricultural projects
World Bank CARMAC II project	- Grants for food processors to upgrade technology and increase exports
USAID	- Agricultural and SME development
UNDP	- SME development, much work with small food processors
USDA	- Agriculture and Food safety

The value chain in numbers

To understand and analyse a value chain it is important to understand how many players are involved and who is profiting from the chain.

Figure 5: The Value Chain in numbers



*It is difficulty to put a good estimate on "many" but it indicates high competition. For ingredients suppliers, there may be less than fifty supplying to Armenia but thousands are available worldwide. Regarding resellers, there may be thousands reselling on a regular or occasional basis. Local distributors are wholesalers could be hundreds or even more than one thousand and final sellers of Armenian products could be tens of thousands of outlets worldwide.

It was difficult to extract data on the quantities of value chain operators so the figures depicted above are reliant on estimates. The estimates for the number of farmers involved in fruit and vegetable production overall is based on the employment statistic of over 300,000 in agriculture, assuming that at least one third of farms are involved in fruit and vegetable farming considering mixed farming and geographical distribution. Small farms have emerged following the privatisation and democratic

distribution of land in Armenia following independence, meaning most farms are on average 1.4 hectares in size. Of these hundreds of thousands of farms, it is likely that thousands of these have bigger farms, meaning they produce e.g. more than two tonnes of fruit and vegetables annually. These are the farmers that may have storage facilities and formal agreements with processors. Other food ingredients are sourced internationally and there are many players in a competitive market. Utilities suppliers are very few and therefore have a lot of power over energy and water supply and there are not many equipment dealers in the country or even worldwide players with the right machinery.

There are 69 formal fruit and vegetable processing companies. This does not include the many informal players selling e.g. jam from the homestead. Eight of the formal companies are considered to be large. Three or four companies also have IQF frozen production. It is estimated that there are 2,905 employees in the formal sector. However, thousands more are likely to be employed in the informal economy.

Of the distributors, it is estimated that there are many distributors and wholesalers in Armenia that are distributing the products of the value chain. It is difficult to estimate the number of players on international markets but given the level of exports and the need for bulk transport, it is likely that there are less than one hundred international importers/distributors of any significance that are importing products from the value chain from Armenia. This is significant because it means that efforts to build relationships with these distributors would be worthwhile as it is a manageable number.

At the final retail, food service and manufacturing level, it is difficult to estimate but there are of course many end sellers both in Armenia and worldwide. Even the retail industry in Armenia is fragmented with many smaller retail chains and independent stores. In terms of manufacturers, it is likely that there are not as many involved as they are mainly customers of IQF products and small volumes are involved thus far. However, the potential number of manufacturing customers is high.

Profitability

It was not possible to get detailed enough information to determine the margins earned by manufacturers. However, we know that they complain both about high prices of inputs and low quality. The low quality and old machinery can contribute to losses indicating lower profitability. Export prices of the products are generally in the range between US$1 and US$1.70 per kg while retail prices per kg in the USA vary from $8.56 for tomato paste to over $23 for cherry preserve. Armenian retail prices are generally between two and nine USD per kg. We can see therefore, that there are large margins gained following export. The fragmented nature of distribution within Armenia makes it difficult to estimate the distribution of margins. Some products are sold directly from processor to retailer, while others are sold to wholesale markets, then to distributors and possibly another wholesaler before reaching the final seller. The differences between export prices and final domestic retail prices tell a story. Jams that are exported at US$1 per kg are sold at 1,889 AMD per kg or almost $4 USD. This shows a 75% margin between retailers and distributors which is above international norms. However, data gathered is not detailed enough to make an accurate judgement.

Chapter 4: Social Considerations

The role of women, men, youth, people living with disabilities and border communities

Women & Men

The fruit and vegetable processing value chain generally employs many women, particularly at the processing stage. Estimates are that 75-80% employees in processing are women and 60-70% of those working in agriculture are women (including informal economy). Jobs are generally assigned to specific genders. Men are more likely to work in warehouses and in distribution and different jobs are assigned on the farm. About 80% of employees in logistics and cold storage are men.

Armenian Law prohibits discrimination on the basis of gender. However, the World Economic Forum's 2021 Global gender gap index gives Armenia one of the lowest rankings in the region and 114th place globally. Reasons for the gender gap are closely related to working conditions and include earnings gaps, low labour force participation and low female representation in managerial positions. Labour force participation of men is 71.7% while female labour force participation is just 49.6% The main reason is that women are exiting or workforce to care for children.

A major root cause for this gender disparity is the cultural attitude that women are wives and mothers, do not own land and pursue traditional education. One benefit of the attitude is that because male youths are more likely to leave school to participate in the labour force, females are more likely to continue education. This means that females are more educated. However, there is a skills mismatch, because they are not encouraged to study skills that are in demand such as agronomy and engineering.

In 2018, the labour force in agriculture in Armenia included 48% women and 52% men. Women are more engaged in informal agricultural activities and are less secure. They are more engaged in low skill field work such as harvesting, sorting, and packaging. 53% of women aged 15-75 had no job and did not look for a job, mainly being engaged in unpaid household activity. Women have low access to land, technologies, technical knowledge, training, extension services, information and finance. They are paid less than men for their work (The gender pay gap in Armenia is one of the highest in the ECA region at 28.4%, which is higher when taking into account that women are more educated; and the pay gap is higher for higher-paid jobs) and have less involvement in decision making both in the public and in private sectors. Due to low access to resources, traditional practices and stereotypes, women are less likely to own and run their private farm. In 2018, the Ministry of Agriculture was also dominated by men, who made up 62% of the staff.[15]

Armenia has good maternity benefits and leave by international standards, but full benefits are only available to formally employed women. The same is true for childcare benefit and nanny subsidy which is only available to formally employed women. Because women are overrepresented in informal employment, unpaid work in family farming, and in domestic activities, they are then more vulnerable to poverty.

Youth

Interviews indicated that youth do not want to do agriculture like their grandparents or work in processing but are interested in higher technology. This means that they are attracted to jobs in ICT but also that they can be attracted by technological innovation in agriculture. In Tavush marz, for example, the EU Green Agriculture Armenia Initiative (EU GAIA) has developed smart agriculture centres which can be attractive to youth. Youth are also engaging in greenhouse projects. University reform could attract youth by offering interesting study programmes, but jobs also need to be attractive. Modernizing technology in processing should also consider modernizing career opportunities for youth. Indications from Green Lane NGO suggest that programmes to encourage youth have succeeded in creating more interest and excitement in the sector.

[15] Source: Armenia assessment of agricultural sector vulnerability to climate change , 2020, National Adaptation Plan (NAP) to advance medium and long-term adaptation planning in Armenia" UNDP-GCF Project

People living with disabilities

The Government of the Republic of Armenia encourages the inclusion of people living with disabilities in the work place through financial incentives for recruiting new staff. An EU-funded project is also working with youth and providing start-up grants to organisations that can accommodate persons living with disabilities. People living with disabilities also have access to income security through social welfare payments to help with adjustments and pensions for adults.

There are a number of positions in processing that are suitable (or can be made suitable through simple adjustments) for people with disabilities, for example in packaging and labelling or in laboratories.

However, societal attitudes to people with disabilities are still negative and need to addressed. Changing attitudes should be coupled with added efforts to to support universities and employers to employ people of every ability in their workplaces, not only through financial incentive but also through sensitization and services to help with workplace adjustment and integration. An assessment of the suitability of processing positions to various disabilities could also help employers.

Border Communities

People living near the border of the Artsakh (Nagorno-Karabakh Republic) disputed territory are particularly vulnerable to poverty and more likely to be left behind, particularly given the extent of the war in 2020. People from these communities may also have been displaced. As marzes of Gegharkunik, Vayots Dzor and Syunik which border the Artsakh territory are home to fruit and vegetables, these communities should be supported to ensure that they have access to markets for their products.

Working Conditions

Employment contracts and pay disparity

As already discussed, the value chain has many informal workers, albeit less so at the processing stage. The proliferation of women at the farming and processing stages coupled with overall gender pay gaps, suggest that the salary levels in the value chain are below average wages.

Work Hazards

While the fruit and vegetable processing value chain is not the most hazardous of the food processing industry there are still several risks involved.

Looking first at the input level, farming can involve heavy physical work and long working hours and exposure to weather (sun, rain, frost). Harvesting and post-harvest handling can involve heavy lifting and exposure to cold temperatures.

The initial work on the factory floor of peeling and preparing fruit is hard work, wet and possibly cold with long working hours. Employees paid by weight of product handled rather than by hour are under extra pressure to perform for the low wages.

On the production lines, there are typical hazards associated with machinery. Even if companies are aware of these hazards and provide the necessary signage and inform employees of the risks, employee awareness is nevertheless an issue for concern as employees do not always heed warnings or truly understand the dangers and can endanger themselves with sharp machinery, electrical outlets etc.

Cold storage facilities generally comply with rules including providing special clothing so that working conditions do not negatively affect the health of employees.

Worker Protection and Healthcare

The protection of workers remains a challenge in the Armenian Fruit and Vegetable Processing Value Chain. There is no legislation for occupational safety and health and weak employment injury provisions

for occupational accidents and diseases. In addition to this, while universal healthcare is important to workplace health and safety, the system is underfinanced, and so more expensive treatments are not publicly funded. More importantly for workers, there is illness benefit, but it does not extend to informal workers.

Social Welfare System

The Republic of Armenia has a comprehensive social welfare system but there are some gaps that need to be addressed to protect workers, improve working conditions and attract employees to the fruit and vegetable processing value chain.

- Maternity leave and benefit: As mentioned earlier, while sufficient for formal workers, the benefits for informal workers are inadequate.
- Childcare benefit: There is no universal childcare benefit in Armenia. While formal workers get subsidies for children up to the age of two, informal workers receive no such benefits.
- Unemployment benefit: Armenia has no provision for unemployment benefit. Unemployment benefit protects workers because they have less fear of losing their jobs and so are less likely to accept unsuitable or deteriorating working conditions.
- Illness benefit: As mentions illness benefit only applies to formal workers

A 2011 study by the Asian Development Bank suggested that 98.6% of all agricultural jobs in Armenia were informal, while manufacturing (incl. food processing) fared a lot better at 11.8%[16]. Informal employment increases vulnerability through lack of worker protection and maternity and childcare benefits on the one hand; and negatively affects the balance of payments by reducing Government tax income, while maintaining social welfare expenditure for those receiving income support. To resolve this issue, a review of how social welfare payments are allocated is needed, followed by an adjustment to the system. The review should also consider how to allow for temporary employment without having a negative overall effect on annual income.

Overall Social Impact of Fruit and Vegetable Processing

The main negative social impact of the fruit and vegetable processing value chain is the persistence of informal employment at the farming stage. On the other hand, the value chain has the positive impact of creating jobs in poorer areas of the country. Agriculture generally benefits poorer people and fruit and vegetables are cultivated across the country bringing income to many areas.

Upgrading the value chain can bring many benefits. Firstly, increasing farm mechanization can alleviate the issue of labour shortages and pressures on farmers, while creating better jobs in agricultural services. Secondly, upgrading processing can increase the number of off-farm jobs, improving the proportion of community with access to decent jobs. This upgrading must of course be accompanied with putting better working conditions and a social safety net in place for employees.

However, upgrading interventions must ensure that the most vulnerable do not get left behind. For example, supporting mechanization can unintentionally help bigger farmers grow, while smaller farmers do not take the risk of investment, thereby increasing the poverty gap.

[16] Source: ADB https://www.adb.org/sites/default/files/publication/28437/informal-sector-armenia.pdf

Recommendations to ensure productive inclusion and decent jobs in the value chain

a. In-depth assessments to improve the inclusion of youth, Border Communities Persons living with disabilities in the value chain:

- In conjunction with curriculum and skills development planning, conduct an assessment on the needs of youth and how to make the industry more attractive to them
- Conduct a study to recommend interventions to integrate persons living with disabilities in food processing work places considering support to physical adjustments of the workplace, training and changing the mindset of employers and society in this respect
- Conduct an assessment of the needs of Fruit & Vegetable processing value chain operators in Border Communities.

b. Development and dissemination of training and sensitization modules on workplace hazards in fruit & vegetable processing, targeted at increase employee awareness and behaviour

c. Policy improvements to ensure better working conditions in the value chain – through development of the social code and implementation of labour law

- Regulations on worker protection through the introduction of legislation for occupational safety and health
- Conduct an assessment to consider how informal workers can access maternity benefit
- Introduction of universal childcare to ensure ability of both formal and informal workers to return to the workplace and encourage more parents into the labour force
- Introduction of unemployment benefit based on a feasibility study for a sustainable financing mechanism
- An assessment and strategy, potentially involving social welfare reform is needed to attract workers, especially women of child-bearing age from the informal to the formal economy

Chapter 5: Environmental Considerations

When conducting a market systems analysis, it is important to understand the environmental implications of the system. This means analysing if the value chain has or could potentially have a negative impact on the ecological environment and if climate change is negatively impacting the value chain. Food and agro-based value chains both contribute to climate change and are affected by it. One of the reasons that the fruit and vegetable processing value chain was selected for this study, however, is that this value chain is less damaging to the environment than other agricultural sectors.

In the fruit and vegetable processing chain, particularly at the primary production stage, the economic and environmental sustainability of the value chain is inherently interlinked. The root causes of environmental and economic challenges and solutions to overcome them and often common. This section will discuss aspects that are specifically related to the environment and go into detail in Chapter 7 on the root causes.

Agriculture is an extremely climate-sensitive field so Armenia's rural population and livelihoods are vulnerable to climate change. Armenia is a mountainous country with vulnerable ecosystems, has a history of uneven distribution of droughts and water resources and is subject to erosion and natural disasters, as a result of which the country becomes more sensitive to global environmental changes. Agriculture is also the second largest sector contributing to greenhouse gas emissions accounting for more than 22% of total emissions at national level. A large proportion of this is attributable to animal husbandry. About 80% of the territory of Armenia is exposed to various degrees of desertification, due to both human-induced and natural factors. Projections for the agriculture sector as a result of climate change include, in the next century, reduction of soil humidity by 10-30% and soil moisture reserves for various agricultural crops by 7-13%; an increase in land water deficits of 25-30%; a 25% decline in river flows resulting in a 24% fall in productivity of irrigated land; the intensification of land degradation.[17] By 2030, crops yield could fall up to 14%. Strong storms can also cause natural disasters, such as soil erosion, mudflows and floods, which, in turn, can damage agricultural lands and irrigation infrastructure.

According to the World Resources Institute, Armenia is ranked 34th among the 164 UN member states in terms of water stress, as a country with high baseline level of water stress. The irrigation sector remains Armenia's largest water consumer. Vulnerability of the sector to climate varies across land zones and crops and is more evident in low-lying and medium-altitude zones in Armenia, typically in the fruit and vegetable growing areas. The high risks in agriculture compounded by insufficient availability of land resources, significant losses in the current irrigation system (around 80%) and unsatisfactory state and operation of risks prevention systems. Overall, Armavir, Kotayk, and Vayots Dzor regions are the riskiest ones with regard to natural disasters. The Ararat Valley (Ararat, Armavir, and Aragatsotn provinces) are especially vulnerable to droughts and late-spring frosts, while Shirak, Lori, Tavush and and Vayots Dzor are more vulnerable to hail and floods. On the other hand the Ararat valley is better protected against droughts, as most of agricultural land in the valley is irrigated.

Hailstorms, frosts, heat waves, and drought have a particularly significant impact on the loss of agricultural crop yields due to hazardous hydrometeorological phenomena. Armenian farmers are experiencing increased temperatures during the day and night, an increase in more variable precipitation, changes in disease and pest pressure and more frequent and intense extreme weather events such as floods, drought and untimely frosts.

Government intervention

Armenia is committed to international climate change initiatives, having ratified the UNFCCC and submitted four National Communications on Climate Change (NCCC) and two Biennial Update Reports. The first Nationally Determined Contribution (NDC) was submitted in 2015. In 2018, Armenia released

[17] Source: Global Climate Change and Land Degradation in Armenia, 2017. http://documents.worldbank.org/curated/en/260051468221982009/pdf/733320WP0ARMEN00Armenia0Jun20120Arm.pdf

a Road Map for the Development of Climate Change Related Statistics, addressing statistical measuring of greenhouse gas emissions, their source and impact. The **Agriculture Development Strategy 2020-2030** includes the principle of "climate change adaptation, resistance and environmental sustainability" and a number of important priorities and measures to support Climate Change adaptation in agriculture. A pilot program for introduction of agricultural insurance has also been approved and there are support schemes for installation of hail-nets and modern irrigation systems. The upgrading of water infrastructure has led to the provision of ten new reservoirs in the country.

However, fruit and vegetable farming in Armenia remains unsustainable and there are a number of gaps to be addressed:

- First, as discussed in Chapter 7, farm yields are low and inefficient farming means that too much land is being used per tonne of crop produced resulting in deforestation and land degradation and ultimately in net carbon emissions. Root causes for this will be discussed in Chapter 7 and include lack of skills in modern climate-smart agriculture, pest management, planting and appropriate application of fertilizers and pesticides; lack of certified seeds; outdated technology and equipment; inefficient irrigation infrastructure; small-scale farming; and insufficient extension services.
- The policy environment for climate change mitigation and adaptation in agriculture is encouraging but inadequate. While climate change mitigation and adaptation is included in the agricultural development strategy, the strategy is severely underfunded so it is unreasonable to expect successful implementation of aspects. Furthermore, not only does climate change need to be considered in agriculture but agriculture needs to be better included in climate change policies. There is a chronic need for an all-encompassing action plan for Climate Smart Agriculture that considers recovery of salinized soils, improvement of irrigation infrastructure, integrated pest management, quality infrastructure especially for monitoring water and soil, Skills development, Research & Development; integration of climate smart agriculture in all agricultural projects and programmes; improvements to extension services; and training of public officials to better understand climate change mitigation and adaptation and climate smart agriculture.
- Outdated technical capacity and know-how in processing facilities mean that energy and water use have not been optimised in line with general improvements in the global industry and carbon emissions are higher than necessary as a result.
- The heavy nature of the products (mostly packaged in heavy glass) and the long transport distances is one of the greatest contributors to emissions in the value chain. Not only is this an issue of environmental sustainability but also of economic sustainability as consumers learn about carbon footprints and choose local and regional products.

Because all of the above issues affect the economic competitiveness of the value chain, they are considered in the main section on Constraints in the market system and solutions recommended accordingly.

A comment during interviews indicated that women are more interested in sustainable agriculture. Farming berries in small plots, for example, is attractive to women and can be sustainable. If women are given motivation and very practical training all along the value chain including training on soil and climate suitability, there could be a more positive impact.

Chapter 6: Opportunities/ Potential

While this report goes into much detail about the challenges to the fruit and vegetable processing market system in Armenia, it is, in fact the opportunities and potential for the value chain that drive the need to address the sector's challenges in order to maximize on the potential.

Armenia's fruit and vegetable processing sector is full of opportunity. From the global and local market potential to comparative advantage in fruit and vegetable production, an overall favourable business enabling environment and positive recent developments, Armenia has the potential to have long term sustainable success and growth in the value chain.

Market potential

Exports and net exports of processed fruit and vegetable products from Armenia have been growing steadily in recent years in line with international demand for healthier more natural products. Products particularly in demand are preserved fruits and vegetables, "superfruit" juices, apricot jam and authentic sauces. As described earlier, there are significant margins being earned in export markets.

Armenia's location and good political relations with the Russian Federation and membership of the Eurasian economic union offer continued potential. Armenia also has a free trade agreement with Iran and the signing of the EU and Armenia Comprehensive and Enhanced Partnership Agreement (CEPA) in March 2021 paves the way for market opportunities in Europe.

In total, Armenia has access to one billion people globally with low or no tariffs on exports. This is a significant opportunity to serve developed markets. Armenia also has a strong diaspora network worldwide providing an important market segment for Armenian foods. Today, an estimated 7 million Armenians live in more than 100 countries around the world and the largest Armenian communities are in Russia (2.25 million), the USA (1.5 million) and France (about 450,000). Other significant communities are in Georgia, Argentina, Lebanon, Iran, Poland, Ukraine, Germany, Australia, Brazil and Canada[18]. Russia, the USA, Georgia and Ukraine are some of the largest importers of Armenian processed fruit and vegetables[19], which corresponds with the level of diaspora. In addition to this, Armenian distribution companies facilitate both the demand and supply of Armenian products.

Comparative advantage in fruit and vegetable production

While challenges to the quality of inputs are discussed in Chapter 7, Constraint 2, Armenia seems to have a comparative advantage in fruit and vegetable growing. Although processors complain of low quality and rising prices, there is a possible comparative advantage in fruit and vegetables, especially apricots, because they are proving internationally competitive in domestic and export markets. Climate and soil conditions are favourable in Armenia, especially for apricots. The challenge is to upgrade technology to sustain the value chain. Armenia's high level of self-sufficiency in fruit and vegetables also hints to its ability to produce.

Favourable business enabling environment

Armenia has made great strides to provide a favourable business enabling environment and the fruit and vegetable processing value chain benefits from some of the following opportunities.

Low costs and large capacities

Although processors bemoan the cost of inputs, there are many low cost factors in processing. Labour costs are low as are the costs for warehousing and transportation and Armenia has comparatively low energy costs for industry. It also has large unused production capacities with 250,000 tonnes capacity overall for the value chain. Given the spare capacities and low cost, there may be opportunities for

[18] Source: http://diaspora.gov.am/en/diasporas. Source: http://diaspora.gov.am/en/diasporas
[19] Based on analysis of export data from ITC trademap

contract manufacturing. There have been some positive experience in contract manufacturing in the textile sector.

Policy Environment

There are many good policies to support the fruit and vegetable processing value chain including the agriculture strategy and environment policy and a legal framework for contract farming is in place. In terms of environmental policy, some important developments include the creation of an inter-agency Council on Climate Change and the Climate Change Information Center.

State support programmes

There are a number of technical assistance and financing progammes available to support the sector including fully subsidized loan interest so that investors can borrow at 0%, a lending program for the establishment of intensive orchards cultivated with modern technologies; subsidized loan interest for greenhouses; matching grants for irrigation and modernisation including for investment in working capital and infrastructure; and zero percent credit for capacity building of processing companies and the establishment of refrigeration facilities. Supports also extend to organic agriculture. Development partners projects such as Carmac II also provide grant support. These initiatives have ensured a sufficient provision of orchards and greenhouses in Armenia, allowing for dramatic increases in production, processing and export volumes in the coming years.

Infrastructure

While major challenges exist regarding infrastructure for this value chain, as mentioned above, an extensive network of greenhouses exists. The logistics and export system has also improved recently including cold storage, logistics centres and cargo transportation, although further investment is still needed.

Investment support

The investment conditions in Armenia are good. There is an open-door policy for investors, which has attracted foreign direct investment from Russian private investors, Germany (primarily in tech and mining), Armenian Diaspora and from France, with which good political relations exists. The export community also supports investors and Enterprise Armenia is focussed on assisting local and foreign investors in realising their investments with dedicated investment support and aftercare service.

Standards

While the challenges in the next section outline some of the obstacles to be overcome in implementing and enforcing standards, there is some good news in this regard. First of all, there is a Law on Food safety and a law on state control of food safety. The FS Control Law established reference laboratories and their tasks and functions in ensuring the accuracy and high quality of the operation of testing laboratories in the food safety system. Furthermore, national standards exist, albeit compliance is a challenge. However, grant programmes including from CARMAC II, USAID, EU and ADB require compliance, which should see results in the coming years.

University reform

A new rector in the national agriculture university (ANAU) has introduced significant reform to agriculture and related curricula to enable the modernisation of agriculture and food processing and the availability of skilled labour. Needs based programmes in agriculture, food technology and agribusiness have been developed based on consultation with the private sector; partnerships with European universities have been established for information exchange and learning; Programmes for sustainable agriculture are included; and three knowledge innovation hubs have been established. Although the results of this reform are not yet visible until the first students graduate, this reform is one of the greatest opportunities for the sector and a key solution to the challenges set out in Chapter 7.

Availability of support services and capacity building

Although extension services are limited, there are many projects providing outreach and capacity building to farmers. This experience and capacity building can be expanded to reach more farmers. Green Lane NGO, for example, has experience and modules available for Branding & Marketing Communications and Good agricultural practice; has an agricultural consultancy hotline and is helping small producers to sell under their label. It has also been working with women, youth, people living with disabilities and border communities to ensure their inclusion in the value chain.

Positive recent developments

Some recent developments in Armenia ensure that there is experience to be learned from and built on:

- Vertical integration of companies has been helping to improve quality – Spayka and Arsi House, which buys, does post-harvest handling, processes and exports have been working to improve the quality of products exported, thereby learning lessons and setting standards for the industry and giving experience to employees who can use it in other companies or in their own future ventures.
- Emerging medium- and large-scale farmers. There is an ongoing, though slow, process of formation of medium- to large-size commercial landowners/farmers who apply modern farming technologies, i.e. vineyards and orchards, vegetable plantations, animal farms and dairy farms, and greenhouses. This is progress and will hopefully encourage others to invest in expansion and consolidation of farmland.
- The Yerevan brandy company is working closely with farmers using a team of agriculture specialists to help improve the quality of inputs. This experience in building long term relationships and improving quality could be transferred to the mainstream fruit and vegetable processing sector

These opportunities are the basis for analysing the value chain and providing recommendations to address the challenges that exist.

Chapter 7: Constraints (Bottlenecks and root causes)

A key motivation for doing a market systems analysis is to identify bottlenecks in the value chain to understand their root causes and identify how to address them. This section looks at the main challenges faced by the fruit and vegetable processing value chain in Armenia, that hinder the functioning or growth of the industry and examines what reasons - either internal to the value chain or in the support system and rules around it - are behind them. These reasons or root causes, enable us to recommend solutions that will allow for value chain upgrading and growth.

Along the value chain, constraints have been identified at the supply side, processing and demand-side levels. They include economic, environmental and social issues, which all contribute to hindering the sustainability of the market system. Key issues at each stage involve human capital, technical capacity and, unsurprisingly, access to finance. The constraints are outlined in detail below.

Supply Side Challenges

1. Unsustainable Farming

The dangers, vulnerability, exposure and risks of climate change have been discussed earlier. In brief, the effects of climate change, mean there is less water for irrigation, rising greenhouse gas emissions, desertification, increased weather events such as hailstorms and overall decreased productivity. Poor farming techniques are contributing to this issue through overuse of land, degradation of land through inappropriate fertilizer and pesticide use, lack of integrated pest management and poor planting techniques. Farmers also do not have the ability to adapt to climate change. These are some of the root causes of the issue:

a. Climate Change and the vulnerability of farmers of fruit and vegetables to its effects as discussed earlier. Vulnerability is due to location, fragmented small-scale farming and outdated inefficient irrigation infrastructure among others.
b. Climate Change Mitigation and Adaptation is not yet fully integrated into Government and Development Partner programmes and general agricultural practice. In particular:
    i. *The National Agricultural strategy is underfunded* with just 10 million USD allocated each year to its implementation.
    ii. There is *no action plan for Climate Smart Agriculture* to mainstream it across all agricultural practice. This needs policy, capacity building, legislation and regulation. Climate Smart agriculture can also provide processors with better quality fruit at lower prices.
    iii. Climate Change affects all sectors, and all sectors affect it. To mitigate Climate change and adapt to its effects, a high level of *interagency cooperation is required* e.g. between the Ministries and agencies responsible for agriculture, infrastructure, meteorological services, environment, education and territorial administration.
    iv. Public sector officials do not understand the topic well.
c. As mentioned earlier, Armenia has a very high level of *water stress*. This is compounded by the fact that irrigation, which accounts for most of the water use in Armenia, has high water losses- more than half of water used in irrigation is said to be wasted. Future water needs will increase according to climate change projections, so addressing this issue is urgent. Farmers are highly aware of the issue and need better infrastructure and training for efficient irrigation methods. Interagency cooperation and dialogue that includes farmers is important to ensure this issue is properly addressed.
d. *Outdated machinery and technology* is compounding the issues of inefficient farming and is discussed in 2 c. below.

Solutions to address unsustainable farming include an integrated approach to Climate change mitigation and adaptation through increased budget allocation for the national agricultural strategy; a comprehensive and well-funded action plan for Climate Smart agriculture that includes investment in improvements in irrigation infrastructure, updating of equipment, capacity building of farmers (including

planting techniques, irrigation, integrated pest management and fertilizer and pesticide use, among others), agricultural service providers and public sector officials; support in soil management and de-salinization; and the establishment of a platform for interagency cooperation and stakeholder dialogue to address climate change issues and implement climate-smart agriculture.

2. Inferior quality of fruit and vegetable raw materials

Processors seem to buy the lowest quality fruit and vegetables and still complain about the rising prices. Rising prices in the past year have been caused by supply shortages due to the effects of the war in Artsakh (Nagorno-Karabakh) and recent drought. The issue is mentioned here as price rises are also an effect of low yields and poor quality. Although Armenian-grown fruit and vegetables are mostly sold fresh, processing companies still uses 12.6% of vegetable production, and about 22.3% of fruits and berries.

These are some of the root causes of poor quality of inputs in Armenia:

a. *Small Scale Farming*: With an average farm size of approximately 1.4 hectares, most farmers are operating on a very small scale. This has a number of consequences. It is difficult to invest in mechanisation at this scale or to achieve greater efficiencies. Also with more than 300,000 farms, it is difficult to run outreach programmes and build skills. Weak land tenure underpins this issue although there has still been an increased in the proportion of medium and large-scale farms. This issue is possibly compounded by the limited arable land that is available- Armenia's land resources are limited, a challenge that is compounded by climate change (desertification).
b. *Lack of certified agricultural inputs*: Armenia has yet to develop a system for certifying agricultural inputs. By regulating and certifying seeds, saplings, fertilizers, pesticides and other relevant agricultural inputs, farmers can achieve higher and more uniform quality and improve their prospects both in fresh fruit & vegetable and manufacturing markets.
c. *Sub-optimal technical capacity*: As mentioned above, farming technology is outdated, often dating back to the soviet era. Many new technologies are available to mechanize and automate farming including badly needed modern irrigation technologies. Improving farm mechanization and automation can improve product quality and consistency and overall sustainability. Jobs in higher technology farming are also more attractive to youth.
d. *Skills & Information gaps in farming*: Also a possible root cause of technical capacity challenges is the level of skills in farming. Farms lack information and training on new techniques and technologies available and climate smart agriculture. Currently there is no requirement for farmers to have any formal training and as farmers get older, old skills are dying out. They also need skills in commercialisation and profitability of crops as well as entrepreneurship and market understanding. University reform should produce better expertise but capacity building of farmers is needed in the medium term as well as a programme for information in new techniques and technology.
e. *Agricultural extension services are needed* to support farmers in terms of upskilling, introducing new technologies and techniques, providing soil analysis service, advising on the right crops to cultivate in the area and providing information and about support projects and financing that is available to small farmers. Extension services in the marzes[20] have reduced recently and there is a chronic *shortage of skilled agronomists*, which limits the quality of the services. While CARD services and Green Lane NGO provide some services, there is a need for an integrated approach, pooling of resources and a long-term strategy. Extension services need agricultural specialists (hopefully university reform will resolve this in the near future), farmer field schools, demonstration plots and cooperation with universities for R&D to foster innovation that responds to the needs of farmers and the community.
f. *Armenian farmers are not working to any farming standards:* There is little adoption of global GAP or other standards, limiting the chances for improved quality.

[20] Marzes refer to the administrative divisions or regions of Armenia

The key solutions to improving fruit and vegetable quality in Armenia lie in improving land tenure and incentivizing larger scale farming; introducing a certification programme for agricultural inputs; supporting the upgrading of technology though financial incentive and capacity building programmes; upgrading curricula and services for agricultural and commercial training; improving the quality and quantity of agricultural extension services through improved education, investment and coordination; and encouraging the use of global GAP or introducing a national farming standard related to Climate Smart Agriculture.

3. High post-harvest losses

A factor contributing to higher costs, unsustainability and lower quality is post-harvest handling. This means sorting and grading, storage and transport. The main contributors to post-harvest losses in fruit and vegetables in Armenia are:

a. Inadequate cold storage facilities and transport: This area requires significant investment.
b. Poor post-harvest handling know how: Post-harvest handling skills include grading, sorting and washing fruit and vegetables; warehouse and cold storage operation; and operation and maintenance of temperature-controlled transport. For example, different fruit and vegetables require different storage temperatures and warehouse workers also need knowledge in operational procedures to maintain temperatures and quality.

Solutions to the post-harvest losses are to encourage investment in cold storage and transport and to provide technical assistance and capacity building in post-harvest handling and storage.

4. Poor market infrastructure

There are three main wholesale markets in Armenia and Mehmandar is the main wholesale market of fruits and vegetables in the country. The market has poor infrastructure, issues related to unregistered sellers and the quality of produce is inferior. Because of fragmented small-scale farming, wholesale markets can aggregate product for processors, saving time and costs. However, investment is needed to upgrade the physical and quality infrastructure of markets with appropriate phytosanitary conditions and inspection to provide an efficient platform for the trading of fruit and vegetables.

The solution to this problem starts with a needs assessment of the Mehmandar market including the impact of upgrading on the fruit and vegetable processing value chain.

5. Lack of entrepreneurship

Feedback from interviews cited lack of entrepreneurship among farmers as a challenge. There are two likely root causes:

a. Traditional farming has been seen a means of survival rather than an opportunity for economic success. This is seen by the attitudes of youth who prefer to seek success in other sectors.
b. While Government programmes subsidize interest on loans for existing companies, support is not available for start-ups and no loan-guarantee mechanisms are available. This makes it difficult for youth and small-scale/ informal farmers to invest in agriculture. This issue is discussed again later under constraint 13. Access to Finance.

Solutions to encourage entrepreneurship include entrepreneurship training for farmers and youth; encouraging youth to study agribusiness and invest in farming; and supports for start-up financing.

6. Weak implementation of Contract Farming

The legal framework requires contracts for the purchase and sale of produce. This is a good first step. However, contracts are often just drawn up at the point of sale. The concept of contract farming, centres more around the vertical integration of the value chain than the contract itself. More important than a formal contract is building long-term relationships where processors and farmers work together to improve quality of fruit and vegetables so that end products meet the needs of the final customers and consumers as demonstrated by Yerevan Brandy company.

Some root causes for this challenge are:

a. Lack of understanding of the benefits of contract farming by farmers. Well implemented processes could bring them expertise, improved yields, guaranteed orders and higher profitability.
b. Processors are too focussed on price rather than on improving the quality of product they deliver to the market. Better understanding on their side to encourage them to invest in contract farming.
c. There is a weak culture for stakeholder dialogue which deters cooperation.

The solution to this challenge is a support programme to bring processors and farmers together, improve awareness, learn from best practice and encourage exchange and cooperation in improving quality and profitability along the chain.

Challenges at the Processing stage

As soon as processors have secured the necessary raw materials, packaging and utilities, the fruit and vegetable processing stage begins. The main bottlenecks at this stage are related to technical capacity, human capacity, compliance with food standards and processing waste.

7. Technical Capacity

Similar to the challenge at the farm level, machinery and equipment for fruit and vegetable processing is often outdated, even going back to soviet times, particularly for smaller processors. Even for the larger processors, used machinery and equipment have often been bought from another factory. Given that advances in technology focus on reducing energy and water use for sustainability and of course improving quality, the lagging technical capacity reduces Armenia's profitability, sustainability and competitiveness in the marketplace.

There are three main root causes of this challenge:

a. Access to Finance – see section (12.) below. Machinery and equipment requires significant capital investment, that requires suitable finance. The Government of Armenia provides matching grants and subsidises interest investment in machinery and this should continue.
b. General industry knowledge -The section below discusses the lack of specialists available to the industry. Without specialist food processing and fruit & vegetable processing expertise, processors are unlikely to know which machinery is updated, feasible and best suited to their operations.
c. Procurement Skills – Related to the industry knowledge are procurement skills for seeking out the right equipment and machinery suppliers and specifying any construction requirements.

Solutions to these issues are addressed in section 8. (Human Capital) and section 13. (Access to Finance) below.

8. Human capital

This is one of the greatest challenges for the value chain. In short, the fruit and vegetable processing industry does not have the appropriate skills available that it needs. While there are plenty of university graduates in Armenia looking for work, their skills do not match the needs of this value chain, particularly in the case of women.

There is a web of root causes underlying this challenge:

a. Most importantly, *university curricula* in the past were not aligned to the needs of the value chain. Recent university reform is changing this but there is a time-lag between the introduction of reform and the availability of a critical mass of specialists. Also, reform must be an iterative process with the processing sector providing feedback and explaining needs on an ongoing basis. On-the-job training must be fostered both during university and afterwards to ensure appropriate skills. Skills required include not only processing and food technology skills but also for agronomy, marketing and export. Faculties for food technology and food safety exist in the

Agrarian university but there may be a need for specific programmes on fruit and vegetable processing.

b. *Capacity Building and information services* are insufficient to meet the current needs of the industry. To meet short and even medium-term needs, companies need to improve skills in processing and marketing and export. Smaller processors in particular need support in links to domestic and international markets through knowledge, contacts, digital know-how and equipment and services.
c. *Youth are not attracted to working in the industry and there is low female participation*. Even if university and training courses are improved, students must participate in the courses and then apply to work in the industry. To address this issue, the working conditions in the industry must be more attractive. The section on social considerations above outlines this in more detail. Additionally, youth seeks jobs that have career paths and opportunities for promotion. To summarise underlying causes of youth resistance to working in the industry and low female participation:
    i. Pay is not good for unskilled workers, especially women and the work is hard
    ii. There is no legislation for occupational safety and health and weak worker protection
    iii. People living with disabilities need more support to access the workplace
    iv. Social welfare support including unemployment benefit, maternity benefit and childcare is inadequate
    v. While women perform most of the tasks, qualified women are low in supply and need to be encouraged to take more market-oriented courses of study.
    vi. Companies do not provide graduate programmes or potential for promotion as can be experienced in other industries e.g. in banking.

Solutions to address these root causes are as follows

1. Ongoing review and modernisation of university curricula based on dialogue between universities and the private sector at a minimum and ideally with the input of the Ministry of Economy and the Ministry of Environment. A sector skills council could be formed as a platform to monitor the success of reforms, discuss improvements and find external expertise to support modern curricula with sufficient on-the-job training.
2. Interventions to attract females to participate in university programmes relevant to the fruit and vegetable processing sector.
3. Skill/ Capacity-building programmes for food processing, export and marketing to build, among others, technical, business and commercialisation skills especially for smaller players.
4. Development of a company twinning programme to link companies with similar companies in Europe or North America to allow for exchange of skills and work placements to help build career development for youth. This will also help overall company knowledge and skills development and could encourage youth participation and lead to economic partnerships.
5. Social reform to address equal pay for similar skills levels, inclusion of persons living with disabilities and social welfare benefits as recommended in the section on social considerations.

9. <u>Compliance with standards</u>

Armenia has a number challenges with compliance with food safety and quality standards and requirements. While larger companies are successful in fulfilling the requirements to export to Eurasian countries and the USA, smaller enterprises are mainly not compliant. Low exports to the European Union suggest low ability to comply with standards there.

There are three main root causes for compliance issues:

a. Smaller processors do not have the *awareness and capacity* to comply with national and international standards and technical regulations. This means that they do not have the information and understanding of requirements, nor do they have the technical or human capacity to implement the changes needed and procedures to comply. This is compounded by

the gaps in enforcement discussed in the next point. There is a need to improve education in food safety from the secondary vocational level as well as through university education and supplementary capacity building services.

b. While grant programmes encourage compliance with food standards and technical regulations, the Food safety inspection body does not yet have the *capacity to enforce and monitor*. Helping processors to comply with national standards from the start puts them in a better position to grow large enough and be in a good position to serve export markets. The lack of implementation and enforcement of legislation that needs to be addressed.
c. *Poor quality infrastructure:* The Republican Veterinary-Sanitary and Phytosanitary Laboratory Services Center provides laboratory analysis of food products in Armenia as well as company in-house laboratories and some private sector offers. FDA laboratory can provide certificates to wine makers but there seem to be no other local accreditation services. There is a need for a local service provider of accreditation to support Armenian processors, particularly smaller processors, to access accreditation,

Solutions to address these root causes include capacity building -sensitization and training- for smaller processors on standards and compliance; implementation and enforcement of food safety and quality legislation through support to the National Inspection Body; and support to encourage local provision of international accreditation.

10. Processing Waste

Poor quality produce, inferior equipment and skills gaps lead to waste in the processing sector threatening the economic and environmental sustainability of the chain. By addressing skills, quality and technical upgrading, this issue should be resolved.

Demand Side Challenges

On the demand side, the challenges cited can be summarized as low capacity to export and reliance on one land transport route to Russia.

11. Low export capacity

While exports of processed fruit and vegetables and their growth is impressive, there are a number of factors that limit this growth:

a. *Weak trade relations with neighbouring countries*. Armenia is land-locked and surrounded by four neighbours. Historical and current conflict mean there are poor political relations with Turkey and Azerbaijan but there is even no Free Trade Agreement with Georgia, a significant importer of Armenian food products. This limits opportunities.
b. *Lack of knowledge of export requirements and market information*. The long-term sustainability of the value chain requires producing products that meet the needs of the end markets. Profitability also relies on mitigating losses and overcoming export challenges. Armenian processors lack information on some export rules such as the ban on exporting product to or through Georgia that are made in Armenia that have Georgian names. The result is that products get stuck either at the border into Georgia or before entering Russia, ultimately leading to cost and waste. Also, processors need to better understand Russian attitudes regarding fresh produce and serve the market with longer life items.
c. *Poor marketing skills*: Related to knowledge of the markets, skills in export marketing, market research, strategy and communications need to be improved to maximize on opportunities available.
d. *No export desk to support and advise exporters*: One of the root causes cited for lack of information and export capacity is that while Enterprise Armenia has taken on responsibility for supporting exporters, it does not yet have the resources to fund an advisory desk. This desk could save processors more money in prevented waste than the cost of running it.

Solutions to address the root causes related to low export capacity include capacity building measures for export marketing including modules in business education; a feasibility study regarding financing an export desk, possibly with private sector contribution or sales of services. Enterprise Armenia could also consider having a presence in the Russian market, given its importance for Armenian exports.

12. Reliance on one land transport route to Russia

To export products to the Russian Federation, Armenia has two options. The first is to send the products by air, which is too expensive for heavy processed fruit and vegetable products. The second is to transport the goods through Georgia entering Russia at the Larsi border crossing. This route experiences significant delays because due to large volumes of products crossing from both Georgia and Armenia, administrative delays at border posts and also difficult weather conditions in winter. There are other roads that enter Russia but none have customs processing. Armenia is negotiating an alternative route, exiting Georgia at Poti to deliver to Russia via the Black Sea. However, reports indicate that infrastructure in Russia's sea ports are not appropriate.

The solution is to conduct a feasibility study on the use of the Black Sea for the transport of goods to the Russian federation.

Underlying causes affecting all stages of the value chain

The challenges to the sustainability and growth of the fruit and vegetable processing value chain in Armenia are manifold and multi-faceted with different layers and linkages like a spider's web. Two challenges that underlie the challenges already discussed and have their own set of root causes are worth special attention because addressing these challenges could help to unlock many of the bottlenecks along the chain. These are related to access to finance and stakeholder dialogue.

13. Access to Finance/ Lack of investment

It is easy to jump to the conclusion that money will solve issues. Of course, it will not. However, there are financial challenges that threaten the competitiveness and sustainability of Armenia's fruit and vegetable processing value chain. Finance is needed to invest in value chain upgrading

The main root causes of lack of investment and Access to Finance issues in Armenia are:

a. *Lack of financial supports for start-ups***:** While there are excellent programmes available to remove the burden of interest costs and provide matching grants to encourage investment, they generally only benefit existing businesses. New ventures also need access to grants and need a loan guarantee mechanism in the absence of collateral.
b. *Lack of information for investors*: Armenia does not have a greenfield database to identify potential properties for investment. This delays and deters investment in processing.
c. *Red Tape*: While Enterprise Armenia supports investors in navigating the bureaucracy, reducing it in the first place is a necessary step.

The solutions to addressing root causes of investment and access to finance issues include programmes and funding to incentivize start-ups; the development of a greenfield database to help investors; and efforts to reduce red tape, which could be helped by stakeholder dialogue.

14. Stakeholder dialogue

There are many stakeholders involved in the Market System for Fruit and Vegetable Processing in Armenia. Many of the bottlenecks identified in the value chain are rooted in lack of access or availability of knowledge or information and/or can be solved by better understanding of the issues. In Armenia, there is limited discussion between stakeholders at the various stages of the value chain, between the stages of the value chain such as between farmers and processors and between the public and private sectors. This is not to say that there is no dialogue but there is certainly room for improvement.

The main root causes for this issue are:

a. *Lack of associations specific to the value chain*: While there are general farmers associations and an active greenhouse association at the input level and a chamber of commerce and industry and a Union of exporters as well as the Employers' Association RUEA to support processors, none of these associations are specific to fruit and vegetable processing and addressing the value chain's specific needs.
b. *General cultural aversion to working collectively*, probably due to the soviet legacy. While it is important for individual enterprises to work independently and be competitive in the marketplace, coming together to resolve industry-level issues serves the best interests of the enterprises in the long term.

Solutions to root causes include facilitating temporary dialogue measures such as round-table discussions between investors and the Government on reducing red-tape in order to gain some experience and trust in collective approaches and dialogue; and encouraging longer term dialogue and cooperation through setting up a sector skills council or enterprises joining associations such as RUEA or forming an association for fruit and vegetable processors and farmers and supporting farmers and processing to build long term relationships within the framework of contract farming. A culture of dialogue and exchange is key to upgrading the value chain.

Chapter 8: Recommendations

This section of the report builds on the information already provided about the market systems and the constraints bottlenecks, root causes and potential solutions that are there. Rather than repeat the issues in detail, this section summarises the recommendations arising from the market systems analysis.

Given the opportunity for Armenian processed fruit & vegetable products in developed markets, the potential for expansion and the presence of diaspora across the world, addressing the constraints identified has significant potential to unlock this opportunity. Processed fruit and vegetables are more profitable and less perishable that their primary products and so logistics challenges are lower. They also add more value and create more decent jobs.

There are many recommendations outlined below, some that are overarching for the food industry, agriculture or the economy as a whole and others that focus on the fruit & vegetable processing value chain. Some are more urgent than others, some are easier to implement than others and some will have more impact than others. However, unlocking the potential of the value chain lies in an integrated approach to value chain upgrading with stakeholders working together and in parallel to implement various recommendations and relieve bottlenecks.

1. Development and implementation of an action plan for Climate Smart Agriculture

As described in detail earlier, one of the greatest threats to the value chain is its vulnerability to climate change. Therefore, an action plan on climate smart agriculture, as recommended by CARD in 2020 is necessary to ensure the sustainability of the supply of fruit and vegetables. The action plan should consider investment in improvements in irrigation infrastructure as a priority; updating of equipment; capacity building of farmers (including planting techniques, irrigation, integrated pest management and fertilizer and pesticide use, among others), agricultural service providers and public sector officials; support in soil management and de-salinization; and the establishment of a platform for interagency cooperation and stakeholder dialogue to address climate change issues and implement climate-smart agriculture. It should also provide for Research and Development on the topic.

2. Education and Information

This is an urgent and the most highlighted issue in the value chain and is of utmost urgency and importance to address.

a. *Ongoing modernisation of University Curricula* should improve and increase the supply of specialists in agronomy, processing, food business and marketing. Curricula should consider current and future needs of the value chain including mechanization specialists and fruit & vegetable processing experts. Curricula for agriculture should centre around Climate Smart Agriculture and processing should include modules on water and energy efficiency. A sector skills council to allow for easy access to the private sector and ministry of economy could support the university (ANAU) in its endeavours. Support and investment in developing the practical aspects of education may be needed to ensure useful industry placements and demonstration plots, sufficient laboratory equipment etc. future potential of the value chain and include practical experiences via demonstration. Furthermore, broader business education courses should include modules on export marketing in the Armenian Food industry.
b. *Farmer certification*. Benchmarking against best practice in European countries, a farmer certification programme that in the long term requires all farmers to complete basic agricultural training centred around Climate Smart Agriculture and even to regularly update skills will facilitate the improvement of agricultural knowledge as well as the dissemination of information regarding farm mechanization. This could be implemented in conjunction with a partner university and should be conducted under the Ministry of Economy in partnership with universities. Ideal development partners to support such an initiative are the FAO, IFAD and USAID.
c. *Capacity Building programmes* – The recommendations above take time to implement and trickle down with up to five years before the first students graduate and longer until there is a critical mass of qualified and experienced specialists. In the short and medium term, capacity building

measures are needed to plug the skills gaps. Capacity Building programmes are needed to build skills in farming, farm mechanization, cold storage, post-harvest handling, entrepreneurship, processing techniques, compliance with standards, equipment procurement, commercialisation and export marketing, particularly for smaller processors. Capacity building programmes should be coordinated by the Ministry of Economy but could be run through development partner projects and funding such as through the World Bank Group, UNDP, USAID, GIZ and the European Union

d. To further enhance capacity and create more attractive jobs for youth, a *company twinning programme* that matches processors with similar companies in other countries can provide a number of benefits: Armenian processors can learn about improved technologies, market dynamics and optimisation of business processes through exchange and factory visits and by sending staff for learning placements in the international companies. The opportunity for international placements and learning will also attract youth to the industry and the relationships could lead to outsourcing contracts from processors in more developed economies in order to reduce costs. Of course, partnership with direct competitors may need to be avoided. Such a programme could be coordinated by RUEA or Government ministries in partnership with their counterparts in Europe or North America. Governments of developed countries might even provide financial support to facilitate the exchange.
e. *Agricultural extension and information services*. Key to the improvement of agricultural services is the availability of qualified specialists. This has been addressed above in the need for improved curriculum. However, building robust agricultural advisory services with attractive working conditions and pay will also attract students to the profession. Farmers need support in particular on improving CSA techniques; understanding suitability of crops to their land; introducing or upgrading automation and mechanization e.g. irrigation infrastructure; and in understanding the markets and various projects and services that are available to provide them with financial support and capacity building. Such services are already being provided in Agricultural Service Centres and through projects such as CARD Farmer services and Green Lane NGO initiatives. More investment and coordination is needed to build a robust and coordinated system of extension and information.
f. *Research and Development*: To ensure ongoing improvements in adapting to climate change at the input level and responding to market needs at the output level, an iterative process of R&D is recommended. Combining the efforts of the private sector, extension services and universities as well, of course, as research centres can provided action-oriented R&D.

3. Social Recommendations to improve working conditions

As highlighted earlier and based on the needs to attract and retain and protect human capital, the following is recommended to improve inclusion and working conditions in the value chain:

a. *In-depth assessments to improve the inclusion of youth, Border Communities Persons living with disabilities in the value chain*:
   - In conjunction with curriculum and skills development planning, conduct an assessment on the needs of youth and how to make the industry more attractive to them
   - Conduct a study to recommend interventions to integrate persons living with disabilities in food processing work places considering support to physical adjustments of the workplace, training and changing the mindset of employers and society in this respect
   - Conduct an assessment of the needs of Fruit & Vegetable processing value chain operators in Border Communities.

b. *Development and dissemination of training and sensitization materials on workplace hazards* in fruit & vegetable processing, targeted at increase employee awareness and behaviour

c. *Policy improvements to ensure better working conditions in the value chain* – through the implementation of labour law

- Regulations on worker protection through the introduction of legislation for occupational safety and health
- Conduct an assessment to consider how informal workers can access maternity benefit
- Introduction of universal childcare to ensure ability of both formal and informal workers to return to the workplace and encourage more parents into the labour force
- Introduction of unemployment benefit based on a feasibility study for a sustainable financing mechanism
- An assessment and strategy, potentially involving social welfare reform is needed to attract workers, especially women of child-bearing age from the informal to the formal economy

The main responsibility for implementing these recommendations lies with the Ministry of Labor and social affairs. The ILO is a particularly suitable development partner to support the process.

4. Quality Infrastructure

Quality infrastructure improvement is needed primarily in three main areas:

f. *Certification of agricultural inputs.* For farmers to be confident to invest in better varieties, it is important to have approved inputs that they can use. This should be introduced by the Ministry of Economy and will require support in setting up such a system. Learning from other countries will be most helpful and could be supported by the FAO or other international development partners.

g. Facilitation of the use of global GAP or introduction of a national *farming standard* related to Climate Smart Agriculture.

h. *Capacity building* -sensitization and training- especially for smaller processors on standards and compliance

i. *Improvement of the implementation of legislation and enforcement of food standards* and regulations. Support to the Food Inspection Body is needed to create awareness This must be followed by support to the National Food Agency in implementing and enforcing it. Improving compliance with national standards will accelerate the ability of smaller producers to comply with international standards and export as they grow.

j. *Provision of international accreditation services locally.* Companies can apply for GOST, ISO, IFS and other international standards accreditation. However, these services are currently not provided locally. Support should be provided to build partnerships with international standards bodies to provide the services on their behalf in Armenia. If this is not feasible, the standards bodies should be encouraged to set up a local office or at least have a representative based in Armenia who can support applications and advise on compliance requirements.

5. Physical Infrastructure

There are four main areas where updates to infrastructure can unlock bottlenecks in the fruit & vegetable processing value chain in Armenia:

d. *Water infrastructure*. As mentioned earlier, there is a chronic need to invest in updating irrigation systems to save water losses and prepare for future irrigation needs in adapting to climate change. The first step in this process is an assessment of the water infrastructure needs of the value chain.

e. *Market infrastructure*. The first step in upgrading market infrastructure is to conduct a needs assessment and develop a plan for upgrading of this infrastructure suitable to the needs of the fruit and vegetable processing industry and assessing the potential impact of the investment.

f. *Cold storage expansion*. The financial incentives mentioned elsewhere to support technical upgrading should allocate enough budget to ensure than investment in cold storage can reach the existing and future needs of the value chain.

The Ministry of Territorial Administration and Infrastructure (MTAI) has a large role to play as does the Ministry of Environment and Ministry of Economy. Support from international banks such as the World

Bank Group and the Asian Development Bank can play an important role in providing the necessary financing.

6. Financial & Investment support mechanisms

To resolve issues in accessing finance and investment, the following recommendations are made

d. Government incentives should also *encourage start-up investment*, specifically through access to grants, cheap loans and a loan guarantee mechanism. The existing mechanisms for financial supports discuss in Chapter 6 under "stated supported programmes" (zero interest loans, grants for irrigation, capacity building etc.) should be used and expanded to support these measures.
e. Government Ministries and Agencies should ensure *continued funding and technical assistance to facilitate investment* in farm mechanization and automation; irrigation infrastructure; cold storage capacities; processing technology; and related packaging industry, focussed on investment in greener technologies. This requires significant budget and there is a role for Development Partners including the international banks (EBRD, World Bank, Asian Development Bank) to support.
f. Develop a *database of green fields* to facilitate investors. This should be the work of the Ministry of Territorial Administration, the Marzes and Enterprise Armenia.

7. Promotion of stakeholder dialogue

Many of the recommendations provided in this report centre around or include the need for dialogue among stakeholders. Dialogue can mean formal or informal processes to help unlock value chain bottlenecks. They should be focussed on achieving results and not get tied up in the formalities of the structures used. Temporary measures to encourage dialogue include facilitating roundtable discussions and setting up committees to lead dialogue on issues for example to reduce administrative red tape. Longer term solutions including setting up associations, dialogue platforms and a sector skills council to provide for the ongoing needs of the value chain. Specific stakeholder dialogue incentives that should be tackled immediately are:

d. *Review of administrative procedures of investment*: Often, issues regarding administrative procedures lie in lack of understanding between parties. The first step in resolving issues related to laborious procedures is dialogue between the private sector and the Ministry of Economy. RUEA could lead this process by involving the Ministry and the Union of Exporters to set up a roundtable discussion with the private sector to better understand the issues from both sides and follow by conducting deeper assessments of the issues. This can then be followed by further dialogues and agreement on solutions.
e. *Support to existing and new associations to foster dialogue in the chain*. This could mean supporting dialogue in the value chain by facilitating the formation of a fruit & vegetable producer association or a sub-group within the national Farmers' union; facilitating the formation of an association for fruit & vegetable processors specifically or food processors in general; or supporting processors to get involved in existing associations: RUEA or the Union of Exporters. These processes could be supported by development partners with experience in supporting stakeholder dialogue.
f. *Support to Contract Farming processes.* By facilitating dialogue between farmers and processors, long-term relationships and contracts are possible. The dialogue would also help to identify interest in cooperation and further need for support. GIZ is one development partners with experience to offer in this area. The process could start with sensitization of processors and farmers on the benefits of contract farming and supporting those with genuine interest in engaging in contract farming processes.

8. Promotion of the increase of farm sizes

Encouraging economies of scale through larger farm sizes can be done as follows:

c. Review of the land tenure legal framework for consolidating farms to ensure that robust legislation is in place for renting and selling farms. This should be led by the national Farmers' Union in conjunction with the Ministry of Economy with the support of development partners.
d. Sensitization of farmers and investors on the legal framework and updates to encourage investment.

9. Provision of an export desk.

A feasibility study on financing an export desk to advise exporters and help with troubleshooting is the first step. A mechanism could be set up that involves a membership fee or sales of specific services to help finance and sustain the desk. This should be led by Enterprise Armenia.

Implementation of recommendations

As highlighted earlier, there are many recommendations outlined here and we see the first three recommendations (an action plan for climate smart agriculture, improvements in education and information, and social reforms) as crucial to unlocking the bottlenecks in the value chain. Suggestions have been made for donors and implementing partners for the various interventions and these suggestions need to be discussed with the stakeholders as a next step to get commitment on implementation. The report has been prepared for the ILO and RUEA, who have significant roles to play in upgrading the Market System for processed fruit and vegetables. RUEA as the representative body for employers, has an overall role in lobbying for the implementation of recommendations and should focus first on advocacy for an action plan for climate smart agriculture, while at the same time working with Employers, Government and Education providers to support education and capacity building along the value chain – to improve the quality of fruit and vegetable inputs, improve the efficiency, effectiveness and quality of processing and enable export growth. Supporting stakeholder dialogue is also a natural fit for RUEA to leverage advocacy for the implementation of these recommendations and in addressing further issues that may arise.

The ILO for its part, apart from supporting RUEA as a partner, can apply its international experience and expertise in implementing social reform. The first set of social recommendations relate to assessments for the better inclusion and protection of vulnerable groups. Working with the Ministry of Labor and Social Affairs, the ILO could focus particularly on the inclusion of people with disabilities and youth – both areas that need significant attention. The second social recommendation relates to training and sensitization materials regarding occupational safety and health. The ILO could work with RUEA to develop and disseminate these materials. Finally, there are a number of policy improvements needed in the social protection of workers. The ILO has a lot to offer the Ministry of Labor and Social Affairs in making these improvements and is best suited to intervene here to address some pertinent issues in the value chain.

Chapter 9: Conclusion

There are clear market opportunities for processed fruit and vegetables from Armenia. However, to really benefit from the opportunities, a number of challenges need to be overcome at the input, processing and export stages. The report has outlined nine overall recommendations of which three are critical to the upgrading and sustainability of the value chain: Policy for climate smart agriculture; Education and information to improve skills and knowledge; and improvements to working conditions. Considering the key partners and supporters of this study, the Ministry of Economy (agriculture) should lead the way for Climate Smart Agriculture; RUEA should lead processes to ensure better provisions are in place for education, capacity building, extension services and information (in close cooperation with Government, Private Sector and University stakeholders); and the ILO should partner with the Ministry of Labour and Social Affairs to review policy for better working conditions in fruit and vegetable processing.

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Annex

Annex 1: Research Questions

Annex 2: List of Organisations interviewed

Annex 1 Research Questions

Economic Questions

1. **What are the characteristics of the value chain ?**
    a. What are the **stages/ processes** in the value chain? (e.g. transport, logistics, processing steps, intermediaries, final points of sale)
    b. Who are **value chain operators**? How many at each stage? Men/ Women/ Children etc. What is the relative size of enterprises (e.g. hectares/ no. employees/ turnover) and which operators have supplier/ buyer power?
    c. What are the **transactions** between operators - costs, sales, profitability, wages
    d. What contracts exist? E.g. between farmers and buyers, formal or informal.
    e. What are the modes of ordering and payment?
    f. What are the final market products? (e.g. 500g jar of plum jam)
    g. Where sub-sectors (varieties) exist, define the differences between them e.g. production, quality, costs, prices, demand, final products
    h. What **policy** – regulations, support programmes etc. – exists that affect the Value Chain?
    i. How is the **infrastructure**? E.g. roads, electricity, water.
    j. What logistics is available? Warehouses, trucks
2. **What is the market potential? (At each stage of the value chain)**
    a. **Demand-side:** Volumes, prices, which markets? E.g. Export – Which countries? Trends, growth potential. (What is the current trend in the market? Is there growth of demand/sales and in what market niches?)
    b. **Supply-side:** What are the costs at each stage: inputs, labour, utilities, transport, transaction costs.
    c. What value is added at each stage? (Margins)
    d. What standards are needed to reach the market and is it difficult to meet the standards?
    e. Are the products **competitive**? Do they have the right price and the right quality? Why/ Why not?
    f. Availability/ Accessibility of inputs
    g. How is the **productivity** at each stage?
    h. Existence of processing facilities in- country
    i. **Availability of support services** – private and public sectors. (e.g. ICT support, agricultural extension services, insurance, financial services, business training, consultancy services, advice on accounting, export credit, building maintenance, transport services etc.)
        i. Are the services working well?
        ii. How are these service addressing key constraints
        iii. Which services are needed or need to be improved?
    j. Barriers to export
    k. Level of innovation (technology, R&D, human resources) required
    l. Does the region have a **comparative and/or competitive advantage** in this chain?
    m. What are **competitors value chains doing in other countries**?
        i. What international benchmarks are used by the industry?
        ii. How does the productivity (for labour, capital and key inputs) of national firms in the sector compare with global & regional best practices?
        iii. How does the technology in the sector compare with global and regional best practices?

iv. How does the factor costs compare with global and regional best practices (labour, capital and key inputs)?

3. **What are the opportunities and limitations in the value chain? (At each stage of the value chain)**
    a. How can the value chain improve in order to meet current and future market demand?
    b. How can quality be improved to meet market demand? (at each stage)
    c. How can the value chain become more profitable?
    d. What initiatives could be adopted that have succeeded in other value chains/ countries?
    e. What **technology** is available to help the functioning of the value chain and is it accessible? How can it be improved?
    f. What is the opportunity for innovation and how can it be achieved?
    g. Is **information** readily available throughout the chain and for the different actors involved? Who holds key information?
    h. What **capacity building** (skills, technology, institutions) is needed to improve the efficiency and effectiveness of the Value Chain?
    i. **Access to finance**, insurance, savings and credit mechanisms (including infromal ones and in-kind lending from business partners)
    j. What **alternative employment opportunities**/ value chains are available to the operators (particularly in the case of cotton)? How are skills and competencies transferrable to other sectors or to self-employment? Which are the business and other services to be developed to enable their productive employment?
    k. What rules and regulations support or hinder the functioning of the Value Chain?
        i. What government regulations hinder or support the functioning of the value chain at each stage?
        ii. What regulations by the local or national state are difficult to fulfil? Time and costs?
        iii. What control mechanisms does the state have? Are these enforced?
        iv. Do enterprises face corrupt officials? Is this a relevant cost?
        v. What are informal rules and regulations that help or hinder the functioning of the value chains?
        vi. Start-up, running and closure of enterprises, what regulations are a burden at what stage of operations?

4. **What are the recommendations of the value chain operators to improve the value chains?**
    a. What do the operators believe are the best solutions?
    b. What do BDS providers and extension service providers say? Where are weaknesses and how could they be addressed? Does it seem realistic? Would the market take it up?
    c. Do they have the capacity to implement these solutions?
    d. What do they need in order to implement these solutions e.g. investment, policy, other finance, technology, training

Social Questions – Working conditions

5. **What type of social groups are involved in each stage of this value chain? E.g. women/ men/ children/**

a. Groups
b. Salaries (Are they sufficient?)
c. Contracts (formal or informal, legal or illegal, individual or for family)
d. Modes, frequency and any conditions of payment
e. Level of skill: Skilled or unskilled workers

6. **Vulnerability to poverty**
    a. Size of family
    b. Absent parents (full or non-full families)
    c. Difficulty in getting paid
    d. Support services available and awareness of rights and services and access to those services.
7. **Hazards of the value chain**
    a. What are the working conditions – water, sanitation, hours, breaks, working tools, holiday entitlement?
    b. Health risks/ impacts
    c. Difficulty getting paid
    d. Physical hazards
    e. Psychological factors
    f. Disturbances to education/ Level of participation in education
    g. Availability and access to education
    h. Level of awareness of awareness of employers and employees of the risks being taken/ hazards involved.
8. **Opportunities to improve working conditions**
    a. Which hazardous labour activities could be replaced by technology? If so, how would the current labourers get an income?
    b. How can physical hazards be reduced?
    c. How can psychological hazards be reduced?
    d. What support services are needed/ could help? How can they be facilitated in the value chain? Which existing stakeholder would have the capacities/ willingness/ incentives to provide these services?
    e. What policy changes could help?
9. **What are the preferences/ wishes of the groups to improve their situation?**
    a. How do workers see the situation improving
    b. How do they (men and women) think the situation should/ can change?

Environmental Questions

10. **What negative or positive effects does this value chain have on the environment? (Pressure on the environment) e.g.**
    a. potential to absorb carbon
    b. negative effects due to use of water
    c. negative effects due to land degradation caused
    d. other emissions released due to the activities of the value chain
11. **Is there potential to reduce carbon emissions in this value chain or as a result of value chain activities?**
    a. For example, what options are already available? (e.g. laboratories for soil testing and control)
    b. Is technology available to reduce carbon emissions? Is it easily available? Is it affordable?

c. Have value chain operators the capacity to reduce emissions? What capacity Building is needed?
d. What measures are already in place? (e.g. technologies, practices)

12. How is this Value Chain affected by Climate Change?

a. What are the climate hazards to the value chain e.g. weather events, disease, biodiversity issues?
b. How vulnerable is the value chain to climate change? E.g. the level of capacity to adapt, lack of trees, lack of infrastructure.
c. What is the level of exposure of the value chain to climate change? i.e. which stages of the chain are affected and which/ how many people?

13. What climate change adaptation options are in place and recommended?

a. How are value chain operators currently adapting to climate change?
b. What other adaptation options are available?
c. What is the capacity of value chain operators to adapt to climate change?
    - Willingness to change
    - Skills/ Knowledge
    - Technological capacity (Technology already there and easily available)

Annex 2: List of Organisation interviewed

Value Chain Operators

1. Spayka
2. Ice House
3. IBari factory
4. Sis Natural LLC
5. Proshyan Wine and Cognac factory LLC
6. Vegetable oil producer
7. Ragmak LLC
8. Frozen food-Tamara fruit
9. Farmers and small producers

Enablers

1. Ministry of Economy
2. Kotajk Farmer's union
3. Food Safety inspection Body
4. Carmac II (World Bank project)
5. Green Lane NGO
6. UN Enviroment Expert
7. Enterprise Armenia
8. FAO