Export Potential of Major Fruits in Sri Lanka

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FOREWORD

Fruits have always been an integral part of the Sri Lankan diet. The island has been immensely blessed in her fruit complement in terms of diversity, nutritional attributes, and flavour. Fruits, then, constitute an important but largely unrecognised and even under-utilized set of resources both with regard to securing local food security and, especially in the context of the current economic crisis marked by foreign exchange scarcity, their export potential. This study, although initiated before the above mentioned crisis manifested itself, addresses a key area in the agricultural sector with multiple implications for the overall economy.

Despite what a cursory glance across the agricultural landscape would yield, it is important to assess performance, competitiveness, potentials, and barriers before thinking about a comprehensive strategy to develop this industry. A survey of export-oriented fruit farmers, fruit collectors and fresh and processed fruit exporters, then, was a necessary precondition for policy advocacy.

The study has revealed that papaya and pineapple have retained comparative advantage in relation to the majority of Asian countries while avocado and lime have shown healthy rates of growth.

Encouraging as these findings are, it is clear that much work needs to be done to further develop these industries. It would be timely, moreover, in the current context, to explore the potentials of all fruits at all levels, from domestic to commercial cultivation for local and foreign markets. This study, therefore, provides an excellent template for such a project, especially since it reveals that even in the more visible of the fruits considered Sri Lanka is considerably distanced from achieving anything close to full potential.

Dr. G.G. Bandula
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EXECUTIVE SUMMARY

Tropical fruits from Sri Lanka are highly rated worldwide due to their unique characteristics such as flavour, aroma, and colour. In terms of fresh and processed fruit export industry Sri Lanka has not tapped its full potential as only a speck of the total production reaches off-shore markets. Despite significant evidence available on fruit export industry in Sri Lanka, scant attention has been paid to its performance, competitiveness, potentials and barriers.

Therefore, this study was designed to analyze the current export performance, export potential and identify factors inhibiting exportation in order to suggest policy measures to enhance the fruit export industry in Sri Lanka. Both primary and secondary data were used for this study. Export data was used from 2010 to 2020 which was collected from Sri Lanka Customs. Primary data was gathered by using questionnaire surveys, key informant interviews and case studies. Purposive sampling technique was applied to select the sample from export-oriented fruit farmers, fruit collectors and fresh and processed fruit exporters.

Revealed Comparative Advantage Indices and Comparative Export Performance Index were used to analyze the competitiveness of major fruit exports from Sri Lanka. The Compound Growth Rate Analysis was performed to ascertain the growth in extent, production, productivity and exports of major fruits from Sri Lanka. Instability in export of fresh and processed fruits was analyzed by calculating the Co-efficient of variation.

Weighted Average Score Analysis was used to identify the most potential fruit crop to export while Augmented Gravity Model was employed to estimate the export potential of Sri Lanka for the study period.

Results revealed that papaw and pineapple have retained the comparative advantage while papaw remained at the top. Sri Lanka's papaya exports have retained competitive advantage in relation to majority of Asian countries.

According to Compound Growth Rate Analysis, lime recorded the highest growth rates in terms of production and productivity while avocado exhibited the highest growth rate in terms of cultivated land extent. Further, Compound Annual Growth Rates were calculated for different export indicators of major fruit for the study period. Avocado exhibited the highest growth rates in terms of quantity, value and unit value of exports.

According to the results of Augmented Gravity Model, importing country's gross domestic product and population have a positive impact on Sri Lanka's fruit exports while distance has a negative and significant impact. In addition, the difference between the factor endowments has a positive and significant impact on Sri Lanka's major fruit exports and it is in accordance with the Heckscher-Ohlin theory. However, real exchange rate has a positive and significant impact on Sri Lanka's fruit exports. Further, the results of the augmented gravity model revealed that Sri Lanka has not

tapped more than fifty percent of its potential in the Oceania, Europe and Asian region while the American region was the preferred choice.

With regard to barriers and challenges, high transportation cost, no continuity in supply of quality raw materials, strong international competition and lack of governmental support in export marketing and promotion were identified. Inadequate quality fertilizers and pesticides was another challenge. The study suggests to formulate a long term and consistent export policy, in the consultation with relevant stakeholders in the industry.

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ABBREVIATIONS

CAGR	Compound Annual Growth Rate
CEP	Comparative Export Performance
CEPII	Centre d'Etudes Prospective et d'Informations Internationals
CISIR	Ceylon Institute of Scientific and Industrial Research
CSR	Corporate Social Responsibility
DOA	Department of Agriculture
EDB	Export Development Board
EU	European Union
FAO	Food and Agriculture Organization
FRDI	Fruit Research and Development Institute
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GMP	Good Manufacturing Practice
HACCP	Hazard Analysis Critical Control Point
ITC	International Trade Centre
ITI	Industrial Technology Institute
LFVPPEA	Lanka Fruit & Vegetable Producers, Processors and Exporters Association
MRL	Maximum Residue Level
NES	National Export Strategy
NIPHM	National Institute of Post-Harvest Management
NPQS	National Plant Quarantine Service
NRCA	Normalized Revealed Comparative Advantage
OLS	Ordinary Least Square
RCA	Revealed Comparative Advantage
RSCA	Revealed Symmetric Comparative Advantage
SCEP	Symmetric Comparative Export Performance index
SFA	Stochastic Frontier Approach
SLSI	Sri Lanka Standards Institution
SPS	Sanitary and Phytosanitary
TBT	Technical Barriers to Trade

TJC	Tom Juan Carlos
UAE	United Arab Emirates
UK	United Kingdom
WDI	World Development Indicators
WTO	World Trade Organization

CHAPTER ONE

Introduction

Fruits play a vital role in human nutrition and health, being good sources of vitamins, minerals, antioxidants, and dietary fiber. They are commercially important and nutritionally indispensable food commodities in the world (Prasanna *et al.,* 2007). Fruits can be defined as edible products of perennial higher plants with high water content, soft texture, sweet, sour, and semi astringent flavours (Patel *et al.,* 2018). Thus, fruits are essential items in the human diet as they provide variety, taste, interest, aesthetic appeal, and required nutrients for a balanced diet (Wills *et al.,* 1996). Moreover, considerable attention is paid to different parts of the world because of their exotic flavour and taste (Patel *et al.,* 2018). Tropical fruit exports from Sri Lanka such as pineapple, rambutan, mangosteen, passion fruit, ripe jackfruit, star fruit, and soursop are very popular around the world due to their unique flavours, aroma, and colours (Export Development Board, 2019).

1.1 Global Fruit Production and Trade

With the revolutionary advances in horticulture technology, the production of fruits has increased substantially all around the world. According to the Food and Agriculture Organization (FAO), global fruit and vegetable production has been growing at around three percent per annum over the last decade (FAO, 2013). According to the data from FAO, the global fruit production was about 870 million metric tons in 2018. The fruit market plays a significant role in global agricultural trade since about nine percent of all fruits grown are traded internationally, of which the share is increasing. At present, bananas, apples, citrus fruits, and grapes are traded worldwide, with Latin America as a dominant global export force and China as a giant and increasing import market (Rijswick, 2018). Latin America and the Caribbean constitute the world's most important exporting region for banana and the four major tropical fruits; mangoes, pineapples, avocados, and papayas. However, this region ranks the second leading producer of bananas and tropical fruits globally, next to Asia which accounts for 44 percent of the total fruit-producing area in the world while contributing 42 percent to the total world fruit production, with the largest and the second largest fruit producers located on this continent (APCAEM, 2007; FAO, 2019a). India, the second largest producer of fruits after China, ranks first in the production of mango, banana, lime, and lemon (Kusuma, 2014).

Banana and plantain are among the top ten crops globally in terms of cultivation extent, yield and calorie content, occupying the seventh or eighth place depending on the category. Banana is also a major export crop and most widely consumed fruit in the present world (Calberto *et al.,* 2015). As stated by FAO (2021a), the world gross banana exports in 2020 is 22.2 million tons while gross imports are around 18.9 million tons. Global production of tropical fruits has been increasing over the years due to growing demand in the major producing areas. Of the almost entire tropical fruit production, largely practised by small-scale farmers, takes place in developing countries (Altendorf, 2017).

Tropical fruits constitute a comparatively new group in global commodity trade that significantly emerged on the international marketplace since 1970. Further, advances in transportation, trade agreements and shifting consumer preferences led to fastest average annual growth rate in export volumes of the four major fresh tropical fruits: mango, pineapple, avocado and papaya (Altendorf, 2019).

1.2 Fruit Industry in Sri Lanka

1.2.1 Existing Fruit Production in Sri Lanka

Sri Lanka's agricultural diversity, characteristic of varying soil and climatic conditions, favours different fruit cultivars of around 55 in 46 agro-ecological zones (Bogahawatta, 2003). Fruit cultivation in Sri Lanka is spread over 150,000 hectares in which a major part is undertaken by small scale producers and home garden growers (Central Bank Annual Report, 2018). However, commercial cultivation is practised only for few varieties such as banana, pineapple, papaw, mango, passion fruit and rambutan. According to the Department of Agriculture, Sri Lanka produced 1,019,000 metric tons of fruits in year 2017 (Export Development Board, 2019).

The total fruit production increased in 2018, with significant contributions from avocado, orange, guava, rambutan, and lime, recording a significant growth of 28.8 percent in 2018, a surge of 9.5 percent compared to the previous year (Central Bank Annual Report, 2018). However, owing to drought weather conditions it suffered a setback in 2019, recording a decline of 3.1 percent (Central Bank Annual Report, 2019). More specifically, mango, plantain and avocado production decreased considerably whereas orange, melon, papaw, passion fruit and pineapple production reported a growth during that year. The production rose in 2020 by the same level as the drop in the previous year (3.1%), with significant improvements in the production of mango, banana, papaw, guava, and melon (Central Bank Annual Report, 2020).

The fruit industry of Sri Lanka has the potential to make a significant contribution towards commercialization of non-plantation agriculture (Esham and Usami, 2006). The fruit sector also has greater potential to increase the national income, employment opportunities and nutrition and health status of the people (Dahanayake, 2015). Meanwhile, on par with the state policy to increase the fruit production to attain near self-sufficiency level by 2020 the Ministry of Agriculture initiated a line of projects: establishment of fruit villages, year round cultivation of fruits by establishing five off-seasonal fruit zones (fruit crop zoning), intercropping fruit crops in plantation sector (under coconut, early stage of rubber planting), fruit variety development for home gardens and commercial cultivation and increasing the availability of high quality and productive fruit plants. Further, as stated by the Export Development Board (2016), the farmers are constantly educated to practice Good Agricultural Practices (GAP) at nurseries and some farms received the GLOBAL GAP certification. Moreover, the processing/ manufacturing facilities owned by export companies comply with local standards (SLSI) and with International Quality Standards such as ISO, HACCP, and EU Standards.

Despite various forms of facilitation and assistance extended by the Ministry of Agriculture the contribution of the fruit production industry to the national development remains low (Central Bank Annual Report, 2018). Major roadblocks to the development of the sector are increasing the effectiveness of fruit cultivation, ensuring the quality of products and meeting market demand by creating awareness among farmers on ground conditions (Central Bank Annual Report, 2018).

1.2.2 Fruit Export Market in Sri Lanka

Although Sri Lanka is blessed with a wide range of delicious fruits, only a small share of the total production is exported. Sri Lanka exported 38,725 metric tons of fresh fruit worth US $ 33.1 million during 2020. Meanwhile, Sri Lanka imported 52,778 metric tons of fresh fruit amounting to US $ 58.1 million in the same year. In the preceding year as well as in 2020, apples, mandarins, oranges and grapes were the main varieties that were imported (Central Bank Annual Report, 2020). Consequently, the percentage fruit contribution to total merchandise exports in 2020 was around 0.36 (Export Development Board, 2021). Even after a number of promotional events initiated by the Export Development Board, Sri Lanka has not succeeded in meeting the demand of foreign market in terms of fresh fruit production. Further, as Dahanayake (2015) postulates the major challenge faced by the Sri Lankan exporters is locating exportable quality fruits in sufficient quantities.

According to the Central Bank Annual Report (2020), failure to maintain a consistent good quality fruit supply for export is a major constraint, which can be partly overcome by promoting and adhering to good agricultural practices, particularly with regard to agricultural input usage and harvesting, establishing direct links between producers and exporters, and developing contract farming system.

The Export Development Board reveals that Sri Lanka exports both fresh and processed fruits and vegetables with 65 percent of the fresh products targeting the Middle East and the Maldivian market. The destination of almost 90 percent of the processed products is the European market. United Arab Emirates, Saudi Arabia, Qatar, Maldives, Kuwait, Germany, Pakistan, Japan, Oman are Sri Lanka's leading fresh fruit markets. The total fruit exports were US $ 41.13 million in 2018 (Export Development Board, 2019). Sri Lanka exported 38,896 metric tons of fresh fruit amounting to US $ 41.1 million during 2019 (Central Bank Annual Report, 2019). It was 38,725 metric tons worth US $ 33.1 million in the year 2020 (Central Bank Annual Report, 2020).

1.3 Problem Statement

It is predicted that the world's population will reach the mark of 10 billion by 2050. Invariably, the rising population leads to a rise in demand for better quality fresh food all around the world (Bell, 2007). Processed food and fruits and vegetables sectors have been identified as a sector with high potential due to increasing demand from end consumers and for value added products in the world market. Changing consumer preferences and fast-growing consumption of fruits in developed and

developing countries continued to be the predominant factor that led to an expansion in global shipments of fruits (FAO, 2019b).

In Sri Lanka there is high potential for cultivating fruit crops for domestic and export markets (Dahanayake, 2015). Compared to certain other countries in the region, given the favourable climatic and soil conditions, Sri Lanka has high prospects in fruits (Dahanayake, 2015). Moreover, specialties associated with Sri Lankan products such as superior flavours, vicinity and organic yield have elevated the industry's prospects (Export Development Board, 2019). For instance, tropical fruits in Sri Lanka such as pineapple, rambutan, mangosteen and passion fruit are highly popular around the world for their unique flavour, aroma and colour (Export Development Board, 2019). According to the National Export Strategy of Sri Lanka 2018-2022, processed food and beverages is a booming sector in Sri Lanka and is diversifying. Further, Shand (2002) stated that another direction of diversification is making processed export crops. Today, the Sri Lankan processed food and beverages sector is geared for its next level. Although starting from a low base, growth in exports has demonstrated the interest in and markets for Sri Lankan products. Export growth over the last few years clearly shows that the country is in a good position to increase food and beverage processing and transform it into a major industry, turning the sector into a leading foreign exchange earner and a standard-bearer for high-quality Sri Lankan products abroad (Ministry of Development Strategies and International Trade, 2018).

To harness the full potential, it is essential to analyze current export performance of fresh and processed fruits, evaluate the potential end markets and export competitiveness of Sri Lankan fruits. As opposed to the little evidence available in respect of export trends in agricultural and horticultural commodities information is on export competitiveness of major Sri Lankan fresh and processed fruits, direction and magnitude of change in exports and constraints faced by various players of fruit export is scarce. Further, only a limited number of studies have been conducted on export performance of fruit industry in Sri Lanka and no substantial study has investigated the issues affecting the grassroots level to export markets. Perera *et al.,* (2015) also recommended further research into processed fruit export products and the market situation. In similar vein, Shand (2002) underscores the need to study export crops' potential in international markets.

At present, the government of Sri Lanka hails export promotion as a key strategy to capture the international market. Further, the current local agricultural policy framework is aimed at modernizing the Sri Lankan agriculture to draw a lucrative income from export crops. In this context identifying and addressing the issues that caused uncertainty in the fruit export subsector in Sri Lanka despite the growing world demand is a step in the right direction (Perera *et al.,* 2015). With the recognition of proper niche markets, Sri Lanka may have potential to develop exports in fresh and processed fruits (Department of National Planning, 2019). Therefore, scientific research directed at revealing the underlying reasons for market changes and potential niche markets is needed (Ministry of Agriculture, 2017). Hence, the present study will analyze the export potentiality of major Sri Lankan fresh and

processed fruits, direction and magnitude of change in exports and constraints faced by fruit export marketing channel actors.

1.4 Objectives

1.4.1 Main Objective

To analyze the current export performance, export potential and identify factors inhibiting exportation in order to suggest policy measures to enhance the fruit export industry in Sri Lanka.

1.4.2 Specific Objectives

- To examine the characteristics and structure of the fruit export sector.
- To assess the export competitiveness of Sri Lankan major fruits in global and Asian region.
- To analyze the growth pattern and direction of trade of major Sri Lankan fruit exports.
- To identify the potentials and challenges of fruit export sector.

1.5 Organization of the Research Report

The report consists of ten chapters. The introductory chapter provides the background and objectives of this study. The second chapter reviews the literature of past studies on the fruit export sector. The third chapter is devoted to the conceptual framework while the fourth chapter provides the research methodology and study locations. Chapter five, chapter six, chapter seven, chapter eight and chapter nine present the results and discussion of the study. The final chapter contains the conclusion and recommendations.

CHAPTER TWO

Literature Review

A wide variety of fruits are grown all over the world. The main fruit-growing regions are Africa, North and Central America, South America, Asia, Europe, and Oceania. Extensive variations can be seen in the fruit varieties and quantities produced in different regions as well as countries in the world. As stated by Dattatreyulu (1997), the global production of fruits is comprised of fresh fruits, citrus fruits, tropical fruits, miscellaneous fruits, and tree nuts. Definitions of tropical fruits, the major tropical fruits market in the world, and developments in the major tropical fruit trade are discussed in this chapter. A comprehensive review of existing literature and relevant research gaps are identified subsequently.

2.1 Tropical and Sub Tropical Fruits in the World

Of thousands of fruits in the tropics only 50 are well known (Martin *et al.,* 1987; Galán Saúco, 2013). According to the spread of cultivation, the volume of production, and trade, tropical and sub-tropical fruits can be divided into four main categories: major tropical fruits, minor tropical fruits, underutilized species, and wild tropical fruits. However, the borders between categories cannot always be clearly demarcated (Galán Saúco, 2013 as cited in Galán Saúco, 1996, 2008).

2.1.1 Major Tropical Fruits

Major tropical fruits are cultivated in most tropical countries. Some of tropical fruits can be cultivated in subtropical regions under suitable weather conditions. Major tropical fruits are well known in both local and international markets (Sabbe, 2009). Mango, pineapple, avocado, and papaw are the major tropical fruits according to FAO (2020). According to Galán Saúco (2013), banana is also included in this major category.

2.1.2 Minor Tropical Fruits

Minor tropical fruits can be defined as fruits that are not so extensively cultivated. Further, consumption and trade of this fruit category tend to be more limited both geographically and quantitatively, than the major tropical fruit categories (Galán Saúco, 2008). Guava, lychee, longan, durian, passion fruit, rambutan, mangosteen, and jackfruit are the best examples of minor tropical fruits as stated by Altendorf (2018).

However, some of the minor tropical fruits are considered major tropical fruits in different regions due to their economic importance in the respective national markets (Sabbe,2009). For instance, lychee, and mangosteen are categorized as major tropical fruits throughout Southeast Asia (Chomchalow *et al.,* 2007). Further, trade data on a cluster of mangoes, mangosteen, and guava are reported under major tropical fruits in FAO (2021b).

2.2 Major Tropical Fruit Markets in the World

Bananas and the four major fresh tropical fruits; mango, pineapple, avocado, and papaya, play a significant role in the worlds' agricultural production by securing the nutrition and livelihoods of smallholders in producing countries (OECD/FAO, 2021). Pineapple, avocado, and mango were the three most traded tropical fruits in the world with respect to export quantities in 2020 (FAO, 2021b). The global banana and major tropical fruit export industries respectively generate around US $ 9.1 billion and US $ 10 billion per year on the basis of 2019 statistics (OECD/FAO, 2021).

Global exports of mangoes, guavas, and mangosteens rose to 2.2 million tons in 2020, an increase of 2.9 percent from 2019. Global pineapple exports decreased to 3.1 million tons in 2020, corresponding to a 7.9 percent fall from 2019 while the world avocado exports grew to approximately 2.3 million tons in 2020, an increase of 8.2 percent from 2019. Further, total papaya exports in the world rose to approximately 353 000 tons in 2020, a rise of 2.7 percent from 2019 (FAO, 2021b). As stated in Banana Market Review, (2020) global exports of bananas, excluding plantain, remained relatively stable at around 21.5 million tons in 2020, as higher shipments from Latin America and the Caribbean were offset by lower exports from Asia and Africa (FAO, 2021a).

2.3 Review of Past Studies

Based on the research objectives of this study, the existing literature is reviewed under four major categories: 1) export competitiveness of major fruits 2) growth patterns in fruit exports 3) structural changes and trade dynamics of fruit exports 4) potentials and challenges of fruit export industry.

2.3.1 Export Competitiveness of Major Fruits

Ahmad *et al.,* (2021) analyzed the export competitiveness of major fruits and vegetables in Pakistan. Balassa's Index of Revealed Comparative Advantage (RCA) and its extensions was applied to analyze the export competitiveness of major fruits and vegetables in Pakistan for the period 2001-2018. The results indicate that mangoes, citrus, and dates revealed comparative advantage. Further, the existence of comparative advantage emphasizes the considerable export potential of fruits and vegetables in Pakistan.

Chen *et al.,* (2017) in their study that analysed the Comparative Advantage and Export Competitiveness of China's fruit products to find that among seven major exporting fruits in China, the Revealed Comparative Advantage of pear and apple was larger than one. Hence pear and apple produced in China have strong competitive advantages. Citrus and orange have weak competitive advantages. The RCA of banana, grape, and peach indicated that they have even weaker competitive advantages.

Boansi (2014) in a study compared export performance for seven agricultural commodities (Cocoa, Coffee, Fruits and Vegetables (as a unit), Pineapples, Bananas, Oil Palm and Rubber) prior to, during and after initiation of the Agricultural Diversification project (1991-1999) in Ghana. In assessing export performance, the "Comparative Export Performance" index (CEP), the "Symmetric Comparative Export Performance" index (SCEP) and the logarithmic form of CEP (ln (CEP)) indices were used and based on newly developed thresholds, commodities were placed under four categories - "Highly Competitive", "Competitive", "Weakly Competitive" and "Uncompetitive". Use of the thresholds helped in appropriately reflecting the fragileness of agricultural export trade. The results have shown that besides cocoa and pineapples which were "Highly Competitive" in export performance before initiation of the project, only rubber exports witnessed major improvement among the five other commodities during the project phase.

2.3.2 Growth Patterns in Fruit Exports

Singh *et al.,* (2018) examined the trend of growth rate of Indian fresh mango in respect of area, production, productivity, and export indicators such as quantity and value for the period of 2006-07 to 2015-16. The exponential trend or log-linear was employed. The results revealed that compound growth rate of area was non-significant. However, compound growth rate of production, productivity, and value of exports were positively significant at one percent probability level while the quantity of export was negatively significant at one percent probability level. Further, the findings revealed that compound growth rate of value of export was 10.81 percent per annum and quantity of exports had shown a decreasing trend with compound growth rate of -7.56 percent per annum.

Usunde *et al.,* (2016), analyzed the trend and growth pattern in the export of banana and mango from India using compound growth function of the form $Y = ab^t e_t$. The study findings revealed that, the growth rates of fresh banana for overall period (1993-2013) showed that the growth rate of export quantity and export values were 26.59 and 29.81 percent respectively and these growth rates were statistically significant. Further, study findings exhibited that the growth rates for fresh mango for the study period (1993-2013) showed that export quantity and export value was 24.54 and 28.69 percent, respectively and these growth rates were statistically significant. Moreover, the growth rate per unit value of fresh mango exports for the overall period (1993-2013) was positive at 2.78 percent and it was statistically significant at five percent level.

Perera *et al.,* (2015) estimated the growth rate in terms of Sri Lankan F&V export products and markets. The compound growth rate analysis has shown that the total fresh fruit export earnings have increased by 13 percent annually. Papaya export records the highest growth rates over the years compared to other major fresh fruit items which Sri Lanka exported between 1992 and 2010.

2.3.3 Structural Changes and Trade Dynamics of Fruit Exports

Singh *et al.,* (2018) examined the dynamics of trade patterns and direction of Indian mango exports for a period of ten years (2006-07 to 2015-16) by using the stationary form of the first order Markov Chain Model. The findings revealed that Bangladesh is one of the most stable markets of Indian mango as reflected by 82.32 percent probability of retention in terms of quantity of exports while the U.A.E topped in total value exported as reflected 75 percent retention probability.

Usunde *et al.,* (2016) analyzed the instability in export of banana and mangoes from India to different countries by calculating the Co-efficient of variation. The study period was 2000 to 2013. It was observed that, the export of fresh banana in terms of quantity to UAE, Bahrain and Nepal was relatively unstable compared to other countries as indicated by their co-efficient of variation (53.00%). However, export of banana to Kuwait was most stable (18.29%) followed by other countries and Saudi Arabia with a co-efficient of variation of 30.47% and 31.38% respectively. The value earned by the exports of banana from India was unstable for UAE, Bahrain and Nepal with a Co-efficient of variation of 69.00 percent, 68.25 percent and 64.04 percent respectively, whereas for other countries the export of banana in terms of value was found to be most stable (26.93%), followed by Kuwait (33.13%) and Saudi Arabia (38.70%).

Instability was the highest in the case of UK (194.60%) with respect to the quantity of fresh mango exports and observed to be relatively low in terms of export value (45.25%). Quantity of mango exported to and value earned from Kuwait were highly unstable due to changes in the volumes traded (157% and 158%) during the study period. Similar trend was noticed with respect to Bangladesh and other countries. While mango exports to the UAE were stable with a Co-efficient of variation of 9.74 percent for the quantity and 12.74 percent for value. Further, Saudi Arabia (27.48%) was stable for the quantity of fresh mango exports than the value exported (41.51%). Moreover, the study findings revealed that, whenever the average quantity and the average value of exports were higher, the variability co-efficient were low indicating stability in exports (Usunde *et al.,* 2016).

Kusuma and Basavaraja (2014) analyzed the structural change and direction of change in the export of mango for the period of 2001-02 to 2010-11 by using the Markov Chain Analysis. The major Indian mango export markets were categorized as stable and unstable markets based on the magnitude of transitional probabilities. Bangladesh, UK, and UAE were stable markets while Nepal, and Saudi Arabia were unstable markets. The major export markets for Indian fresh mangoes are Bangladesh (46.22%), UAE (33.26%), Nepal (6.06%), Saudi Arabia (3.63%), and UK (3.06%).

2.3.4 Potentials and Challenges of Fruit Export Industry

Sadeghi *et al.,* (2019) analyzed Iran's export market potential using Gravity Model using date market data (1994-2013). It revealed the negative effects of geographical

distance and landlocked location, and the positive effects on Iran's date export of re-export, political relations, social and commercial ties, and access to the high seas. The date export relative prices and per capita GDP of partners show that most of Iran's date has been exported at low prices to countries with low per capita income. Moreover, on average, Iran's export has been close to its full export potential in Central Asia, Africa, and the Middle East, while it has exploited only 76 percent of its export potential to European countries. More than half of the export potential to Germany, Italy, Denmark, and Sweden remained unexploited.

Wickramaarachchi (2019) carried out a study to investigate the determinants of exports of Sri Lanka to estimate the potential exports for the period 2000-2013, using Augmented Gravity Model with a stochastic frontier approach. Panel data for 56 major export destinations of Sri Lanka was used for this analysis. The study findings revealed that importing country's GDP and colonial relationship have a positive impact on Sri Lanka's exports. Further, the difference between the factor endowments of Sri Lanka and the importing country has a positive impact. However, the distance and trade resistance of the importing country have a negative impact on Sri Lanka's exports. Moreover, Sri Lanka's actual exports have achieved only 15 percent of their potential during the period 2000 to 2013.

Challenges and weaknesses of the fruit value chains in Sri Lanka are as follows; 1) inadequate supply of raw material, 2) price increases year on year, 3) climate change, 4) poor application of Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP) and Sanitary and Phytosanitary (SPS) issues at farm levels, low yields 5) Lack of good quality planting material and 6) Processing facilities do not conform to economies of scale with new-age processing technology to be accepted (Venkatprahlad and Wijeratnam, n.d.).

As stated by Gamage *et al.,* (2020) lack of refrigerated transport, storage and handling facilities were identified as main issues in the Sri Lankan fruit supply chain.

Fragmented production by small and marginal farmers, no continuity in supply, small land holding, lack of awareness about quality standards, lack of infrastructure, lack of quality supply, high cost of production, high cost of labour, packaging, transport, airfreight, and electricity, inadequate quality seed materials, high cost of investment in new technology, inadequate research, high-interest rates, and labour issues are a few weaknesses in the fruit sector in Sri Lanka (Export Development Board, 2019).

Hathurusinghe *et al.,* (2012) stated the high cost of good quality packing materials, shortage of good quality fruits, shortage of skilled labour, high prices of fruits during the off-season, high freight charges, and air space limitations as the problems affecting pineapple exporters.

2.4 Research Gap

According to the literature scientific evidence in the Sri Lankan context in terms of export trends in fruits is available (Hathurusinghe *et al.,* 2012; Export Development

Board, 2019 and Gamage *et al.,* 2020). However, no study has been done on growth and instability of fresh and processed fruit exports in a given period (2010-2020). When considering market competitiveness of exports in Sri Lanka, very few studies (Hettiarachchi, 2018) have analyzed the competitiveness of Sri Lankan fruit exports using Revealed Comparative Advantage (RCA) indexes and no study on employing Comparative Export Performance (CEP) index was found. Past literature provided significance evidence on the use of gravity model to identify the export potential but not on estimating the export potential as well as untapped potential of major fruits of Sri Lanka by employing the gravity model. Similarly, challenges for fruit export industry in Sri Lanka (Hathurusinghe, 2012; Dissanayake, 2012; Madanayake, 2016 and Gamage *et al.,* 2020) have been found but not the challenges faced by fruit farmers, collectors and fresh and processed fruit exporters. Hence this present study will be carried out to analyze the export competitiveness, growth patterns, instability, structural changes in trade patterns and to identify the potentials and challenges of Sri Lankan fruit exports.

CHAPTER THREE

Conceptual Framework

In the current global arena fruit exporting plays a vital role in the economic development of the nation as well as the exporting companies. Export marketing is the most popular mechanism by which firms engage with international markets, understanding the drivers of export market where performance is the key to explaining firms' international competitiveness (Morgan *et al.,* 2011). Although, the benefits derived from exporting in an increasingly globalized marketplace are enormous, for many companies, exporting is constrained by numerous challenges (Sisay, 2018). Further, these challenges and opportunities can be identified as internal and external factors (Tesfom *et al.,* 2004; Tesfom and Lutz, 2006). According to the literature, the traditional approach concludes that internal and external factors as well as export marketing strategy directly influence export performance (Lages, 2000). Moreover, export potential analysis can also be performed based on current and past export performance (Ministry of Development Strategies and International Trade, 2018).

3.1 Export Marketing Challenges

Export barriers can be defined as attitudinal, structural, operational, and other constraints that hinder a firm's ability to initiate, develop or sustain international operations (Leonidou, 1995). Several research studies have classified export marketing problems into various categories. Export problems were categorized into two main categories namely "internal" and "external" barriers (Leonidou, 1995; Tesform and Lutz, 2006). A list of export impediments was generated by Clarke (2013) and grouped them into "generic", "product specific" and "market-specific". Karelakis (2008) classified export problems into four groups: "internal-domestic", "internal-foreign", "external-domestic", and "external-foreign". Further, Ramaswami and Yang (1990) stated that there are four sources of export barriers that affect firms' export performance: export knowledge, internal resource constraints, procedural barriers, and exogenous variables. In this study, research focused on the classification of Tesfom and Lutz (2006) to further assess the appropriateness of the problems in major fruit export marketing in Sri Lanka.

3.1.1 Internal Barriers

The constraints associated with organizational resources/capabilities and the company approach to export business can be defined as internal barriers (Leonidou, 2004). Further, Tesfom and Lutz (2006) classified internal export barriers into "company barriers" and "product barriers".

Company Barriers

Company barriers influence their choice of marketing strategy and ability to execute that marketing strategy (Porter, 1985 cited in O'Cass and Julian, 2003; Tesfom and Lutz, 2006; Sisay, 2018). Several research studies categorized "company barriers"

under marketing knowledge and information, financial resources, and human resources (O'Cass and Julian, 2003; Tesfom and Lutz, 2006; Delgado, 2006; Liargovas and Skandalis, 2008; Karelakis *et al.,* 2008).

Export knowledge barriers refer to a lack of information and knowledge about aspects related to the export activity (Suarez-Ortega, 2003). The lack of knowledge about foreign markets constitutes a barrier to increase commitment to international activity within a company (Aharoni, 1966). Consequently, internal resource barriers include; lack of financial resources, the difficulty of obtaining the necessary funds required to initiate or finance export operations (Bilkey, 1978; Bauerschmidt *et al.,* 1985; Keng and Jiuan, 1989); the need to use honouring letters of credit (Rabino, 1980; Barker and Kaynak, 1992) and lack of personnel to devote time to export activities (Rabino, 1980).

Product Barriers

According to Siringoringo (2009), "product barriers" are related to quality and technical requirements of the target export market segment, such as export product design, style, quality, packaging and labelling requirements, and product adaptation or modification. The product barriers that influence the export marketing strategy as well as the export performance of the firms could be classified under two categories such as quality and technical barriers (Tesfom and Lutz, 2006).

Quality barriers are related to packaging, meeting importers' quality standards, and establishing a suitable design and image for export markets (Sisay, 2018). Moreover, the technical barrier is another important barrier in the product barrier category. Most of the problems related to technical adaptability are due to a lack of knowledge of market requirements or a lack of resources to meet the requirements: poor quality control techniques, poor quality of raw material, packaging and labeling requirements, product design and specification (Tesfom *et al.,* 2004; Tesfom and Lutz, 2006 and Delgado, 2006).

3.1.2 External Barriers

External problems or barriers are those barriers that are rooted in the external environment and the firm itself has no control over the consequences of such problems (Sisay, 2018). Further, Tesfom and Lutz (2006) classified external barriers into "industry barriers", "market barriers" and "macro-environmental barriers".

Industry Barriers

Industry barrier is the first category of external problems. The intensity of exporting activities and the nature of export marketing strategies differ considerably across industries. In order to develop a proper export marketing strategy, the differences between market systems, firm sizes, and the presence of foreign competitors across markets should be taken into account (Tesfom and Lutz, 2006; Liargovas and Skandalis, 2008). Industry structure is a key industry barrier which consists of firm size/economies of scale; lack of new technology; unprepared to face large Multi-National Companies; and unreliability in raw material supply (Sisay, 2018).

Competition barrier is another category of industry barriers and it includes meeting foreign competitor prices; withstanding aggressive competitors in the foreign market; lack of competitive prices; and fierce competition in export markets. Especially, firms with limited financial and human resources are affected due to competition barriers (Tesfom *et al.,* 2004; Tesfom and Lutz, 2006).

Market Barriers

Customer barriers and procedural barriers are the major categories of export market barriers that affect the export marketing strategy as well as export performance (Tesfom and Lutz, 2006). Customer barriers stem from the customer's perception of product characteristics. An important issue here is that in addition to specific quality problems, exporters from developing countries face a poor image/goodwill of their country. In addition, the bad image of products in the foreign market and insufficient foreign demand; language and culture differences; and country of origin effect are the major problems affecting the customer preference (Martinez and Poole, 2004; Tesfom and Lutz, 2006; Kuppusamy and Anantharaman, 2014).

Procedural barriers are among the export market barriers. Exporting requires knowledge about export procedures. The time and paperwork required to comply with foreign and domestic market regulations are mostly lengthy. Not only government organizations but also other private organizations such as banks, shipping organizations, and insurance companies, have their own procedures. Lack of information about export procedures and in particular for inexperienced managers' foreign documentation and paperwork may be very difficult to cope with. In addition, delay in payments; procedural complexity of paperwork; and delay in duty drawbacks are among the major procedural barriers that affect the exporting process (Tesfom and Lutz, 2006; Sisay, 2018). Further, procedural barriers can be subdivided into two categories: (1) controllable, those which can be easily solved given the right experience for example; documentation; and (2) not controllable, requiring case-by-case decisions, independent of the routine which has been acquired through experience, for an example; non-tariff barriers (Ramaswami and Yang, 1990).

Macro environment barriers

Macro environmental barriers are the factors that are beyond the firm's control, which are further classified into direct and indirect export barriers (Tesfom and Lutz, 2006). Direct export barriers include; tariff and non-tariff barriers, cost of transportation, inadequate diplomatic support, lack of export promotion and assistance from the government, complex government bureaucracies, infrastructure, and special customs requirements (Ahmed *et al.,* 2004; Tesfom and Lutz, 2006; Karelakis *et al.,* 2008; Maertens and Swinnen, 2009; Morgan *et al.,* 2011; Kuppusamy and Anantharaman, 2014). Naidu *et al.,* (1997) cited in Tesfom and Lutz (2006), described that exporting companies suffer because of the inadequacy of government export promotion policies. This includes a lack of gathering and provision of information on available export opportunities and ineffective promotion of the country's exports abroad (Sisay, 2018).

Indirect export barriers are rooted in the macro-economic policy of the country and international trade agreements. They include exchange and interest rate uncertainties, international trade agreements and foreign exchange rate policy (Tesfom and Lutz, 2006; Kuppusamy and Anantharaman, 2014). International trade agreements are good for the exporter, but they can also discriminate against third-party traders (Tesfom and Lutz, 2006).

3.2 Export Marketing Strategy

Several research studies have found that the degree of marketing programme adaptation is influenced by both internal and external factors (Lages, 2000). The internal forces affecting the degree of marketing programme adaptation include (1) firm characteristics and competencies (Leontiades, 1984; Zou and Stan, 1998), (2) management characteristics (Koh, 1991 ; De Luz, 1993), (3) management perceptions and attitudes (Andrus and Norvell, 1990; Cavusgil *et al.,* 1993) and (4) product characteristics (Boddewyn *et al.,* 1986; Huszagh *et al.,* 1986). The degree of marketing adaptation depends externally on (1) the industry (Hite and Fraser, 1988; Seifert and Ford, 1989), (2) foreign market characteristics (Hite and Fraser, 1988; Synodinos *et al.,* 1989), and (3) domestic market characteristics (Hill and Still, 1984; Yip, 1997).

3.3 Export Performance

Export performance can be broadly defined as the result of a firm's actions in export markets (Shoham, 1996) while Cadogan *et al*., (2003) define it as the firm's degree of economic achievement in its export markets. Export performance can be conceptualized and operationalized in many ways (Das, 1994; Diamantopoulos and Schlegelmilch, 1994). Consequently, several research studies have drawn conceptual frameworks with the measures and dimensions of export performance. Financial and non-financial measures are the two principal modes that look at export performance (Zou and Stan, 1998). Financial measures are commonly used at the international level when compared to non-financial measures (Das, 1994; Evangelista, 1994). Leonidou *et al.,* (2002) have identified that export intensity, export sales growth, export profit level, export sales volume, market share and export profit contribution are the mostly used measures of export performance. Export performance of a firm can also be measured by using both subjective and objective measures (Ayse and Akehurst, 2003). Further, both financial and non-financial measures also can be operationalized in both objective and subjective terms (Evangelista, 1994). In this study both financial and non-financial measures are employed with both objective and subjective terms to assess the export performance of the fruit sector in Sri Lanka.

3.4 Export Potential

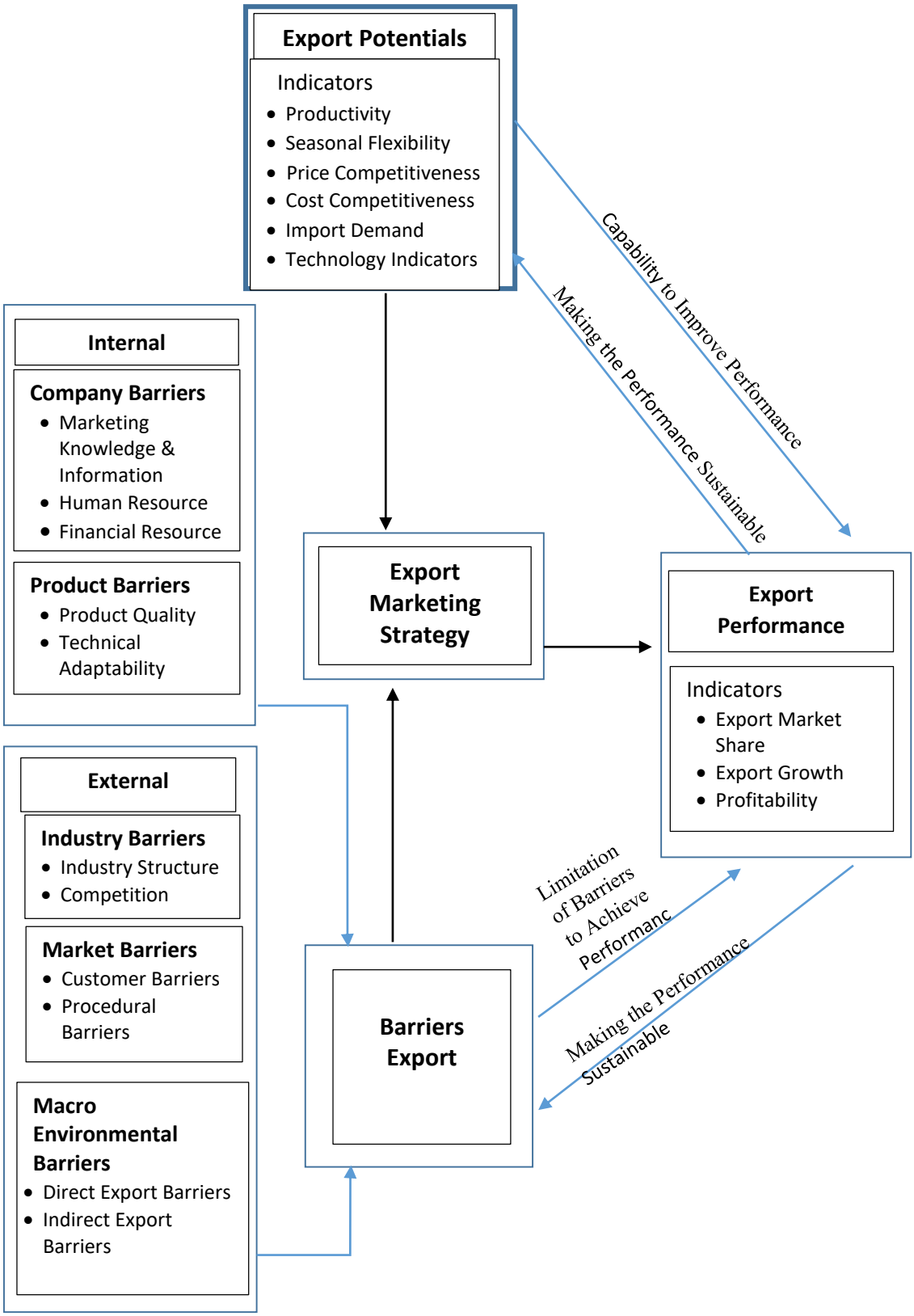
As stated by Thibbotuwawa and Hirimuthugodage (2015), the development of marketing and allied infrastructure, by international trade promotion and branding for primary and value-added products with export potential should be a top priority in agricultural marketing policy in Sri Lanka. Pethiyagoda and Shand (2002), postulate

that the export potential for a product was based on a long run competitive and comparative advantage since long run because risks and costs are high. Therefore, Sri Lankan products must be assessed as having an underlying advantage, preferably over most, if not all, competitors, to exploit export potential.

According to the National Export Strategy of Sri Lanka 2018-2022, export potential analyses were the starting point in the decision-making process. A variety of sectors can be analyzed on the basis of current / past export performance, global import demand including share of a product in total demand, market access conditions (tariffs, distances), percentage of unused potential (per specific markets) and supply capabilities, Revealed comparative advantage, Product space analysis and Stability of export revenue (qualitative). Moreover, there are various approaches to determine export potential. For instance, the Harvard Centre for International Development, Commonwealth Secretariat and International Trade Centre (ITC) have employed statistical techniques to determine the export potential of Sri Lanka's industries. The Centre for International Development focuses on existing trade patterns to explain the ability of a country to move into new industries due to sophistication of existing industries. The Commonwealth Secretariat assesses existing flows and, based on this, looks at extending the flows into new markets or intensifying trade in existing markets. ITC analyses the dynamics of growth and performance of trade, but also market access conditions, and uses a product space approach for moving into new sectors (Ministry of Development Strategies and International Trade, 2018).

Hence, this study focused on growth pattern and the direction of trade of Sri Lankan fruit exports. Compound Growth Rate Analysis and Instability Index were employed. Further, Revealed Comparative Advantage Indices, Comparative Export Performance Index and Weighted Average Score Method were employed to determine export competitiveness and export potentiality of Sri Lankan major fruit exports. Moreover, Gravity Model was utilized to examine the export potential and investigate whether there was any unexploited export potential between Sri Lanka and import partner countries.

The following conceptual framework was designed based on the existing literature and objectives of the study (Figure 3.1). The key determinants of export performance comprise internal and external uncontrollable factors and marketing strategy (Zou and Stan, 1998). Export marketing strategy and performance are dependent on the export performance achieved in the preceding year (Lages, 1999). Therefore, this study hypothesized that the export potential depends on the external and internal factors of the export marketing channel as well as the export performance achieved in the preceding year.



Source: Authors' Work Adopted from Buckley *et al.,* (1988); Tesfom and Lutz (2006)

Figure 3.1: Conceptual Framework

CHAPTER FOUR

Methodology

4.1 Data Collection Methods

4.1.1 Secondary Data Collection

This study was mainly based on secondary data regarding fruit export sector in Sri Lanka. The secondary data was mostly collected from secondary data sources such as data bases at the Department of Customs, Export Development Board, Department of Census and Statistics, Central Bank of Sri Lanka, FAO, CEPII (Centre d'Etudes Prospectives et d'Informations Internationales), World Development Indicators (WDI) and UN Comtrade, publications in the Department of Agriculture and its affiliated institutions. In addition, secondary data was gathered from research reports and journals.

4.1.2 Primary Data Collection

The primary data was collected using different tools such as pre-tested structured questionnaire-based telephone survey, key informant interviews and case studies.

4.1.2.1 Questionnaire Survey

Three questionnaire-based telephone surveys were conducted to collect primary data from farmers, collectors/intermediaries and exporters who are engaged in the fruit export marketing channel in Sri Lanka.

Farmer Survey

The study locations were major export-oriented fruit growing areas as Kurunegala, Gampaha, Anuradhapura, Matale, Puttalam, Kalutara, Hambantota, Polonnaruwa, Moneragala, and Vavuniya. The study locations were identified, and farmers' contact details were gathered in consultation with relevant officials of the Department of Agriculture (DOA), National Plant Quarantine Service (NPQS), Export Development Board (EDB) and Lanka Fruit & Vegetable Producers, Processors & Exporters Association (LFVPPEA). Purposive Sampling Method was employed in sample selection. Contact details of 80 export-oriented fruit farmers were received at the initial stage. However, some did not respond based on various reasons - being out of country, having moved into another income generating activity and selling their products only to the local market. Ultimately the farmer survey covered 70 export-oriented farmers. In parallel, 10 key informant interviews were conducted with farmers who have potential to engage in export market in future.

Collectors Survey

In addition to the farmer survey, another questionnaire survey was conducted with collectors attached to fruit export marketing channel. Purposive sampling method was employed in sample selection due to absence of a reliable database of fruit collectors. The initial sample size was 30 but only 21 collectors responded to our telephone-based questionnaire survey.

Exporters Survey

In parallel, another questionnaire survey was conducted with fresh and processed fruit exporters registered in the Export Development Board. In 2021, 84 fresh and processed fruit exporters were registered in the EDB.

4.1.2.2 Key Informant Interviews

Key informant interviews were conducted with officials in the Export Development Board (EDB), Fruit Research and Development Institute (FRDI), Department of Agriculture (DOA), and Lanka Fruit & Vegetable Producers, Processors & Exporters Association (LFVPPEA).

1. Assistant Director - Fruit and Vegetable Export – EDB
2. President - LFVPPEA
3. Director – FRDI

4.1.2.3 Case Study Method

Five case studies were conducted with selected leading fruit exporters, processors and export-oriented farmers in Sri Lanka.

4.2 Data Analysis and Analytical Techniques

4.2.1 Objective 1:
To Examine the Characteristics and Structure of the Fruit Export Sector.

Data was collected on the fruit export sector in Sri Lanka such as export market channel and actors, export market structure for fresh and processed fruits, exportable fruits varieties and related institutes and their functions. Descriptive analysis was performed.

4.2.2 Objective 2:
To Assess the Export Competitiveness of Sri Lankan Major Fruits in Global and Asian Region.

In order to estimate and analyze the competitiveness of major fruit exports of Sri Lanka, Revealed Comparative Advantage (RCA) Indices and Comparative Export Performance Index (CEP) methods were employed.

Revealed Comparative Advantage (RCA) Indices

To examine the dynamics of comparative advantage of Sri Lankan major fruits in global scenario, the Revealed Comparative Advantage Method was employed. According to Ricardian Trade Theory, comparative advantage determines the pattern of trade (Ahmad *et al.,* 2021).

Balassa (1965) derived an index named Balassa Index, that measures a country's comparative advantage. The Balassa Index tries to identify whether a country has a "revealed" comparative advantage rather than to determine the underlying sources of comparative advantage. However, since first suggested, the concept of RCA has been a focus of many trade studies and various extensions (Ahmad *et al.,* 2021). Some studies measure RCA at the global level (Vollrath, 1991; Hettiarachchi, 2018; Ahmad *et al.,* 2021), others at a sub-global / regional level and while some others evaluate the measurement as bilateral trade between two countries or trading partners (Dimelis and Gatsios, 1995; Batra and Khan, 2005). In this study, standard Balassa's Index and its various modified measures were applied to major Sri Lankan fruits *viz;* banana, pineapple, mangoes (mango/mangosteen/guava), papaya, avocado and lime for the period 2010-2020.

Standard Balassa's RCA Index is as follows,

(1) $$RCA_{ij} = \frac{\frac{Xij}{\sum_i Xij}}{\frac{\sum_j Xij}{\sum i \sum_j Xij}}$$

Where, X_{ij} represents country *i*' s export of product *j*.

This is a widely accepted and later modified measure of RCA in the literature. It is also expressed as follows:

(2) RCAij = (Xij / Xi) / (Xwj / Xw) = (Xij / Xwj) / (Xi / Xw)

Where, *i* stands for Sri Lanka, *j* for selected fruit and *w* for world. *RCAij* represents the revealed comparative advantage of Sri Lanka for j^{th} fruit in equation (2) whereas Xij and Xi represent the exports of selected 'j' fruit and total merchandise exports of Sri Lanka respectively. Total World exports of individual, 'j' fruit and world's total merchandise exports are denoted by Xwj and Xw respectively in equation (2). A value of RCA > 1 indicates the existence of revealed comparative advantage that is a sector in which the country is relatively more specialized while a value of RCA < 1 reveals comparative disadvantage that is the sector in which country is less specialized.

(3) RSCA = (B-1) / (B+1)

Where B is original Balassa's revealed comparative advantage index and values of RSCA range in +1 and -1 with zero as neutral point with respect to comparative advantage.

Yu *et al.,* (2009) introduced and calculated normalized revealed comparative advantage (NRCA) index as the degree of deviation of a country's actual exports from its comparative-advantage-neutral level in terms of its relative scale with respect to the world exports market (Ahmad *et al.,* 2021).

(4) NRCAij = (Xij/Xj) – (XiXj/XwXw)

Where *Xij* is the export of *j* fruit in Sri Lanka, *Xj* indicates total world exports of fruit *j*; *Xi* stands for total exports of Sri Lanka and *Xw* represents total world exports. The value of NRCAij > 0 represent comparative advantage while NRCAij < 0 shows comparative disadvantage. Moreover, as stated by Hassan and Ahmad, (2018) higher values of NRCA reveals stronger comparative advantage and vice versa. The results of NRCA are more precisely and coherently than RCA (Yu *et al.,* 2009).

In this study, RCA, RSCA and NRCA methods were selected to measure the comparative advantage of selected Sri Lanka's fruits.

Comparative Export Performance (CEP)

To assess export competitiveness of Sri Lankan major fruits in Asian Region, the Index of Comparative Export Performance Method was employed. For example, if two countries are compared directly, the index of comparative export performance (CEP) can be used. It is based on export shares which allows comparison of findings between two indices. The formula used to measure the CEP index is presented by (Bobirca and Miclaus, 2011):

CEP = (Xia/Xa)/(Xib/Xb)

where CEP represents the comparative export advantage of country a against country b. If index value is greater than 1, country a has a competitive advantage against country b.

4.2.3 Objective 3:
To Analyze the Growth Pattern and Direction of Trade of Major Sri Lankan Fruit Exports.

In order to estimate the growth pattern and direction of trade in fruit exports, Compound Growth Rate Analysis and Instability Index were employed.

Compound Growth Rate Analysis

The compound growth function was used to analyze the trend and growth pattern in exports of selected fruits. The growth rates of export quantities, values and unit values for selected fresh and processed fruits arrived by using the compound growth function of the form (Bhowmick and Ahmed, 1993). The secondary data was solely used in achieving the above. The secondary data pertaining to export quantity (Kg)

and value (LKR) for selected fruits for the period 2010-2020 was collected from data bases at the Department of Customs Sri Lanka.

(1) $Y = ab^t e_t$

Where, Y = Dependent variable for which growth rate is to be estimated (Quantity exported/ total export earnings / unit value)

a = Intercept

b = Regression Coefficient = (1+g), where g is the compound growth rate

t = Time variable (Years which takes values, 1,2…n)

e_t = error term

The equation (1) was estimated after transforming it to logarithmic form as follows:

(2) Log Y = log a + t log b + log e_t

The percent compound growth rate (g) was computed using the following relationship

(3) g = (antilog of b-1) x 100

The standard error of the growth rate was estimated and tested for its significance with 't' statistics.

Instability Index

Co- efficient of variation (CV) was used to measure the magnitude of instability in export of fresh and processed fruits from Sri Lanka to different countries. In general, the coefficient of variation measures the amount of variation of the response variable.

The index is as follows;

(4) CV = (Standard deviation/Mean) *100

4.2.4 Objective 4:
To Identify the Potentials and Challenges of Fruit Export Sector.

Weighted Average Score Analysis and Gravity Model Estimation were employed in identification of potentials regarding fruit export sector while Descriptive Analysis was used to analyze the barriers and challenges.

Weighted Average Score Analysis

Firstly, researchers used a quantitative matrix for ranking various fruits based on five major parameters: production, cultivated extent, potential for processing, export value and export volume. Major fruit exports: banana, pineapple, mango, papaya, avocado and lemons were considered. The fruit crops were screened and prioritized based on a Weighted Average Score Analysis. The process involved calculation of score of each crop for each selected parameter. The score (X_{11}, X_{12}, ... X_{15}) for each

of the parameter across the crops was individually calculated based on ranking of the selected crops. Also, each parameter was assigned a weight for arriving at a Final Score (X_{11} * weight) for each crop. The weightage for each parameter was assigned.

The weightage to each parameter is given on the basis of their socio-economic importance and key informants understanding of the fruit export sector in Sri Lanka. In terms of weightage of each parameter, more weightage is given to parameters which highlight the export potential of the fruits considered. Therefore, 70 percent weightage is given to parameters such as potential for processing, export value and quantity. Since exports is a function of production and land extent, 30 percent is given to these two parameters. Moreover, each indicator has been given equal weightage except for the indicators highlighting the production parameter since the overall contribution of a crop to total production is basically a function of its individual weight. Therefore, more weightage is given to CAGR of production.

The rank of each crop for each of the parameter was multiplied with the respective weight of the parameter for arriving at the Final Score for a crop. The sum of all Final Scores across all parameters provided the Overall Score for a fruit crop. The scores were calculated on ranking basis, therefore the lower the score the higher the potential of the crop. An illustration for the same is given below.

Key parameters and indicators identified are listed below:

Table 4.1: Key Parameters and Indicators

Screening Parameters	Indicators
Production	• Percentage contribution to county's total fruit production • Growth rate of production (CAGR)
Land Extent	• Estimated land under cultivation (ha) • Growth rate of area of cultivation (CAGR)
Potential for Processing	• Percentage contribution to total export value of processed fruit products • Growth rate of export value of processed products (CAGR)
Export Value	• Percentage contribution to total export value • Growth rate of export value (CAGR)
Export Volume	• Percentage contribution to total export volume • Growth rate of export volume (CAGR)

Note: CAGR = Compound Annual Growth Rate
Source: Authors' data adopted from ADB, Technical Assistance Consultant's Report (2017). pp.33-34.

Table 4.2: Scoring of Each Commodity based on Comparison and Ranking

Crop	Rank of Crop for Indicator 1	Rank of Crop for Indicator 2	Weightage for Indicator 1	Weightage for Indicator 2	Score for Parameter
Crop 1	X_{11}	X_{21}	W_1	Z_2	$(X_{11}*W_1)+(X_{21}*Z_2)= P_{11}$
Crop 2	X_{12}	X_{22}	W_1	Z_2	$(X_{12}*W_1)+(X_{22}*Z_2)= P_{12}$
Crop 3	X_{13}	X_{23}	W_1	Z_2	$(X_{13}*W_1)+(X_{23}*Z_2)= P_{13}$
Crop 4	X_{14}	X_{24}	W_1	Z_2	$(X_{14}*W_1)+(X_{24}*Z_2)= P_{14}$
Crop 5	X_{15}	X_{25}	W_1	Z_2	$(X_{15}*W_1)+(X_{25}*Z_2)= P_{15}$

Crop	Score of Parameter 1	Score of Parameter 2	Weightage for Parameter 1	Weightage for Parameter 2	Overall Score
Crop 1	P_{11}	P_{21}	A_1	B_2	$(P_{11}*A_1)+(P_{21}*B_2)= O_1$
Crop 2	P_{12}	P_{22}	A_1	B_2	$(P_{12}*A_1)+(P_{22}*B_2)= O_2$
Crop 3	P_{13}	P_{23}	A_1	B_2	$(P_{13}*A_1)+(P_{23}*B_2)= O_3$
Crop 4	P_{14}	P_{24}	A_1	B_2	$(P_{14}*A_1)+(P_{24}*B_2)= O_4$
Crop 5	P_{15}	P_{25}	A_1	B_2	$(P_{15}*A_1)+(P_{25}*B_2)= O_5$

Gravity Model Estimation

In the present study augmented gravity model was employed to analyze the export efficiency of Sri Lanka and its fruit export potential. Major fresh and processed fruit exports: banana, pineapple, mangoes, papaw, avocado, and lemon were taken into account. The major importing countries were selected for the sample on the basis of Sri Lanka's fruit export value as well as the data availability. Fruit exports with 19 major destinations in terms of the export value from year 2010 to 2020 can be modelled as:

$$\log(Xijt) = \beta_0 + \beta_1\log(GDPit) + \beta_2\log(GDPjt) + \beta_3\log(POPit) + \beta_4\log(POPjt) + \beta_5\log(PCGDPDijt) + \beta_6\log(DISTij) + \beta_7\log(REERjt) + \beta_9(COLij) + \beta_{10(}TAijt)$$

Where;

Xijt = Value of exports from Sri Lanka to country *j* in year *t*,
GDPit (GDPjt) = Sri Lanka's GDP (country *j*'s GDP) in year *t*,
POPit (POPjt) = Sri Lanka's population (country *j*'s population) in year *t*,
PCGDPDijt = Absolute value of per capita differential of Sri Lanka and country *j* in year *t*,
DISTij = Distance between Sri Lanka and country *j*,
REERijt = Bilateral Real Exchange Rate between Sri Lanka and country *j*,
COLij = Colonial link or relationship of Sri Lanka with country j (dummy variable),
TAijt = Trade agreements of Sri Lanka with country *j* in year *t* (dummy variable)

Estimation was done using the Stochastic Frontier Approach (SFA). Further, the ratio of Actual export (A) and export Potential (P) was obtained by the model. Then, (A/P) was calculated to analyze export potential of Sri Lankan fruit exports. Sri Lanka has exported potential with countries whose values of (A/P) are less than one (Rahman, 2010). The value of [1- (A/P)] is the unused export potential.

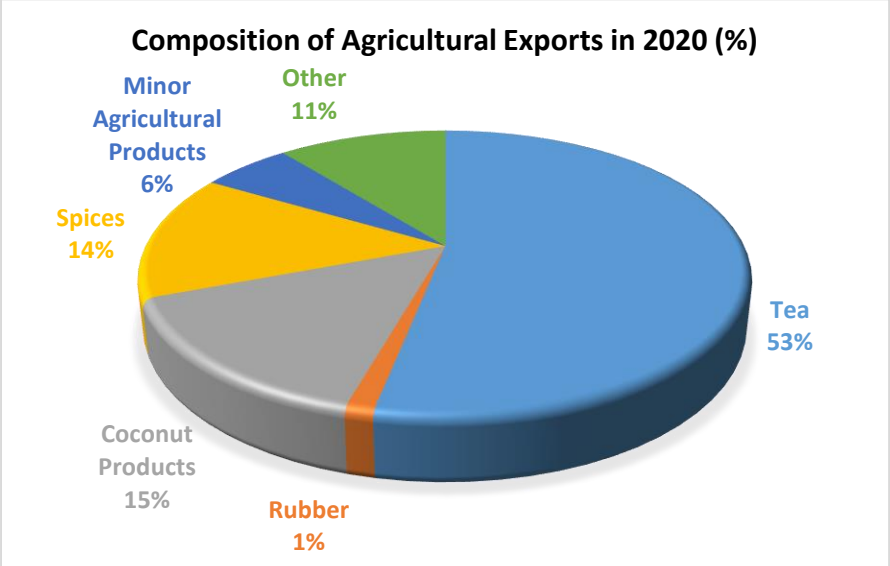
CHAPTER FIVE

Characteristics and Structure of the Sri Lankan Fruit Export Sector

This chapter demonstrates the changing pattern of fruit export share, total fruit export trend during the previous decade, fresh and processed fruit export trends, and market structure for fresh and processed fruit exports. Further, it discusses the government policy and support available in the sector as well as related institutes and their functions.

5.1 Composition of Agricultural Exports in Sri Lanka

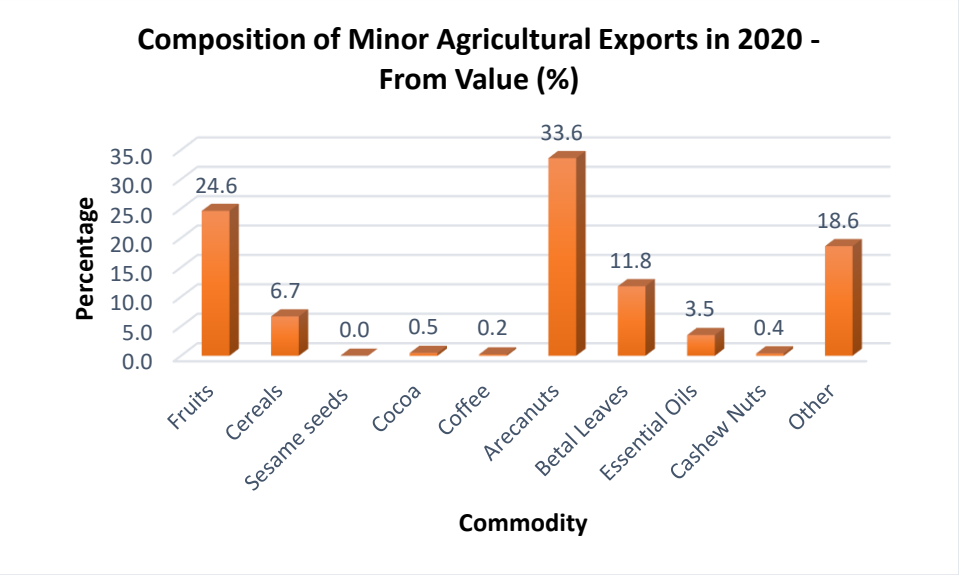
The plantation sector (tea, rubber, and coconut) contributed to about 69 percent of the value of total agricultural exports in 2020. Tea is the most significant export commodity. Over half of the agricultural export earnings are from tea (Figure 5.1). Minor agricultural products constitute six percent of the export earnings out of the total agricultural exports in 2020.



Source: Central Bank Annual Report, Sri Lanka (2020)

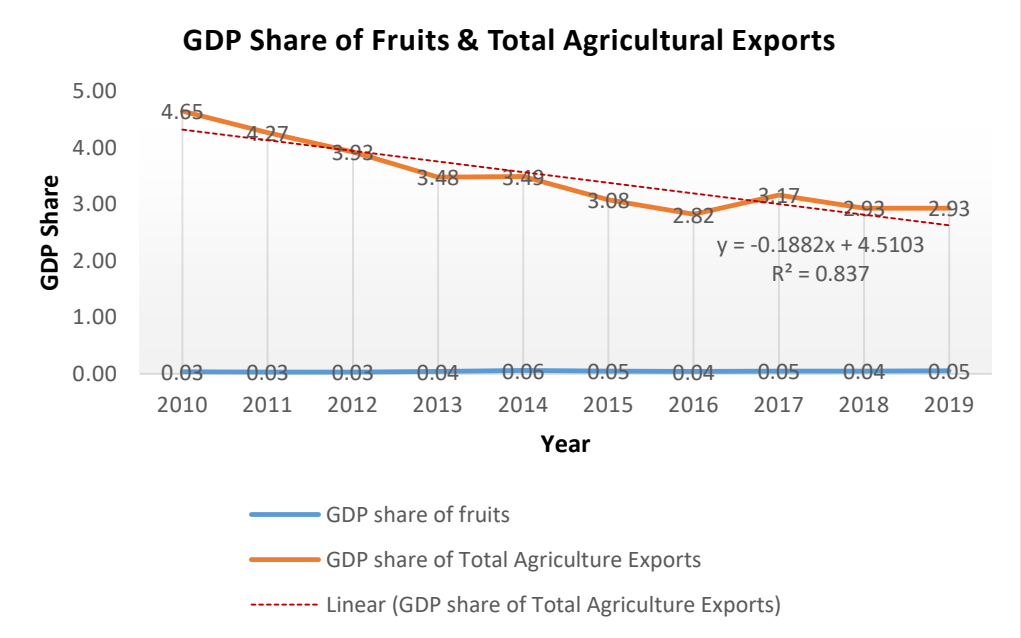
Figure 5.1: Composition of Agricultural Exports in 2020

Minor agricultural exports consist of arecanuts, fruits, cereals, sesame seeds, cocoa, coffee, betel leaves, essential oils, cashew nuts and others. Arecanuts (33.6 %) forms the largest category of minor agricultural exports. As depicted in Figure 5.2, fruit exports contributed to around 25 percent of the value of total minor agricultural exports.



Source: Central Bank Annual Report, Sri Lanka (2020)

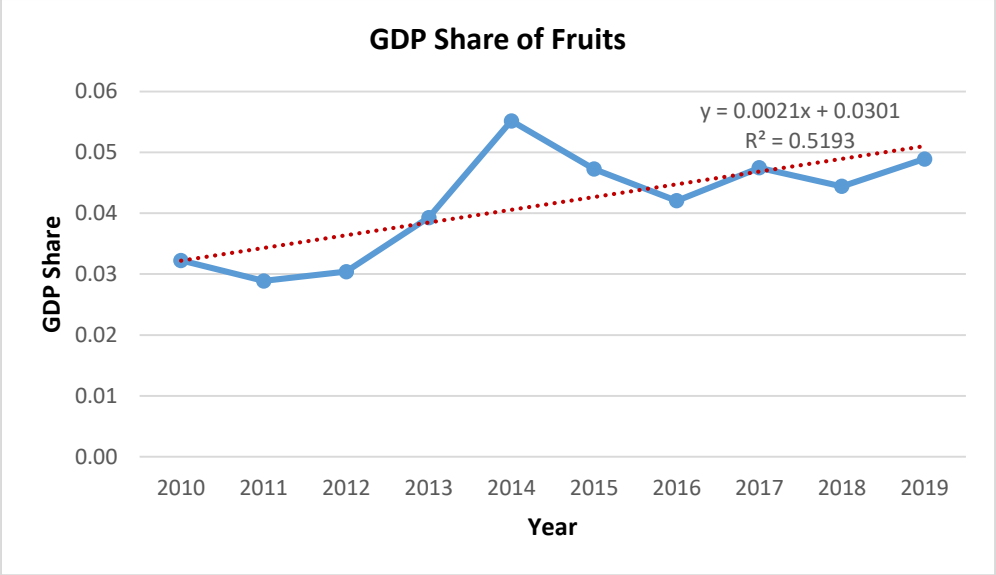
Figure 5.2: Composition of Minor Agricultural Exports in 2020



Source: Central Bank Annual Report, Sri Lanka, Multiple Years

Figure 5.3: GDP Share of Fruit Exports and Total Agricultural Exports (2010-2019)

Figure 5.3 presents the Gross Domestic Product (GDP) share of fruit exports and total agricultural exports from 2010-2019. GDP share of total agricultural exports shows a negative trend over the past decade with fluctuations. In contrast, GDP share of fruits shows a positive trend in the last ten years with fluctuations (Figure 5.4).

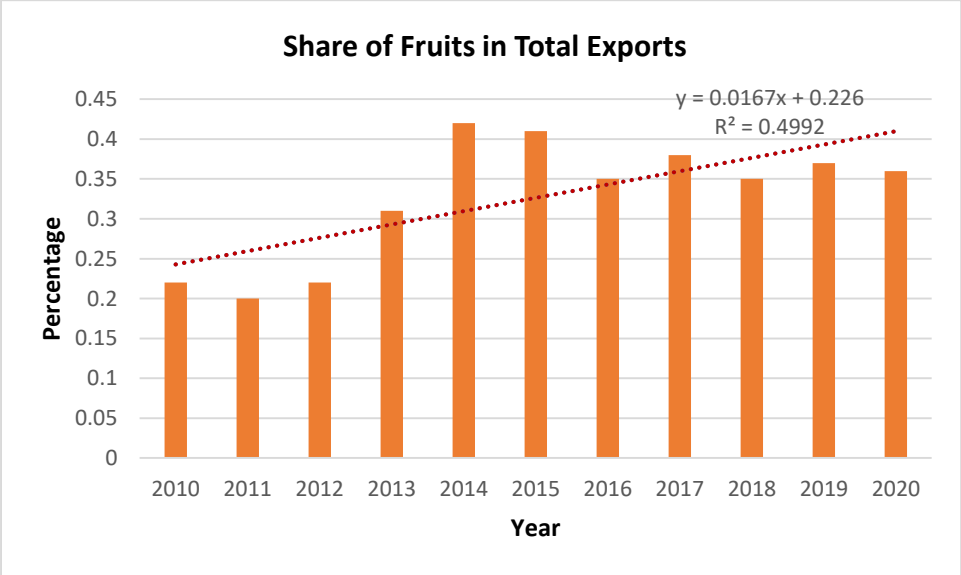


Source: Central Bank Annual Reports, Sri Lanka, Various Years

Figure 5.4: GDP Share of Fruit Exports (2010-2019)

5.2 Changing Patterns of Fruit Export Share

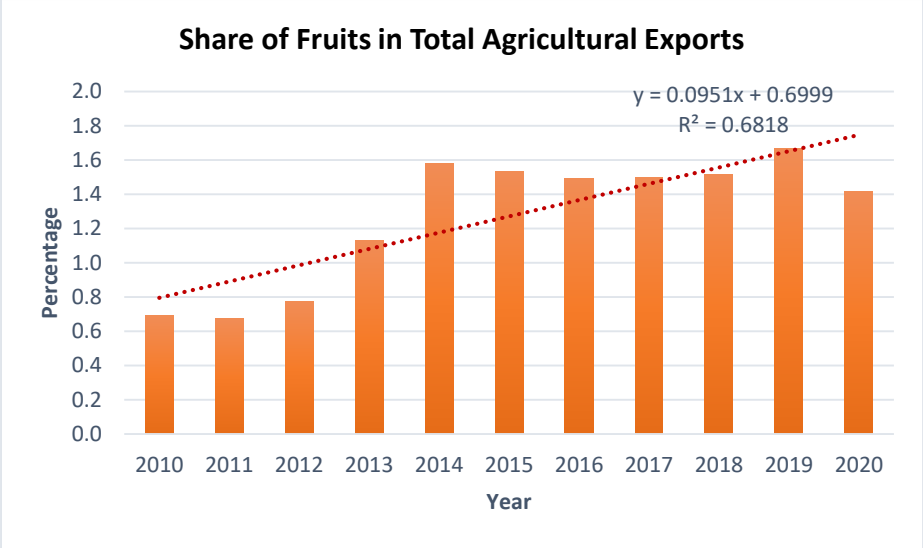
Fruit contribution to total merchandise exports and total agricultural exports over the last eleven years (2010-2020) is depicted in Figure 5.5 and Figure 5.6 respectively.



Source: Export Development Board, Sri Lanka (2021)

Figure 5.5: Fruit Sector Contribution to Export Earnings in Sri Lanka (2010-2020)

The share of fruits in total merchandise exports is on an upward trend (Figure 5.5). The highest value of percentage share was recorded in 2014 (0.42 %). The fruits exports accounted for 0.36 percent of the country's total merchandise exports in year 2020.

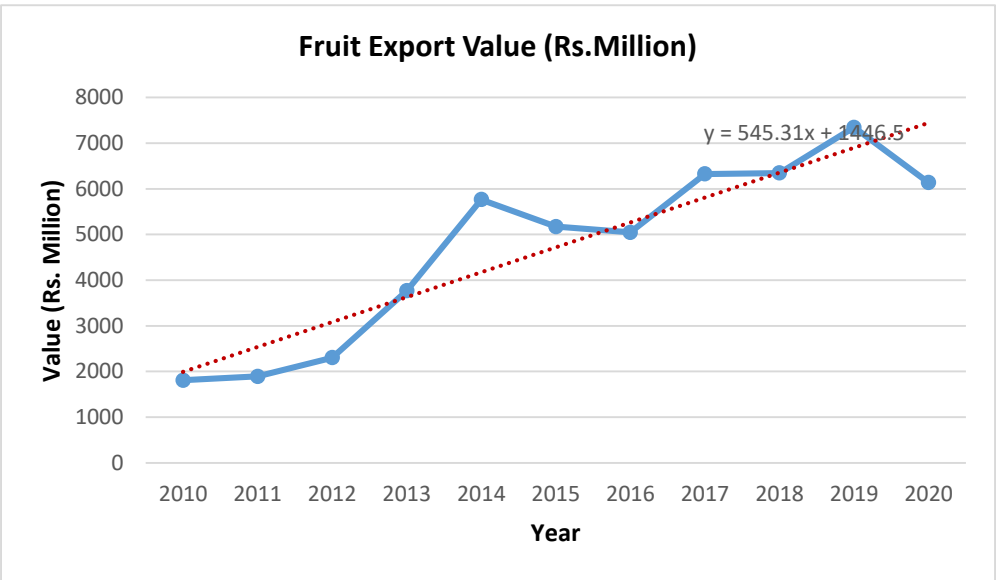


Source: Central Bank Annual Report, Sri Lanka, Multiple Issues

Figure 5.6: Contribution of Fruit Sector to Total Agricultural Exports 2010-2020

Contribution of fruit to total agricultural exports has been increasing over the years. Through the period (2010 to 2020) the largest share was recorded in 2019 and it was 1.7 percent. The fruits exports account for about 1.4 percent of the total agricultural exports of the country in 2020 (Figure 5.6).

5.3 Total Fruit Export Trend in Previous Decade

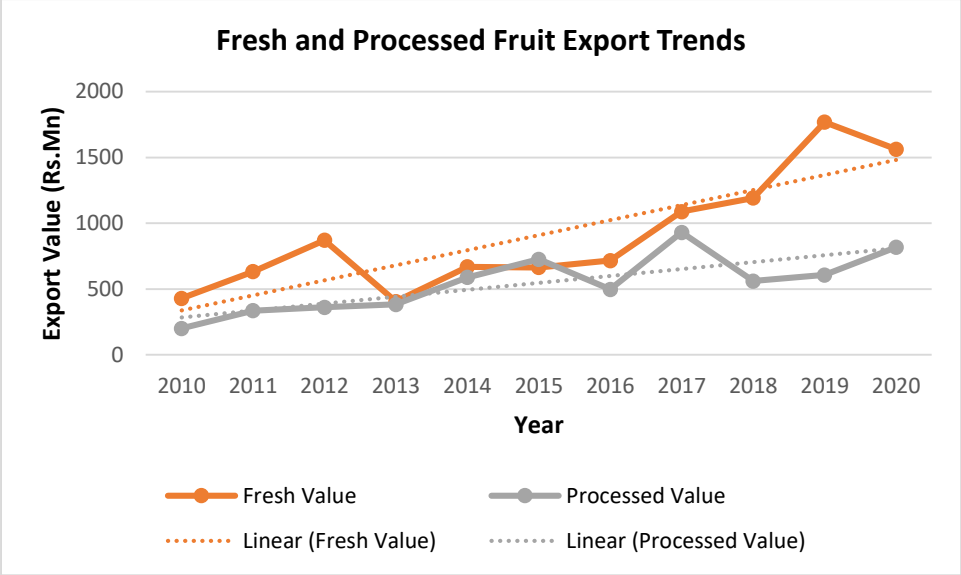


Source: Authors' Compilation based on Central Bank Annual Report, Multiple Issues

Figure 5.7: Fruit Export Value (2010-2020)

According to the Figure 5.7, except for the years 2015, 2016 and 2020 in terms of value an upward trend for Sri Lankan fruit exports is seen. However, the highest value of exports was reported in the year 2019.

5.4 Fresh and Processed Fruit Export Trends (2010-2020)



Note: Fruits included in the Figure 5.8 are Banana, Pineapple, Papaya, Mango, Guava, Mangosteen, Avocado, and Lemon.
Source: Authors' Compilation based on Customs Data, Sri Lanka (2021)

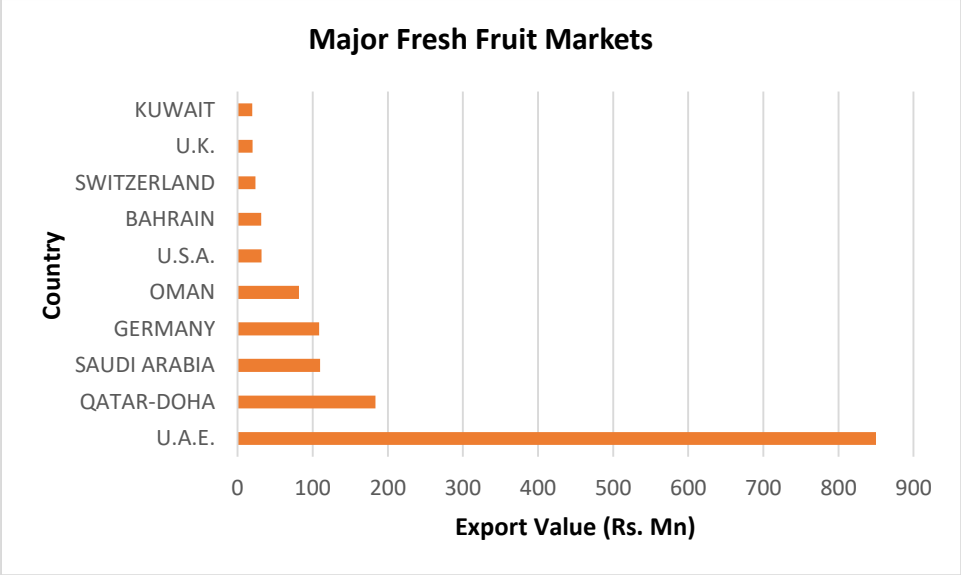
Figure 5.8: Fresh and Processed Fruit Export Value (2010-2020)

As shown in Figure 5.8, except for 2013, 2015 and 2020, in terms of value an increasing trend in fresh fruit exports is observed. The highest fresh fruit export value was recorded in 2019 while the lowest in 2013. As per Figure 5.8, except for 2016 and 2018, in terms of value an upward trend for processed fruit exports is seen. Further, the highest value of processed fruit exports was recorded in 2017.

5.5 Market Structure for Fresh and Processed Fruits

5.5.1 Major Fresh Fruit Markets in 2020

The United Arab Emirates, Qatar-Doha, Saudi Arabia, Germany, Oman, the United States, Bahrain, Switzerland, U.K and Kuwait are Sri Lanka's major fresh fruit exporting countries in 2020 (Figure 5.9). Sri Lankan fresh fruit exports to UAE recorded the highest value in 2020, which was Rs. 849.91 million.

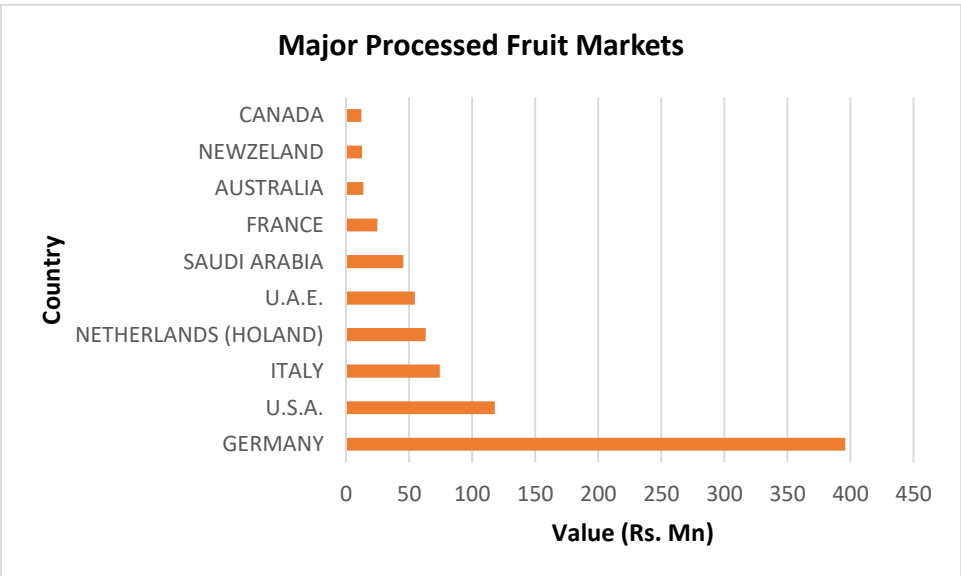


Note: Fruits considered in this analysis are banana, pineapple, mango, papaya, avocado and lemon
Source: Authors' Calculation based on Customs Data, Sri Lanka (2021)

Figure 5.9: Major Markets for Fresh Fruits Exports

5.5.2 Major Processed Fruit Markets in 2020

Germany, U.S.A., Italy, Netherlands, U.A.E., Saudi Arabia, France, Australia, New Zealand and Canada are the major processed fruit importing countries from Sri Lanka in 2020 (Figure 5.10). Sri Lankan processed fruit exports to Germany recorded the highest value (Rs.395.75 million) in 2020.



Note: Fruits considered in this analysis are banana, pineapple, mango, papaya, avocado and lemon
Source: Authors' Calculation based on Customs Data, Sri Lanka (2021)

Figure 5.10: Major Markets for Processed Fruit Exports

5.6 Government Policy and Support Available in the Sector

The Ministry and the Department of Agriculture have introduced a wide range of assistance and development programmes to enhance the fruit sector for many years (Export Development Board, 2019; Department of Agriculture, 2019). Further, the government has initiated a numerous support programmes for integrated farming targeting a group of farmers who perform contract farming and this scheme offers cash subsidies/grants to the beneficiaries (Export Development Board,2019).

In 2018, the National Export Strategy (NES) of Sri Lanka was developed under the guidance of the Ministry of Development Strategies and International Trade and the Sri Lanka Export Development Board (EDB), with financial support from the European Union project. The NES acts as a timely catalyst to reshape the export sector in Sri Lanka. It defines a detailed roadmap for faster export growth and acknowledges a need for a work plan to increase the contribution of trade to country's economic development. The NES was developed in consensus with the entire export community about the upcoming tasks and removing barriers that block smooth progression (Ministry of Development Strategies and International Trade, 2018).

5.7 Related Major Institutes and Their Functions

Fresh and processed fruit exports constitute an important sub-sector of the Sri Lankan economy, with support from government, semi-government and private institutions. The public sector institutions such as the Export Development Board, the Fruit Research and Development Institute, the Department of Agriculture, the Ministry of Agriculture, Industrial Technology Institute (ITI) and National Institute of Post-Harvest Management (NIPHM) play a vital role. Further, there are premier quality institutions like the Sri Lanka Standards Institution (SLSI) and SGS Lanka Pvt Ltd. Among well-established private sector associations, the Lanka Fruit and Vegetable Producers, Processors and Exporters Association (LFVPPEA) contribute significantly to the advancement of the fruit export industry.

Therefore, this section will examine the most relevant public, semi-government and private organizations related to the industry and their main objectives, activities/functions, and relationships with stakeholders.

5.7.1 Export Development Board (EDB)

Export Development Board (EDB) is Sri Lanka's apex organization for the development and promotion of exports, established in 1979 under the Sri Lanka Export Development Act No. 40, under the influence and guidance of the International Trade Center (ITC) and the United Nations Conference on Development of Trade & Tariffs (UNCTAD). There are several divisions coming under the EDB such as Market Development Division, Export Agriculture Division, Industrial Products Division, Export Services Division, Regional Development Division, Trade Facilitation and Trade Information Division and Policy and Strategic Planning Divisions.

Stakeholders of EDB include farmers, processors, exporters, government and private institutes as well as international buyers and associations.

The EDB has initiated a number of programmes to assist export-oriented agriculture projects at regional level. The programme includes varied awareness programmes - horticultural crops, soil testing, crop selection, crop protection, poly house and post-harvest technologies including pack houses and quality certifications, Interrelated Agriculture Projects and Good Manufacturing Practice (GMP) centers (Export Development Board, 2019).

The EDB conducts training programmes and certificate courses for exporters and potential exporters on international trade. Further, this institute provides export marketing support for the enhancement of the Sri Lankan export industry through market research, advisory services, market intelligence, trade promotion, inward and outward buying and selling missions, and auxiliary services.

EDB has maintained the online and offline version of Sri Lanka Exporters Directory as a database of Sri Lankan export product and service suppliers and providers. It provides Sri Lankan exporters a direct path to the global markets and buyers.

5.7.2 Fruit Research and Development Institute (FRDI)

Fruit Crop Research and Development Institute (FRDI) was first established as a Fruit Crop Research and Development Centre on 6th October 2001 at the DOA farm at Kananwila with the mandate of Development and dissemination of appropriate technologies to increase commercial fruit production in the country and improve the living standard of farmers. The main objectives of FRDI are: 1. to make available improved fruit varieties with farmer acceptance 2. to make available associated technologies for high productivity and profitability 3. to make available eco-friendly plant protection technologies 4. to minimize post-harvest losses and enhance value addition and 5. to assure availability of quality seeds and planning materials for stakeholders 6. to popularize and aware stakeholders on fruit crop related technologies.

There are nine divisions coming under FRDI such as Agronomy Division, Soil Science Division, Biotechnology Division, Pathology Division, Entomology Division, Plant Breeding Division, Socio economic Division, Farm Division and Training Division.

Export Related Activities

Increased availability of quality produce for both local and export market is one of the goals of this institute therefore they introduce potential exportable varieties from time to time (Annex 03). Further, they conduct several programmes to promote commercial fruit cultivation in Sri Lanka. For instance, expansion of Cavendish Banana cultivation in three districts was initiated with the aim of establishment of commercial banana cultivation by providing planting materials free of charge and provision of inputs such as sprinkler irrigation systems at 50 percent farmers'

contribution. A total of 150 acres with Cavendish Banana was established (DOA, 2019). About 70 tons were exported from 220 tons of banana that were harvested. Action has been taken by FRDI to expand this programme.

5.7.3 Industrial Technology Institute (ITI)

Industrial Technology Institute (ITI) is a pioneer Scientific Research and Development Organization in Sri Lanka, successor to Ceylon Institute of Scientific and Industrial Research (CISIR) which was established in 1955. There are several divisions coming under ITI such as technical services, research and development, information service center and quality assurance department.

ITI's Contribution to Fruit Export Sector

Food Technology Section attached to research and development division conducts training and workshops on key areas on request by food Industry and other stakeholders. Training and workshops related to fresh and processed fruit export sector were included here.

Postharvest Technology

- Pre and Postharvest quality managements of fruits and vegetables
- Postharvest handling of fresh produces intended for super markets / exports
- Pack house management for better quality and safe produce
- Postharvest treatments to extend the storage life of fruits
- Proper packaging and transportation for high quality produce
- Minimal processing / fresh cut technology of fruits and vegetables
- Safe fruit ripening technology

Fruit and Vegetable Processing Technology

- Fruit and vegetable dehydration technology /fruit and vegetable powders
- Osmotically dehydration technology and high sugar preservation
- Ready to serve drinks / cordials from fruits and vegetables
- Fruit purees / pulps /concentrates technology
- Pickling / sauces /brining technology of perishables

Food Microbiology

- Training on Good Manufacturing Practices (GMP) for food industry
- Microbiological tools for food industries
- Probiotic and prebiotics in food industry

Other training and workshops offered by the Food Technology Section

- Food Canning and bottling technology
- Food safety management in food industry
- Non-thermal processing technology for fruits and vegetables
- Shelf life evaluation of food - real time method
- Food safety and quality management
- Food machinery and unit operations
- Food packaging and labeling

5.7.4 National Institute of Post-Harvest Management (NIPHM)

The National Institute of Post-Harvest Management (NIPHM) functions as the main institution in Sri Lanka engaged in improving the post-harvest technology of rice, other grains, field crops, fruits, vegetables and spices. The institute carried out post-harvest research, training, extension, consultancy, advisory and other development activities.

Fruit Processing Industry Related Activities

Training programme on banana dehydration and value addition was conducted for small and medium scale entrepreneurs. This training covered key areas such as banana dehydration, how to make banana flour, production of bakery products from banana flour and production of banana chips and snacks. NIPHM also conducts training on production of jams, jelly and other products from banana as value additions.

NIPHM is actively engaging in proper technology transfer activities to the Sri Lankan agriculture sector. Through this, many of new small and medium scale entrepreneurs were established island wide and a number of agro-based industries have been developed to produce quality products to their customers. Therefore, this institute further planned to commercialize the technologies as processed fruit and vegetable based products, cereal based products and bio wax.

5.7.5 Sri Lanka Standards Institute (SLSI)

Sri Lanka Standards Institution (SLSI) is the National Standards Body of Sri Lanka, established under the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functioned under the name of Bureau of Ceylon Standards until the Act was repealed and replaced by the Sri Lanka Standards Institution Act No. 6 of 1984. It now functions under the Ministry of Science, Technology and Research and is governed by a Council appointed by the Minister in terms of the above Act. Stakeholders of SLSI include the Government, local and foreign organizations registered with SLSI, scientific institutions, and consumers. Functions of SLSI include: formulation/revision/ amendments of national standards, product certification, system certification (ISO 9001, ISO 22000, HACCP, GMP, ISO 14001, OHSAS 18001 and SA 8000), laboratory testing services, industrial metrology and instrument calibration services, inspection of imports, quality assurance of exports, training on standardization and quality management, providing information service and acting as the national enquiry point on WTO/ TBT.

5.7.6 Lanka Fruit and Vegetable Producers, Processors and Exporters Association (LFVPPEA)

The Lanka Fruit & Vegetable Producers, Processors and Exporters Association (LFVPPEA) was established in 1986 with the aim of creating a single platform for all stakeholders involved in the export supply chain of both fresh and processed fruits

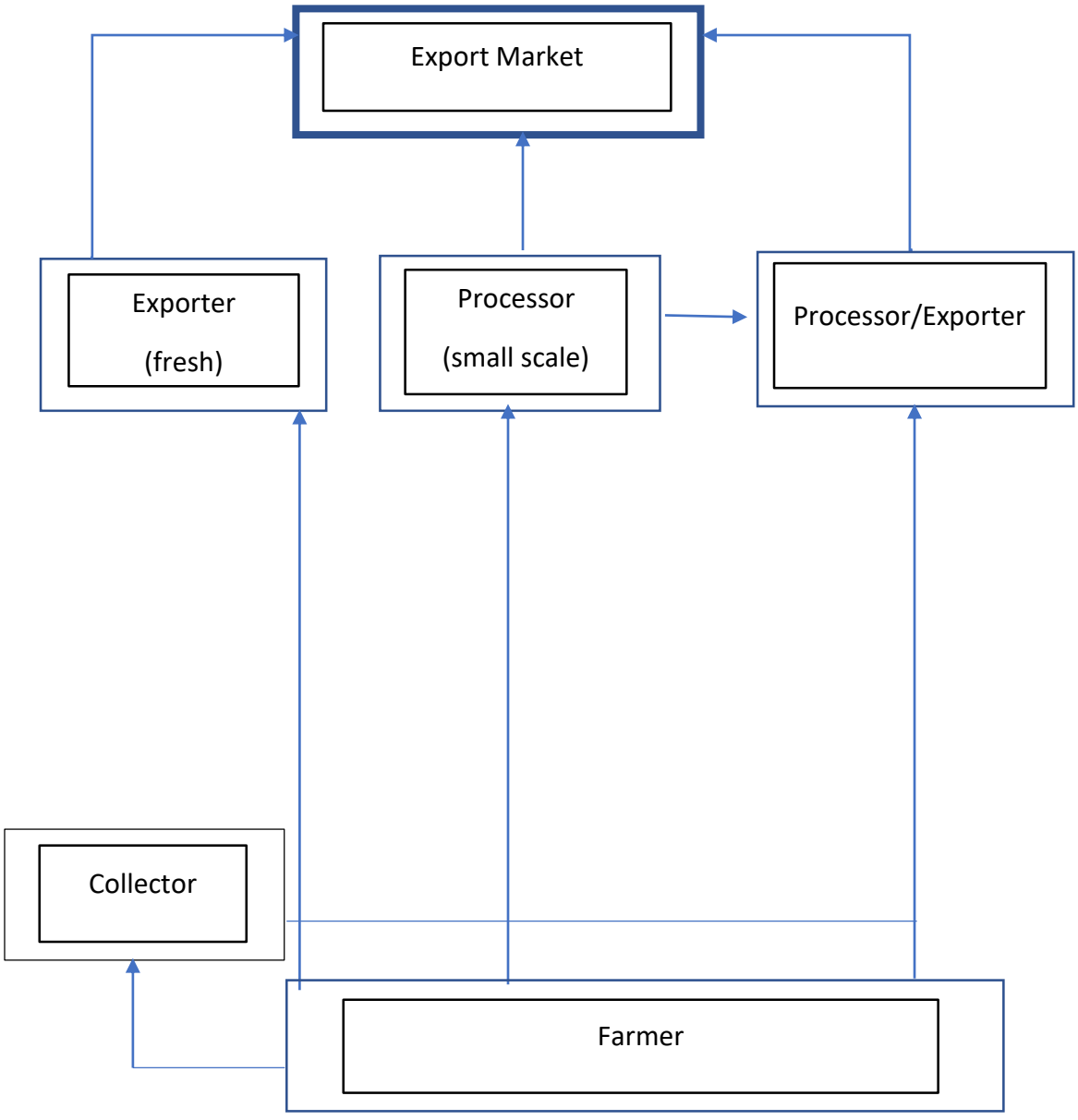
and vegetables in Sri Lanka. At present 54 members are registered in the LFVPPEA. Their mission is: 1. to increase production of crops with high export potential through improved agricultural productivity 2. to reduce post-harvest losses 3. to improve quality and safety of available production 4. to provide linkages between producers and buyers and 5. to facilitate imports/ export and improve the ease of doing business. Over the successive 36 years of its existence, the LFVPPEA has functioned as a bridge between its members and other stakeholders including growers, government ministries, departments, statutory authorities, commercial organizations and international buyers by facilitating communication and sharing information. Further, LFVPPEA as a premier association in fruit and vegetable sector, it influences and advocates for a favourable national and international business environment, policies, tariffs and trade agreements on behalf of its members and the horticulture industry in Sri Lanka.

CHAPTER SIX

Socio Economic Profile of the Fruit Export Market Channel Actors

6.1 Marketing Channels of Major Fruit Exports in Sri Lanka

Marketing channel of fruit exports given in Figure 6.1 is very similar to marketing channels of many other export agriculture crops. Varied marketing channel actors such as farmers, collectors, exporters (Fresh fruits), processors (small scale) and exporters (Processed fruits) are present.



Source: Authors' Compilation based on HARTI Survey Data, 2021

Figure 6.1: Marketing Channel of Major Fresh and Processed Fruit Exports

Mostly, the farmer harvests the produce by himself at the farm. He occasionally sells his fruit to a collector who visits the farm or takes the produce to the collector's location. A farmer may also deliver his fruits directly to a wholesale market or a retail store. Finally, farmers sell their products directly to fresh fruit exporters and small-scale fruit processing companies.

The collector gathers fresh produce at the farm gate or gets delivered to him by the farmer (Rupasena, 1999 cited in Dissanayake, 2012). However, especially with fruits like mango, mangosteen and rambutan, the collector may harvest the fruit rather than the producer. In this instance, the collector typically bids a fee for the entire tree. Further, collectors also sell their fruits to small scale fruit processing companies and exporters.

Moreover, the export market prefers to operate in a separate chain with identified producers to ensure consistent supply and quality. A separate collector gathers the produce and takes it to the location where it will be prepared for shipment. In some cases, the exporter visits the farm to collect the produce.

6.2 Socio-economic Profile of the Export Market Channel Actors: Export-Oriented Farmers

6.2.1 Main Socio-economic Characteristics of the Surveyed Fruit Farmers

The total sample consists of 70 export-oriented fruit farmers and the majority, whose main income source rooted in the industry, are male (98.57%). The average household size is five.

Table 6.1: Main Socio-economic Characteristics of the Farming Community

Variables	Frequency	Percentage
Age Categories		
20 – 40 years	17	24.29
41 – 60 years	43	61.43
61 years and over	10	14.29
Education Level		
Grade 1-5	3	4.29
Up to O/L	26	37.14
Up to A/L	24	34.29
Higher Education	17	24.29

Source: Authors' Compilation based on Field Survey, 2021

The majority of the farmers are 41-60 years old (61.43 %) and the mean age of all districts is 48.20 years. With respect to the total sample 75.72 percent of the surveyed farmers were above 40 years. This implies that most of the farmers engaging in fruit export sector belong to the aged population. However, only 24.29 percent of the total sample is constituted of farmers in 20-40 year age category. This indicates that the participation of young farmers in the industry as an economic venture is less.

According to Table 6.1, majority of the respondents have acquired secondary level education qualifications (G.C.E. Ordinary level and G.C.E. Advanced Level). A considerable percentage has tertiary level qualifications. The results indicate that majority of the farmers in the fruit export sector has received formal education.

6.2.2 Farming Characteristics

The majority of the farmers (78.57 %) are engaged in export-oriented fruit cultivation as their primary occupation as the main income source. The descriptive statistics (Table 6.2) reveal that all farmers have average 17 years of export-oriented fruit farming experience and most of the farmers (68.6 %) have less than 21 years farming experience.

According to Table 6.2, majority (67.14%) of the surveyed fruit farmers have owned lands while the rest is cultivating in others' land or rented lands. Further, Table 6.2 depicts that majority of farming households in the study area (62.32 %) cultivate in a large land extent that sprawls over 10 acres while a significant percentage cultivate five acres or less. However, the average land size of all districts is around 20.69 Ac while minimum and maximum are 0.5 Ac and 150 Ac respectively. Further, 72.41 percent of the cultivated lands are more than 10 acres and mostly located in the Gampaha district.

Further, surveyed farmers said that monthly income varies due to reasons such as low production due to bad weather or pest and disease problems, stage of the cultivation and other input related issues. However, some farmers use strategies to obtain income every month. For instance, they have divided their land into blocks in which fruits are cultivated at different stages to have harvest in the year throughout.

Table 6.2: Farming Characteristics

Variables	Frequency	Percentage
Type of Farming		
Full Time	55	78.57
Part Time	15	21.43
Farming Experience (Years)		
<= 20	48	68.6
21-40	18	25.7
41<=	4	5.7
Land Ownership		
Yes	47	67.14
No	23	32.86
Cultivated Land Extent (Ac)		
< 5	26	37.68
5 – 10	14	20.29
>10	29	42.03

Source: Authors' Compilation based on Field Survey, 2021

6.2.2.1 Cultivated Fruit Varieties

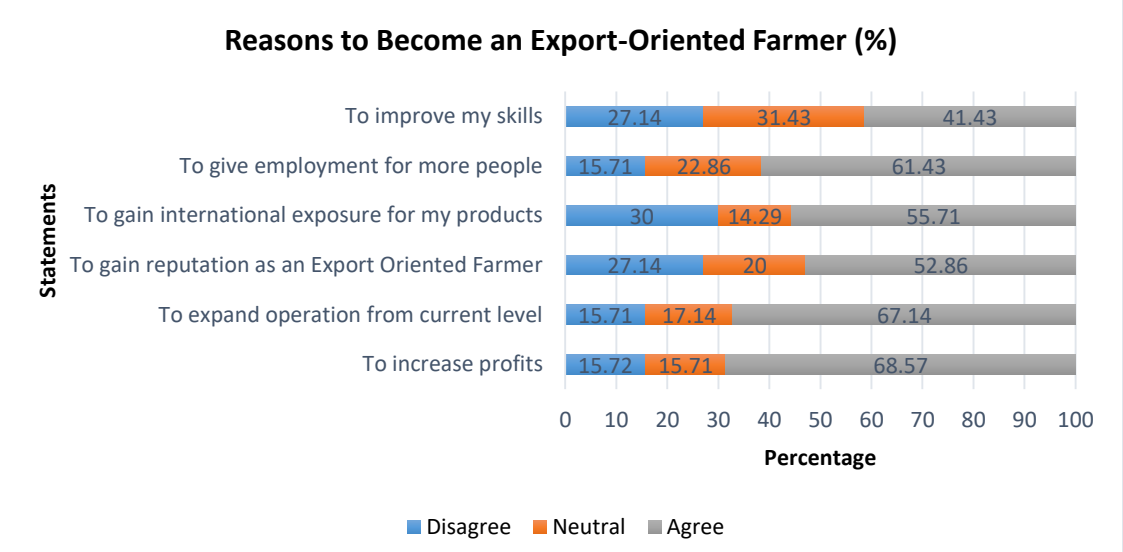
Table 6.3 revealed that most of the surveyed banana farmers (71.43%) cultivated Cavendish variety since it is of greater export potential. Nearly all surveyed pineapple farmers cultivated Mauritius variety. With regard to mangoes, majority of farmers cultivated TJC variety while apple guava is the most popular variety in guava. According to the literature there is one primary variety of mangosteen. There were very few large-scale mangosteen cultivations in the Kalutara district. Further, avocado, a commonly grown fruit in home gardens of the wet zone, is becoming popular in the intermediate zone as well. Generally, 2-3 trees can be found in most home gardens and it is very difficult to find large-scale avocado plantations in Sri Lanka.

Table 6.3: Fruit Varieties Cultivated by Farmers

Fruit	Varieties
Banana	Cavendish (71.43%), Kolikuttu (33.33 %), Ambul (14.28 %), Ambun (14.28 %), Suwadel (4.76%)
Pineapple	Mauritius (100%)
Mango	TJC (86.67 %), Karathakolomban (33.33 %), Villard (6.67%)
Papaw	Red Lady (95.24%), Horana hybrid (4.76%)
Guava	Apple Guava (69.23%), Kilo Guava (30.77%), Rose Guava (15.38%), Lanka Jam (7.69%)

Source: Authors' Calculation based on Survey Data, 2021

6.2.3 Key Reasons to Become an Export-Oriented Farmer



Source: Authors' Calculation based on Field Survey,2021

Figure 6.2: Reasons to Become an Export-Oriented Farmer

Figure 6.2 presents the reasons to become an export-oriented farmer. According to the surveyed fruit farmers' views, to increase profits, to expand operation from current level and to give employment for more people are the most cited reasons.

6.2.4 Relationship with Buyers

6.2.4.1 Buyers' Details

Table 6.4: Type of Buyers on Farmers' Produce

Buyer	Frequency	Percentage of Cases* (N=70)
Collectors	39	55.71
Exporters	30	42.86
Company	22	31.43
Shop/ Boutique	10	14.29
Other- Direct Export	1	1.43

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Compilation based on Field Survey, 2021

Most of the surveyed export-oriented fruit farmers sell their produce to collectors while 42.86 percent directly sell their products to exporters. Only one farmer directly exports his products to Maldives. The rest sell the products to companies, shops and boutiques (Table 6.4).

6.2.4.2 Buyers' Main Requirements

Buyers' expectations from the fruit farmers are presented in the Table 6.5.

Table 6.5: Buyers' Expectations from Fruit Farmers

Expectation	Frequency	Percentage of Cases * (N=70)
Quality	69	98.57
Security	40	57.14
Low Price	33	47.14
Consistency of supply	30	42.86

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Compilation based on Field Survey, 2021

6.2.4.3 Difficulties in Meeting Buyers' Requirements

More than half of the surveyed farmers (55.71 %) mentioned that they faced difficulties in meeting their buyers' requirements as elaborated in Table 6.6 along with reasons.

Table 6.6: Reasons Cited for the Difficulty to Meet Buyers' Requirements

Reason	Frequency	Percentage of Cases*39
Quality inputs being expensive	31	79.49
Limited access to quality inputs	24	61.54
Lack of suitable farming equipment	14	23.08
Limited access to information on quality standards	9	35.90
Lack of knowledge in quality standards	7	17.95
No access to adequate transport facilities	7	17.95
Lack of reliable staff/workers	7	17.95
Limited storage facilities	4	10.26

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Field Survey, 2021

6.2.4.4 Assistance or Collaboration from Buyers

The majority of the surveyed fruit farmers (80.00%) did not receive any assistance or collaboration from their buyers while a quarter of total farmers said that they have received assistance from their buyers in various ways (Table 6.7).

Table 6.7: Assistance Provided by Buyers

Assistance	Frequency	Percentage of Cases* 14
Technology	11	78.57
Information	8	57.14
Credit	3	21.43
Advance	1	7.14
Inputs	1	7.14

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Field Survey, 2021

6.2.5 Farmers' Knowledge and Awareness on Quality Standards

Quality standards play a vital role in maintaining the quality of the exportable fresh fruit products. Descriptive statistics revealed that, majority of the surveyed farmers (80.00 %) were aware of quality standards. Consequently, 32.90 percent of the total sample mentioned that, it is difficult to comply with the quality standards. However, majority of the surveyed farmers (67.14 %) said that there is no difficulty in complying with quality standards. Moreover, most of the sample farmers (57.14%) indicate that, they have received assistance from various sources to comply with these quality standards (Table 6.9).

Table 6.8: Quality Certificates Acquired by Farmers

Quality Certificate	Frequency	Percentage of Cases*19
GAP	17	89.47
Organic standard	2	10.53
SLS	1	5.26
Export permit certificate	1	5.26
Provincial certificate	1	5.26
Total	22	115.79

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on HARTI Survey Data, 2021

The majority (72.86 %) of the surveyed fruit farmers do not have a quality certificate. However, 27.14 percent of the sample farmers have received quality certificates for their products. The most common type of quality certification is GAP (Good Agricultural Practices) certification as the majority (89.47 %) have received it.

According to results in Table 6.9, all respondents who received assistance in quality standards mentioned that they received it from government institutes. Further, 60 percent of the respondents claimed that the assistance was helpful.

Table 6.9: Assistance in Quality Standards

Source	Frequency	Percentage of Cases*40
Government	40	100.00
Non-government	15	37.50
Organizations	4	10.00
Buyers	1	2.50
Family members	1	2.50
Fellow farmers	1	2.50
Through courses	1	2.50
Total	63	157.5

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Field Survey, 2021

The majority (75.71%) expect more assistance to improve quality/ security of the product in; continued supply of quality inputs/raw materials at a reasonable price, conducting demonstrations and training programmes.

Table 6.10: Farmers' Expectation of Further Assistance to Improve the Product Quality

Whether further assistance needed	Frequency	Percentage
Yes	53	75.71
No	17	24.28

Source: Authors' Compilation based on Field Survey, 2021

6.2.6 Extension and Training in Export-oriented Fruit Cultivation

Table 6.11: Membership in a Farmer Association

Membership	Frequency	Percentage
No	45	64.29
Yes	25	35.71

Source: Authors' Compilation based on HARTI Survey Data, 2021

Members are entitled to a range of benefits such as extension services, training, financial assistance, providing inputs and infrastructure facilities (planting materials, fertilizer, plastic crates, and 50% of the requirement of sprinklers), influencing the government, and providing information related to world trends.

Table 6.12: Farmers' Participation in Agriculture-Related Training Programmes

Participation	Frequency	Percentage
Yes	43	61.43
No	27	38.57

Source: Authors' Compilation based on HARTI Survey Data, 2021

According to Table 6.12 and Table 6.13, the majority (61.43 %) of the sample farmers have participated in agriculture-related training programmes whereas most of the farmers who did not receive training in the fruit sector are willing to participate in such training programmes (Table 6.13).

Table 6.13: Farmers' Willingness to Participate in Training Programmes

Willingness	Frequency	Percentage of Cases*27
Yes	25	92.59
No	2	7.41

Source: Authors' Compilation based on Survey Data, 2021

Training programmes which farmers participated were as follows; 1. Cultivation related programmes: pineapple, guava, mango, rambutan, passion fruit and banana cultivation, 2. Training on fertilizer application, organic fertilizer preparation and the use of bio fertilizer, 3. Agricultural extension programmes on new technologies for agriculture: equipment usage, packaging, fruit storing, fruit processing, irrigation systems (sprinkler) and harvesting methods, 4. Training programmes quality standards: GAP certification in fruits and vegetables, and 5. Training on marketing, local business protection and export market. As mentioned by the majority (76.75 %) of the surveyed export-oriented fruit farmers, training programmes were conducted by government institutes such as DOA, FRDI, NIPHM, ITI, and University of Peradeniya.

6.3 Farmers with Export Potential

The researchers conducted key informant interviews with fruit farmers who are willing to join the export market channel. They represent five districts as Hambantota, Ratnapura, Kalutara, Anuradhapura and Vavuniya. Most of them cultivate banana and the rest of the farmers cultivate other major fruits such as papaya and mangosteen. Banana varieties cultivated were Cavendish, Sour, Seeni, Red Banana and Kolikuttu. Major papaya varieties cultivated were Red lady and Tanin. The farmers stated that the above mentioned fruit varieties have high potential for export. More than half of the farmers sold their products to an exporter at least once. However, in present they refrain from this practice due to various reasons: too many procedures/ standards to adhere to, unable to meet exporter's demand, difficult to meet the quality standards, prices received being too low, too much hassle to sell the product, lack of extension services in their areas, difficulty in contacting the exporter and cannot find reliable exporters in their areas.

On the other hand, farmers who have never sold their products to the exporter/ export market said they face may challenges: not having sufficient information on how to sell fruits for the export market, collectors not revealing the details of the exporters, the low-price offers of the exporters and selling to local market at higher prices being more profitable and difficulties in finding reliable and consistent exporters.

However, all respondents expressed their willingness to join the export value chain due to various reasons such as to increase profits, to expand operation from the current level, to earn reputation as an Export Oriented Farmer, to gain international exposure for their products, to provide employment for more people and to improve their skills.

The farmers believe business skills are important to become a successful export farmer. For instance, marketing skills, entrepreneurship skills, networking skills, selling and negotiation skills, market knowledge, communication skills, managing people/labour and having access to government are among those.

Further, surveyed farmers' faced challenges in selling their fruits to exporters due difficulties in communicating with exporters, lack of marketing skills and knowledge, their prices being high for exporters, high quality standards, inadequate supply for the demand, difficulty in maintaining consistency in quality, lack of knowledge in accessing the export market, delayed payments, being less profitable, and poor knowledge about contracts.

Their suggestions to improve the fruit export industry in Sri Lanka are quoted as below;

Table 6.14: Suggestions Given by Fruit Farmers with Export Potential

*"Farmers awareness, communication methods and other methods for continuing the process should be improved as well as the management authority should be increased"- **Banana Farmer in Hambantota District***
*"Need proper instructions and training programmes to give information to farmers related to quality measures, higher cost of production and price cannot be changed, so need inputs at a fair price to reduce the cost of production"- **Banana Farmer in Hambantota District***
*''Should supply quality inputs to farmers, change rules /regulations for the benefit of farmers'' - **Banana Farmer in Hambantota District***
*"Need to conduct special projects with potential farmers, export promotion programmes, should provide knowledge in new technologies: packing, new varieties, cultivation methods'' – **Papaya Farmer in Anuradhapura District***
*"Should remove agriculture equipment tax, should conduct training programmes with demonstrations, should establish pack houses ''- **Papaya Farmer in Vavuniya District***
*"Government should provide lands on lease, should find direct exporters/Companies and establish links with them, need solution for fertilizer and seed shortage'' - **Papaya Farmer in Vavuniya District***
*"Should provide assistance to farmers and should establish a strong bond between farmer and intermediary '' – **Banana Farmer in Ratnapura District***
*''There should be a direct channel to contact exporters and related institutes should provide knowledge about the fruit export procedures" – **Mangosteen Farmer in Kalutara District***

Source: Authors' Compilation based on HARTI Key Informants Survey, 2021

6.4 Socio-economic Profile of Fruit Collectors

6.4.1 Main Socio-economic Characteristics of the Surveyed Fruit Collectors

Even though the initial sample size was 30 only 21 export-oriented fruit collectors responded to the questionnaire survey. Further, these collectors represent the six districts - Colombo, Gampaha, Hambantota, Kalutara, Nuwaraeliya and Ratnapura. The findings revealed that majority of the (95.24 %) surveyed collectors were male, a factor similar to the farmers' sample.

The majority belonged to the 41- 60 year category (66.67 %) while only very few were above the 61 age category. The mean age of all districts is 44.09. This reveals the lower participation of young collectors in the fruit export sector as an income-generating activity. According to Table 6.18, most of the respondents (52.38 %) have studied up to G.C.E. Advanced Level. Nearly 30 percent respondents have tertiary level qualifications such as diplomas, degrees, and masters. This result indicates that almost all the surveyed collectors have received formal education.

Table 6.15: Main Socio-economic Characteristics of the Fruit Collectors

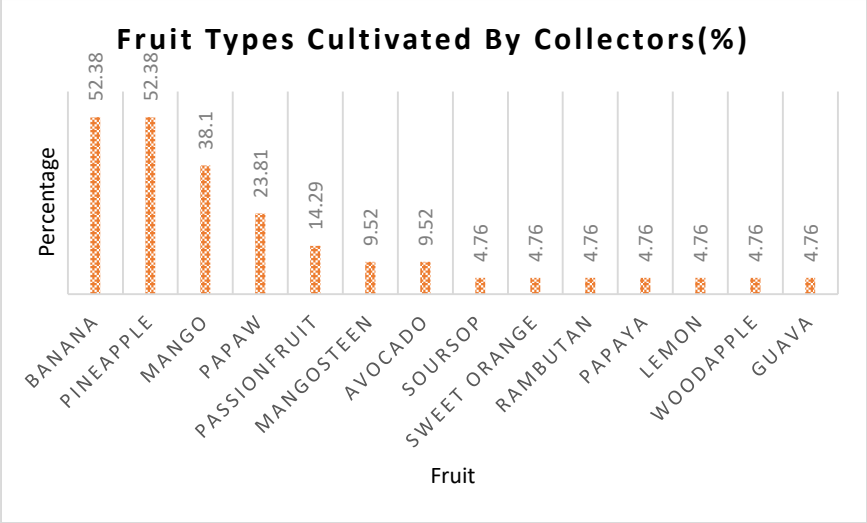
Variables	Frequency	Percentage
Age Group		
20-40 years	6	28.57
41-60 years	14	66.67
61 years and over	1	4.76
Education Level		
Up to O/L	4	19.05
Up to A/L	11	52.38
Diploma	2	9.52
Degree	3	14.29
Masters degree	1	4.76
Type of Collecting		
Full time	14	66.67
Part-Time	7	33.33
Collecting Experience		
10 years and below	9	42.86
11-20 years	7	33.33
21 years and over	5	23.81
Land Ownership		
Yes	15	71.43
No	6	28.57

Source: Authors' Compilation based on Field Survey, 2021

The results in Table 6.15 show that majority of the collectors (66.67 %) are engaged in export-oriented fruit collecting as their primary occupation. This implies that they solely are engaged in their livelihood which is their main source of income. Further, for the rest it is the secondary source of income.

Table 6.15 reveals that collectors have an average of 14 years of experience in export-oriented fruit collecting and most of the collectors (68.6 %) have less than 11 years of experience in this.

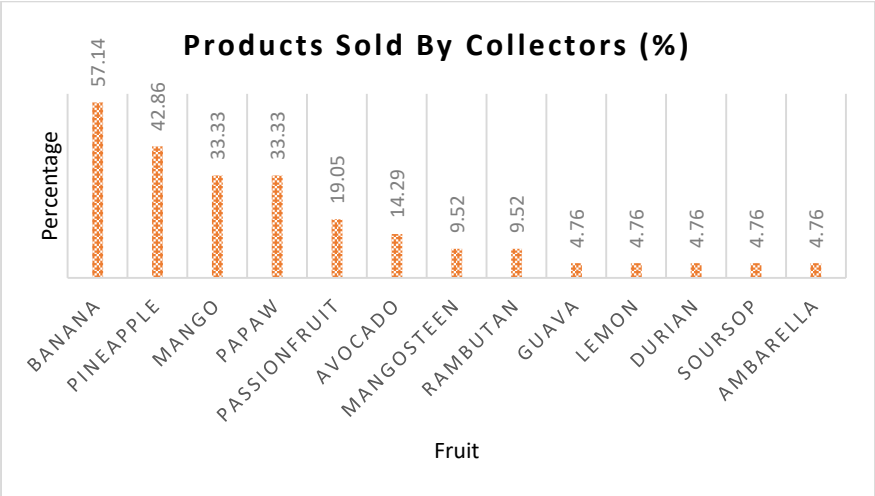
Most of the surveyed collectors (71.43%) in different districts have their own lands. Therefore, they have cultivated various fruits in their lands. However, nearly 30 percent of the respondents do not own the land, but they also grow certain varieties of fruits in their home gardens. Further, it implies that all surveyed collectors have cultivated fruits in their lands (Figure 6.3).



Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

Figure 6.3: Fruit Types Cultivated by Collectors

6.4.1.1 Description of the Products



Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

Figure 6.4: Types of Products Sold by Collectors

As above, banana, pineapple, mango, papaw and passionfruit seem to fetch higher profits due to high demand for those products at the export market.

6.4.2 Relationship with the Buyers

The results show that (Table 6.16) exporters are the most preferred choice of collectors (57.14 %), perhaps due to the increased profit margin while a similar number of collectors opt for intermediaries and companies.

Table 6.16: Types of Buyers for Collectors' Products

Buyers	Frequency	Percentage
Exporters	12	57.14
Intermediary	8	38.10
Company	8	38.10
Shop/Boutique	6	28.57
Broker	3	14.29
Association	1	4.76
Total	38	180.95

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

Table 6.17: Reasons for the Selection of Buyers by Collectors

Reasons	Frequency	Percentage
The larger volume of sales	16	76.19
Higher prices	16	76.19
More trust	13	61.90
Fewer risks	6	28.57
Faster payment	6	28.57
Repeat sales	5	23.81
Purchasing power	1	4.76
Total	63	300.00

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

The majority of the collectors consider the facility of bulk sales (76.19%), higher price offers (76.19%) followed by trustworthiness (61.90%). Risk factor and faster payment are also important determinants. Consistency in sales is also rated as vital as nearly 24 percent cited it. The purchasing power of the buyers apparently is not a great concern.

Table 6.18: Buyers' Main Concerns when Purchasing from Fruit Collectors

Buyers' Requirements	Frequency	Percentage
Quality	21	100.00
Security	7	33.33
Reliability of supply	6	28.57
Price	5	23.81
Punctuality	2	9.52
Total	41	195.24

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

Quality of the produce is an obligatory feature when purchasing fresh fruits for exporting (Table 6.18). Further, the security of the products, reliability of supply, and

the price offers are the other highly rated concerns. However, timely receipt of stocks seems not a great concern.

Table 6.19: Difficulties Faced by Collectors in Meeting Buyers' Requirements

Difficulties	Frequency	Percentage
I can't get quality inputs	12	57.14
I don't have enough information on quality standards	6	28.57
I don't have access to adequate transport facilities	5	23.81
I don't understand the quality standards	4	19.05
I don't have access to adequate storage facilities	1	4.76
I know my staff/workers don't have the right skills	1	4.76
Total	29	138.10

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

The most of the surveyed fruit collectors cited that they are not able to comply with their buyers' requirements while 23.81 percent said that they did not face difficulties in meeting their buyers' requirements. Lack of quality inputs in sufficient quantities is the biggest challenge. Poor flow of information on quality standards and lack of knowledge in quality standards and limited access to transport facilities are the other top constraints. However, fewer respondents, especially Cavendish banana collectors, lamented over the inadequate storage facilities. Lack of skilled workers to manage the process also affected very few.

Table 6.20: Collectors' Perception of Buyers' Preferences

Reasons	Frequency	Percentage
Quantities ordered	18	85.71
Quality requirements	12	57.14
Standards	9	42.86
Delivery dates	6	28.57
By informing	1	4.76
Total	46	219.05

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

The majority (85.71%) of the surveyed fruit collectors learn about buyers' preferences by studying the quantities ordered. Quality requirements expected standards and delivery dates are also dominant perceptions. Fewer buyers directly inform their preferences and therefore, they can manage the operations easily.

Table 6.21: Collectors' Perception on Changes Occurring in Buyers' Preferences

Status	Frequency	Percentage
No changes in preferences	8	38.10
Reduced the number of orders	3	14.29
Increased preference for organic products	3	14.29
Requesting products at a low price/ask to lend the products	2	9.52
Prefer quality products	2	9.52
Inclined towards GAP certification and organic products	1	4.76
Changed the needs or preferences	1	4.76
Export potential is increased	1	4.76

Note: Total Percentage of Categories Exceeds the 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

The results in Table 6.21 indicate that no drastic changes have occurred in the preferences overtime. At the same time, the number of orders has declined and their interest in organic products has grown, which are salient developments. A negligible number of collectors said they have noticed an increase in export potential of some of the Sri Lankan fruits.

In addition, the majority (52.38 %) of the surveyed fruit collectors indicated that they did not receive any assistance or collaboration from their buyers. However, 47.62 percent of the fruit collectors admitted that they received various types of assistance from their buyers. The majority (60.00%) of them have received technological assistance while 30 percent of respondents received information. Further, the rest (30.00%) received assistance in terms of credit and cash advances.

6.4.3 Relationship with the Suppliers

Table 6.22: Type of Suppliers of Collectors' Produce

Suppliers	Frequency	Percentage
Farmers	21	100.00
Direct suppliers	2	9.52
Collectors	2	9.52
Wholesale traders	1	4.76
Own production	1	4.76
Total	27	128.57

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation Based on Survey Data, 2021

Various types of suppliers from whom the collectors currently purchase most of their products were shown in Table 6.22. Farmers are the leading suppliers. Direct suppliers and village level collectors are somewhat prominent.

Table 6.23: Benefits of Different Suppliers

Benefits	Frequency	Percentage of Cases *19
Quality	11	57.89
Price	7	36.84
Punctuality	5	26.32
Volume	5	26.32
Transportation supplied	2	10.53
Standards	2	10.53
Trustworthiness	1	5.26
Total	33	173.68

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

The majority of (85.71%) surveyed fruit collectors mentioned that they receive some benefits from different suppliers they work with. Benefits that are mentioned by the respondents were included in Table 6.23. Further, all surveyed fruit collectors mentioned various problems they face with regard to different suppliers. The most pressing issue is the price issues (28.57%) while quality issue (19.05%) is also severe.

Table 6.24: Kind of Assistance Provided by Collectors for Their Suppliers

Form of Assistance	Frequency	Percentage
Inputs (seeds and other)	13	61.90
Technical assistance	10	47.62
None	5	23.81
Credit	3	14.29
Information related to varieties	1	4.76
Total	32	152.38

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation Based on Survey Data, 2021

According to Table 6.24, majority of the surveyed fruit collectors provide inputs to their suppliers and 47.62 percent provide technical assistance in export-oriented fruit cultivation and harvesting. Further, 14.29 percent of surveyed collectors aid by giving credit to their suppliers. Meanwhile a significant number of fruit collectors did not provide any kind of assistance to their suppliers.

Tables 6.25: Means of Communicating Collectors' Requirements to Their Suppliers

Means	Frequency	Percentage
Quality of produce	19	90.48
Size	13	61.90
Delivery dates	9	42.86
Chemical use	5	23.81
Not specific	1	4.76
Total	47	223.81

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation Based on Survey Data, 2021

The majority (90.48%) were concerned about the quality of produce that they purchased from their suppliers. The size of the fruits, the delivery dates since they need produce on time are also significant. The chemical use in cultivation is also a call for concern, the reason as to why the suppliers are instructed to maintain Maximum Residue Levels (MRL levels). However, one respondent said their suppliers are not informed of any specific requirements as he visits the supplier to collect fruits in a grading process.

6.4.4 Different Grades and Selection Criteria used by Fruit Collectors

Surveyed fruit collectors grade their products according to various parameters; quality, physical appearance, weight, size and flavour. Various grades and selection criteria used by respondents are exhibited in Table 6.26 and Table 6.27 respectively.

Table 6.26: Different Grades used by Collectors

Criteria	Fruit Type
GAP & ISO	Pineapple
1kg< = A grade/800g- 1kg = B grade/800g-600g = C grade/600g> = D grade	Pineapple
1-2 kg is first grade and 0.75kg -1kg is second grade	Pineapple, Papaw
Grade 1- export quality/Grade 2-Local market/Grade 3 and 4- Juice	Banana, Papaw, Mango, Passionfruit, Rambutan
A/B/C	Banana
grade 1- best quality/grade 2-damages	Banana, Pineapple, Papaw
Number 1 and 2	Banana

Source: Authors' Compilation based on Field Survey, 2021

Table 6.27: Selection Criteria used by Fruit Collectors

Parameters	Frequency	Percentage
Physical appearance	9	42.86
Size	5	23.81
Weight	5	23.81
Quality standards	4	19.05
Damage level	2	9.52
Colour	1	4.76
Flavour	1	4.76
Total	27	128.57

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

The majority (42.86%) of the surveyed fruit collectors selected fruits based on the physical appearance while another significant percentage that equals the majority determinates it by the size or weight of the fruits. However, nearly a one fifth considered the quality standards when selecting fresh fruits (Table 6.27).

6.4.5 Collectors' Awareness on Existing Quality Standards

Table 6.28: Surveyed Collectors' Awareness on Quality Standards and Regulations

Quality Standards	Frequency	Percentage
GAP	9	42.86
Organic	6	28.57
ISO norms	5	23.81
Fair trade	1	4.76

Source: Authors' Calculation based on Survey Data, 2021

According to the results, 42.86 percent of the surveyed fruit collectors are aware of GAP while knowledge in organic standards (28.57%) and ISO norms (23.81%) are also significant. Further, the respondents mentioned that most of their suppliers (66.67%) do not have above mentioned quality certifications.

6.4.6 Extension Services and Associations Regarding Fruit Collectors

Descriptive statistics revealed that the majority (52.40 %) of the surveyed fruit collectors did not receive any support while 23.81 percent received agriculture instructors' support regarding cultivation and standard certification. About 14.28 percent of surveyed fruit collectors mentioned that the government provide planting materials and other infrastructural facilities to them. Only few (9.52%) said that they have received technical support to enhance their business. Moreover, the majority (61.54%) of the respondents mentioned that government extension officers provide instructions and support to them while 38.46 percent said that they have received support from non-government organizations (NGO).

Table 6.29: Membership in a Business Association

Membership	Frequency	Percentage
No	13	61.90
Yes	8	38.10

Source: Authors' Compilation based on Survey Data, 2021

The majority (61.90 %) of the surveyed fruit collectors do not hold membership in an association like surveyed farmers. Only around 40 percent are members of a business association, through which they are likely to benefit in various ways; training, knowledge of export activities and standards, providing inputs and other infrastructure facilities such as planting materials, fruit ripening hormones, and collecting baskets/ containers as well as financial assistance. The majority (87.50%) who are members of an association expressed satisfaction in the benefits received from their affiliated association.

6.5 Socio-economic Profile of Fresh and Processed Fruit Exporters

In this study at the initial stage due to the pandemic situation the research team conducted an online survey for all fruit exporters in Sri Lanka. However, due to the

response rate being very low (9.52%) a telephone-based questionnaire survey with fruit exporters was also carried out, in which 43 fresh and fruit exporters responded. However, others did not respond citing reasons such as having stopped fruit exportation, busy schedules and reluctance to provide details. The information derived from the respondents is included here.

6.5.1 Main Socio-economic Characteristics of Fresh and Processed Fruit Exporters

Table 6.30: Key Socio-economic Characteristics of Fruit Exporters

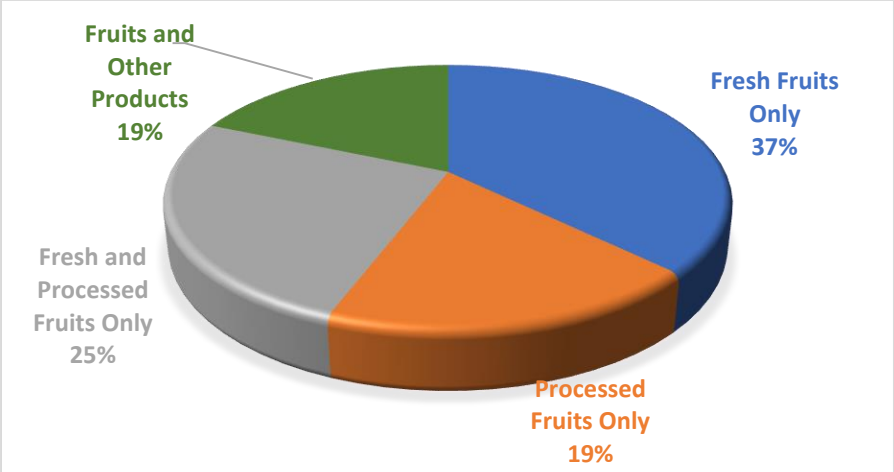
Variables	Frequency	Percentage
Experience (Years)		
0-5	15	34.88
6-10	8	18.60
11-15	6	13.95
16-20	2	4.65
21<=	12	27.91
Membership in Business Association		
Yes	25	58.14
No	18	41.86

Source: Authors' Compilation based on Survey Data, 2021

Table 6.30 revealed that the majority (67.43%) of the surveyed fruit exporters have less than 16 years of experience while 27.91 percent of the respondents have 21 or more than 21 years of fruit exporting experience. The rest have 16-20 years of experience in this sector.

Most of the fruit exporters have membership in business associations such as Lanka Fruit and Vegetable Producers, Processors and Exporters Association. About 50 percent of the fruit exporters who have membership in a business association are satisfied with the service provided by their association. Further, the benefits received range from knowledge on international market opportunities, standards and new technology (68.00%), organizing export promotion activities (48.00%), conducting training (36.00%) and exhibitions (4.00%).

6.5.2 Details of the Fruit Exporting Firms



Source: Authors' Compilation based on Survey Data, 2021

Figure 6.5: Main Products of the Fruit Exporting Firms

Figure 6.5 revealed that majority are interested in exporting only fresh fruits while a quarter of the population is engaged in both fresh and processed fruit exports. However, a significant percentage (around 20 %) exports fruits as well as other products. Further, Table 6.31 presents the fruit varieties as well as major products exported by fresh and processed fruit exporting companies in Sri Lanka. However, the results revealed that 37.21 percent of the surveyed fruit exporters did not have a clear idea about fruit varieties that they export.

Table 6.31: Fresh and Processed Products of the Fruit Exporting Firms

Fruit	Varieties	Product Type
Banana	Cavendish, Anamalu, Kolikuttu, Seeni, Ambun, Rath Kesel	Fresh (78.57%), Processed (Dried) (42.86%), Processed (Other)(10.71%)
Pineapple	Mauritius	Fresh (70.37%), Processed(Dried)(40.74%), Processed(Pulp)(22.22%), Processed (Juices)(18.52%)
Mango	TJC, Villard, Karthakollomban, Alphonsu Betti	Fresh (67.74%), Processed(Dried)(35.48%), Processed(Juices)(16.13%), Processed(Pulp)(6.45%)
Mangosteen		Fresh (100.00%)
Guava	Apple Guava, Kilo Guava	Fresh (100.00%), Processed (Dried) (8.33%)
Papaw	Red Lady,Tanin	Fresh (80.65%), Processed(Dried)(35.48%), Processed Other (12.90%)
Avocado	Hass	Fresh (100.00%), Processed (Pulp)(14.29%)
Lime and Lemons		Fresh (50.00%), Processed(Juices)(25.00%), Processed(Pulp)(25.00%)

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

Surveyed fresh and processed fruit exporters have mentioned the destinations/regions for their products (Table 6.32).

Table 6.32: Export Destinations for Products of the Fruit Exporting Firms

Type	Destination/Region
Fresh	U.A.E 13.33%, Qatar 13.33%, Maldives 33.33%, Dubai 26.67%, ME 13.33%, European 13.33%, U.K 13.33%, USA 13.33%, Australia 13.33%, Germany 10.00%, New Zealand 6.67%, Japan 6.67%, Canada 6.67% , Korea 3.33%, Seychelles 3.33%, Singapore 3.33%, Sweden 3.33%, France 3.33%, Italy 3.33%, Russia 3.33%
Processed	Australia 30.77%, Dubai 30.77%, Europe 26.92%, USA 26.92%, Japan 26.92%, Maldives 23.08%, Canada 19.23%, UK 19.23%, Korea 15.38%, Germany 15.38%, New Zealand 11.54%, Singapore 7.69%, Seychelles 7.69%, Middle East 7.69%, Netherlands 3.85%, Belgium 3.85%, Qatar 3.85%, , Italy 3.85%, Indonesia 3.85%, Thailand 3.85%, France 3.85%, Switzerland 3.85%, Sweden 3.85%, Solomon Island 3.85%, Vietnam 3.85%,Kuwait 3.85%, UAE 3.85%

Source: Authors' Calculation based on Survey Data, 2021

Most (86.05%) of the surveyed fruit exporters have chosen the above destinations due to high market potential, personal contacts with the customers and ability to find reliable customers in these destinations.

Table 6.33: Workforce of the Fruit Exporting Firms

Number of Employees	Frequency	Percentage
<10	15	34.88
10-49	19	44.19
50-249	6	13.95
>250	3	6.98

Source: Authors' Compilation based on Survey Data, 2021

Most (79.07%) of the surveyed fruit exporting companies have less than 50 employees. A considerable number of firms function with a minimum staff while very less number of firms employed over 250 employees (Table 6.33).

Table 6.34: Organization Type of the Fruit Exporting Firms

Organization Type	Frequency	Percentage
Sole Proprietorship	9	20.93
Partnership	4	9.30
Private Company	18	41.86
Limited Liability Company	12	27.91

Source: Authors' Compilation based on Survey Data, 2021

A sole proprietorship is an unincorporated business owned by a single individual and is the simplest kind of business structure. When persons who have entered into partnership with one another to carry out a business are collectively called as a "Partnership Firm". Further, a private company is a firm held under private ownership while a limited liability company (LLC) is a legal business entity owned by its members. Table 6.34 revealed that most of the organizations are private companies whereas partnerships are scarce.

6.5.3 Key Strengths of Fruit Export Firms in Sri Lanka

Table 6.35: Key Strengths of Fruit Export Firms

Strengths	Frequency	Percent of Cases*43
Reputed company/ brand name	27	62.79
High demand for special fruit products	26	60.47
Have regular customer basis	25	58.14
Maintain Quality Standards	21	48.84
Skilled and Effective labour	15	34.88
Can easily access information regarding international markets	15	34.88
Regular supply of quality raw materials by producers	9	20.93
Usage of new technology in packaging & labelling	8	18.60
Other (Goodwill of products, values of the company- Integrity, quality, customer care and Special packing solutions which delay ripen)	5	11.63
Total	151	351.16

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Compilation based on Survey Data, 2021

Key strengths of fresh and processed fruit export firms in Sri Lanka are presented in Table 6.35. Most (62.79 %) of the fruit exporters mentioned that their company have brand name while 58.14 percent said that they have regular customer basis. About 61 percent of fruit exporters noted that there is a high demand for special fruit products of their firms. The similar number of surveyed fruit exporters said that skilled and effective labour and easy access to information regarding international markets are the key strengths of their firms.

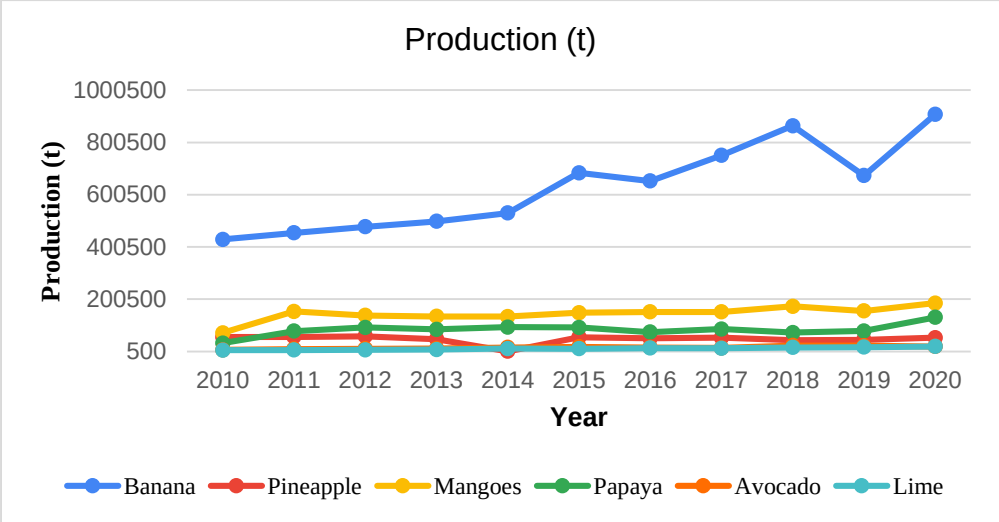
CHAPTER SEVEN

Export Competitiveness of Major Fruits of Sri Lanka

7.1 Production and Export Scenario of Sri Lankan Major Fruits

7.1.1 Production Scenario of Major Fruits

Production patterns of major Sri Lankan fruits are demonstrated in Figure 7.1. Banana has maintained the top position throughout the study period while mango is in the second position. Production quantities of pineapple, papaya, avocado and lime have been increasing with minor fluctuations during the period of 2010 to 2020.



Source: Authors Compilation based on Agricultural Statistics, DCS and FAO Statistics

Figure 7.1: Production Trends of Major Fruits of Sri Lanka from 2010-2020

7.1.2 Compound Growth Rates for Different Production Indicators of Sri Lankan Major Fruit Exports

Compound growth rates for extent, production and productivity of selected major fruits were analyzed for the period effect from 2010 to 2020 and results are given in Table 7.1.

Table 7.1: Compound Growth Rates for Production Indicators of Fruits (2010-2020)

Fruit	CGR (% Per Annum)		
	Extent(ha)	Production(t)	Productivity(t/ha)
Banana	-1.93*	8.68*	9.89*
Pineapple	-0.74^{NS}	-1.55^{NS}	-0.82^{NS}
Mango	0.55*	3.64*	2.28^{NS}
Papaya	-2.29*	-1.43^{NS}	1.86^{NS}
Avocado	23.17*	11.25*	-7.49*
Lime	-2.13*	14.79*	16.36*

Note: * denotes significant at 5 % level of probability, NS denotes Non-Significant, CGR (Compound Growth Rate)

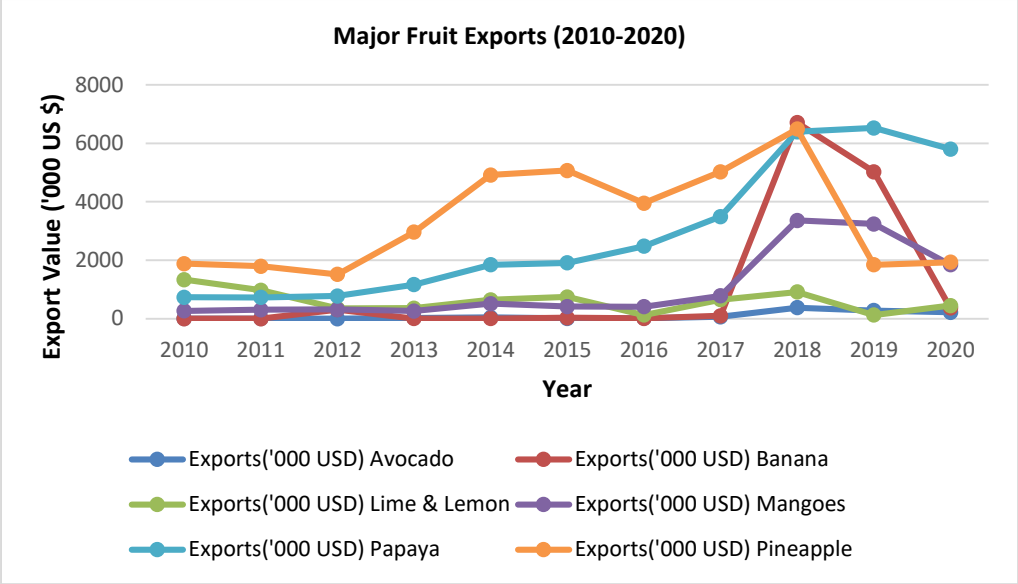
Source: Authors' Calculation based on Agricultural Statistics, DCS and FAO Statistics

The results revealed that the extent of all aforementioned fruits except mango and avocado is on the decline. Lime recorded the highest positive growth rates in terms of production (14.79 %) and productivity (16.36 %) respectively. Consequently, avocado exhibited the highest positive growth rate (23.17 %) in terms of cultivated land extent. The compound growth rate of productivity of avocado (-7.49 %) and pineapple (-0.82%) were negative. Further, the results revealed that compound growth rates of pineapple in extent (-0.74%), production (-1.55 %) and productivity (-0.82 %) were negative (Table 7.1).

7.1.3 Export Pattern of Major Fruit Exports in the Last Decade

Papaya exports value has been increasing gradually from 2010-2019 and has decreased in 2020. However, papaya shows the highest export value in 2020 with respect to other major fruits in Figure 7.2. Even though, pineapple has maintained the top position since 2010 it has shown a drastic decline in 2019. In 2020, pineapple has shown the second highest export value while mango recorded the third highest export value. Mango exports in terms of value has increased from 2010 to 2018 and it has decreased after 2018.

Banana has shown the highest export value in 2018, before dropping to a low. The value of lime and lemons exports has shown a decreasing trend throughout the period 2010 to 2020. Further, avocado has recorded the lowest export value in '000 USD in 2020.



Source: FAO Statistics, 2021

Figure 7.2: Export Trends of Major Fruits from Sri Lanka (2010-2020)

7.1.4 Compound Growth Rates for Different Export Indicators of Major Fruit Exports

Table 7.2: Compound Growth Rates for Export Indicators of Fruits (2010-2020)

Fruit	CGR (% Per Annum)		
	Quantity (Kg)	Value (Rs)	Unit Value (Rs/Kg)
Banana	-24.27^{NS}	-6.48^{NS}	29.20*
Pineapple	-2.06^{NS}	8.65*	10.95*
Mango	23.56*	25.62*	4.85^{NS}
Papaya	32.31*	32.44*	-0.75^{NS}
Avocado	44.92*	69.28*	43.85*
Lime	-7.53^{NS}	-3.90^{NS}	7.06^{NS}

Note: * denotes significant at 5 % level of probability, NS denotes Non-Significant, CGR (Compound Growth Rate)

Source: Authors' Calculation based on Sri Lanka Customs Statistics, 2021

It is evident from the Table 7.2, avocado exhibited the highest positive growth rates in terms of quantity (44.92%), value (69.28%) and unit value of exports (43.85%) respectively. Consequently, these growth rates were statistically significant at 5 percent. The results revealed that export quantity of all aforementioned fruits except mango, papaya and avocado was found to be negatively growing throughout the study period. Export value of banana and lime was found to be negatively growing while papaya (-0.75 %) exhibited negative growth in terms of unit value.

7.2 Competitiveness of Sri Lankan Fruits in Global Markets

7.2.1 Competitiveness of Sri Lankan Major Fruits: Global Context

In 2020, the top five exporters of the banana were Ecuador, Philippine, Costa Rica, Colombia, and Guatemala. According to FAO (2021b), the global exports of bananas, excluding plantain was around 21.5 million tons in 2020. Contribution for global banana exports from the Latin American and Caribbean region was 16.5 percent while it was 4.4 percent and 0.6 percent from Asia and Africa respectively. However, the Sri Lanka's position in global banana export market was 78 while its market share was 0.003 percent (Table 7.3).

Costa Rica, the Philippines, Netherland, USA, and Belgium were the top five pineapple exporters in the world in 2020. Due to COVID 19 pandemic situation, the two leading global exporters of pineapples, Costa Rica, and the Philippines, both experienced sharp declines in shipments, at -7.7 percent and -5.8 percent, respectively in 2020. Total export quantity of 3.1 million tons in 2020, representing a 7.9 percent fall compared to 2019 (FAO, 2021b). For pineapple Sri Lanka's rank among global exporters was 36 and its market share in world pineapple market was 0.09.

According to the results shown in Table 7.3, Thailand was the leading exporter of mango (mangoes/mangosteen/guava) in 2020 followed by Netherland, Mexico, Peru, and Brazil respectively. As stated by FAO (2021b), global exports of mangoes, guavas, and mangosteens rose to 2.2 million tons in 2020 and it is a 2.9 percent increment when compared to 2019. Sri Lanka's market share in world mango exports was 0.06 percent while the rank among global exporters was 43 in year 2020.

Mexico, Brazil, Guatemala, Netherland, and USA were the top five global exporters of papaya in 2020. According to FAO (2021b) there was a slight increase in global exports of papayas of 2.7 percent in 2020. The key reason behind this growth is continued production expansion in Mexico, the largest global exporter of papayas. For papaya Sri Lanka's rank among global exporters was 11 while its market share was 1.87 percent (Table 7.3).

According to the results depicted in Table 7.3, Mexico was the largest global exporters of Avocado in 2020 followed by Netherland, Peru, Spain, and Chile respectively. Sri Lanka's market share in world avocado exports was 0.003 percent while the rank among global exporters was 61 in year 2020.

Spain, Mexico, Netherlands, South Africa, and Turkey were the top five global exporters of Lime and Lemon in 2020. Sri Lanka's rank among global lime and lemon exporters was 71 while the market share was 0.01 percent (Table 7.3).

Table 7.3: World Market Share of Top Five Leading Fruit Exporters and Sri Lanka's Position in Global Trade

Commodity	Country 1	Country 2	Country 3	Country 4	Country 5	Sri Lankan Rank in Global Trade
Banana	Ecuador (26.78 %)	Philippine (12.04 %)	Costa Rica (8.04 %)	Colombia (6.92 %)	Guatemala (6.84 %)	**78**, (0.003 %)
Pineapple	Costa Rica (44.88%)	Philippine (14.97 %)	Netherland (9.73 %)	USA (4.12 %)	Belgium (3.82 %)	**36**, (0.09 %)
Mango	Thailand (17.85 %)	Netherland (14.85 %)	Mexico (14.29 %)	Peru (8.78 %)	Brazil (7.76 %)	**43**, (0.06%)
Papaya	Mexico (31.63 %)	Brazil (13.70 %)	Guatemala (9.66 %)	Netherland (9.47 %)	USA (7.34 %)	**11**, (1.87 %)
Avocado	Mexico (42.76 %)	Netherland (18.42 %)	Peru (11.82 %)	Spain (7.06 %)	Chile (3.90 %)	**61**, (0.003 %)
Lime & Lemon	Spain (25.71%)	Mexico (13.83 %)	Netherland (10.08 %)	South Africa (9.50 %)	Turkey (6.81 %)	**71**, (0.01 %)

Note: Figures in Parenthesis Indicated Percentage Share of World Export in 2020(in Value term US$)
Source: Author's Calculation based on the Data from FAOSTAT, 2021

7.2.2 Competitiveness of Sri Lankan Major Fruits: Asian Context

Top five banana exporters in Asia during 2020 were the Philippines, Vietnam, Cambodia, Turkey, and India. Sri Lanka's rank among banana exporters in Asia was 22 while the market share was 0.01 percent. India is the only South Asian country among the top five banana exporters in the world (Table 7.4).

The Philippines, China (Taiwan Province of), UAE, Thailand, and Malaysia were the top five pineapple exporters in Asia during year 2020. For pineapple Sri Lanka's rank among Asian exporters was 09 while the market share was 0.47 percent (Table 7.4).

According to the results in Table 7.4, Thailand was the leading exporter of mango (mangoes/mangosteen/guava) in the world in 2020, followed by other Asian countries such as Vietnam, India, Pakistan, and Philippines. Sri Lanka's market share in Asian mango exports was 0.15 percent while the rank was 16 in year 2020.

China; Mainland, Malaysia, Sri Lanka, the Philippines, and India were the top five papaya exporters in the Asian Region in 2020. For papaya Sri Lanka's rank among Asian exporters was 03 while the market share was 14.25 percent (Table 7.4).

In 2020, top five avocado exporters in Asian region were Israel, China (Hong Kong SAR), UAE , Lebanon, and the Philippines. No South Asian country is among the top five avocado exporters. However, Sri Lanka's market share in Asian avocado exports was 0.21 percent while the rank was 13 in year 2020.

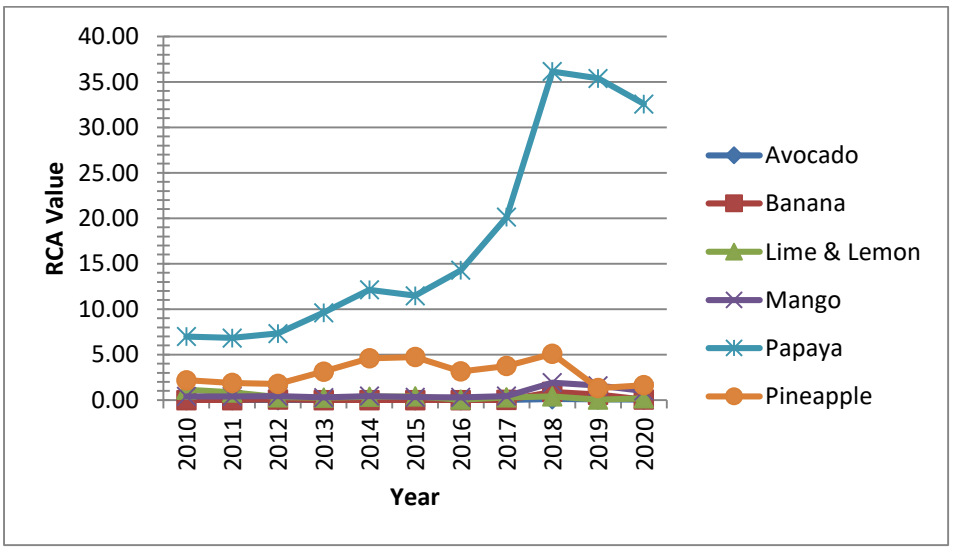
Turkey, China (Mainland), UAE, Vietnam and India were the top five Asian exporters of Lime and Lemon in 2020. Sri Lanka's rank among Asian lime and lemon exporters was 24 while the market share was 0.07 percent (Table 7.4).

Table 7.4: Market Share of Top Five Leading Fruit Exporters in Asia and Sri Lanka's Position in Asian Region

Commodity	Country 1	Country 2	Country 3	Country 4	Country 5	Sri Lankan Rank in Asian Trade
Banana	Philippines (69.09 %)	Vietnam (6.95 %)	Cambodia (5.06 %)	Turkey (4.33 %)	India (4.33 %)	**22**, (0.01 %)
Pineapple	Philippines (75.48 %)	China, Taiwan Province of (13.72 %)	UAE (3.63 %)	Thailand (1.84 %)	Malaysia (1.24 %)	**9**, (0.47 %)
Mango	Thailand (46.13 %)	Vietnam (14.84 %)	India (11.12 %)	Pakistan (8.20 %)	Philippines (5.25 %)	**16**, (0.15%)
Papaya	China, Mainland (36.95 %)	Malaysia (17.85 %)	Sri Lanka (14.25 %)	Philippines (13.62 %)	India (6.92 %)	**3**, (14.25%)
Avocado	Israel (62.34 %)	China, Hong Kong SAR (17.94 %)	UAE (7.87 %)	Lebanon (3.26 %)	Philippines (2.33 %)	**13**, (0.21 %)
Lime & Lemon	Turkey (44.93 %)	China, Mainland (28.05 %)	UAE (11.50 %)	Viet Nam (6.12 %)	India (1.62 %)	**24**, (0.07 %)

Note: Figures in Parenthesis Indicated Percentage Share of Asian Export in 2020(in Value term US$)
Source: Author's Calculation based on the Data from FAOSTAT, 2021

7.3 Revealed Comparative Advantage Indexes



Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

Figure 7.3: Revealed Comparative Advantage of Major Fruits Using Balassa's Index

Balassa's index was employed in this present study to estimate the revealed comparative advantage of major fruit exports from Sri Lanka. Figure 7.3 depicts that papaw and pineapple have retained the comparative advantage as RCA values are greater than 1, during the study period 2010 – 2020. Balassa's RCA index values for papaw remained at the top throughout the study period. Mango retained the comparative advantage from year 2018 to 2020. Lime and lemon showed comparative disadvantage throughout the study period except the year 2010. Avocado and banana exhibited comparative disadvantage during the study period.

7.3.1 Revealed Comparative Advantage Indices for Banana

Table 7.5: Estimates of RCA Indices in Banana Exports (2010-2020)

Year	RCA	RSCA	NRCA
Min	0.000000	-1.000000	0.000000
Max	0.897525	-0.054005	0.000542
Mean	0.148407	-0.822059	0.000090
SD	0.304182	0.336214	0.000186
CV	204.9654	-40.899	207.1924

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

Results of the estimates of various RCA indices in banana exports shown in Table 7.5. The values of Balassa's index fluctuated between 0.00 – 0.89 with mean value of 0.15, indicating comparative disadvantage. The mean value of RSCA is - 0.82 and in the range of -1.00 to -0.05, indicating comparative disadvantage. The mean value of NRCA is 0.00 indicates comparative disadvantage. The values of coefficient of variation of all the indices; RCA, RSCA and NRCA; are 204.96%, -40.90% and 207.19 % respectively.

7.3.2 Revealed Comparative Advantage Indices for Pineapple

Table 7.6: Estimates of RCA Indices in Pineapple Exports (2010-2020)

Year	RCA	RSCA	NRCA
Min	1.321939	0.138651	0.000825
Max	5.087887	0.671479	0.003075
Mean	3.022486	0.446798	0.001798
SD	1.364401	0.18676	0.000879
CV	45.14168	41.79963	48.90718

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

Results in Table 7.6 depict the estimates of various RCA indices for pineapple. The values of Balassa's index fluctuated between 1.32 – 5.09 with mean value of 3.02, indicating comparative advantage. The mean values of RSCA and NRCA are 0.45 and 0.002 that indicate comparative advantage. Further, the values of coefficient of variation of all the indices; RCA, RSCA and NRCA; are 45.14%, 41.80% and 48.91 % respectively.

7.3.3 Revealed Comparative Advantage Indices for Cluster of Mango, Mangosteen, Guava

Table 7.7: Estimates of RCA Indices in Mango (Mango/Mangosteen/Guava) Exports (2010-2020)

Year	RCA	RSCA	NRCA
Min	0.286628	-0.554450	0.000153
Max	1.918551	0.314728	0.001160
Mean	0.683807	-0.281711	0.000406
SD	0.566882	0.311208	0.00035
CV	82.90094	-110.471	86.12514

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

Results of the estimates of various RCA indices for mango are provided in Table 7.7. According to the values of Balassa's index, mangoes exhibited comparative disadvantage during 2010 to 2017 while it showed a weak comparative advantage during 2018 to 2020. The mean value of RSCA index is 0.28 with the range of -0.55 to 0.31. The estimates of the RSCA index are greater than zero in year 2018, 2019 and 2020. Therefore, it revealed that Sri Lankan mango exports have retained comparative advantage from 2018 to 2020. The values of NRCA index are fluctuating in between 0.000153 and 0.001160 with the mean value of 0.000406. Eventhough, the estimates of NRCA for the study period are greater than zero it shows the lesser increment from zero. Therefore, it revealed that the Sri Lankan mango exports have very weak comparative advantage. Moreover, the values of coefficient of variation of all the indices; RCA, RSCA and NRCA; are 82.90%, -110.47% and 86.12% respectively.

7.3.4 Revealed Comparative Advantage Indices for Papaya

Table 7.8: Estimates of RCA Indices in Papaya Exports (2010-2020)

Year	RCA	RSCA	NRCA
Min	6.833769	0.744695	0.003686
Max	36.143027	0.946154	0.022089
Mean	17.536893	0.850848	0.010499
SD	11.69332	0.077944	0.007226
CV	66.6784	9.160756	68.82697

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

The results in the Table 7.8 exhibits the estimates of various RCA indices for Sri Lankan papaya exports. The estimates of the Balassa's RCA index varying in the interval from 6.83 to 36.14 with the mean value of 17.54 revealed that throughout the study period, Sri Lankan papaya exports retained a strong comparative advantage position. The values of RSCA and NRCA indices are remained fluctuating between 0.74-0.95 and 0.004-0.02 with the mean values of 0.85 and 0.01

respectively indicating, comparative advantage of papaya exports in Sri Lanka. The values of coefficient of variation of all the indices; RCA, RSCA and NRCA; are 66.68%, 66.70%, 9.16%, and 68.83% respectively.

7.3.5 Revealed Comparative Advantage Indices for Avocado

Table 7.9: Estimates of RCA Indices in Avocado Exports (2010-2020)

Year	RCA	RSCA	NRCA
Min	0.000000	-1.000000	0.000000
Max	0.108383	-0.804430	0.000065
Mean	0.027654	-0.948172	0.000016
SD	0.035167	0.064052	2.13E-05
CV	127.1671	-6.75533	129.2557

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

Results of the estimates of various RCA indices in Avocado exports shown in Table 7.9. According to the study findings Avocado exhibited comparative disadvantage throughout the study period 2010-2020. The estimates of RSCA index remained fluctuating between -1.00 to -0.80 with the mean value of -0.95 indicating comparative disadvantage in Sri Lankan avocado exports. Further, the mean value of NRCA index is 0.00 and it reveals the neutral level of comparative advantage. Moreover, the values of coefficient of variation of all the indices; RCA, RSCA, and NRCA; are 127.17%, -6.75% and 129.25% respectively.

7.3.6 Revealed Comparative Advantage Indices for Lime & Lemon

The results in the Table 7.10 exhibits the estimates of various RCA indices for Sri Lankan lime & lemon exports. The values of Balassa's RCA index exhibited the comparative advantage throughout the study period except year 2010. The values of NRCA index are fluctuating in between 0.000035 and 0.000644 with the mean value of 0.00023. Eventhough, the estimates of NRCA for the study period are greater than zero it shows the lesser increment from zero. Therefore, it revealed that the Sri Lankan lime and lemon exports have very weak comparative advantage. Estimates of the RSCA index also exhibits the negative values from 2011 to 2020 while it is positive in year 2010. The values of coefficient of variation of all the indices; RCA, RSCA and NRCA; are 82.52%, -59.74%, and 79.91% respectively.

Table 7.10: Estimates of RCA Indices in Lime & Lemon Exports (2010-2020)

Year	RCA	RSCA	NRCA
Min	0.056076	-0.893803	0.000035
Max	1.153431	0.071249	0.000644
Mean	0.398412	-0.491214	0.000229
SD	0.328786	0.293462	0.000183
CV	82.52402	-59.7421	79.91192

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

7.4 Comparative Export Performance of Major Fruits: Asian Region (2010-2020)

CEP shows the comparative advantage in the country's export *a* (Sri Lanka) in relation to the country *b* (Each other Asian countries). If the index value is bigger than one then the country *a* (Sri Lanka) has a competitive advantage in relation to the country *b* (each other countries in Asian region) (Miteva-Kacarski, 2018).

The index of comparative export performance of selected major fruits in relation to other Asian Countries is shown in Annex 04, Annex 05, Annex 06, Annex 07, Annex 08 and Annex 09 respectively.

7.4.1 Comparative Export Performance in Banana

As per Annex 04, in 2020 Sri Lanka has a competitive disadvantage in Banana exports in relation to other Asian countries as follows: Georgia, India, Jordan, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Malaysia, Pakistan, the Philippines, Thailand, Turkey, Vietnam and Yemen. Consequently, some aforementioned Asian countries as Lao People's Democratic Republic, Lebanon, Pakistan, Philippines, and Yemen have retained competitive advantage in relation to Sri Lanka throughout the study period (2010-2020). That means these countries can be the major competitors for Sri Lanka's Banana exports with respect to Asian region. Further, India and Pakistan are the two major competitors in South Asian region.

7.4.2 Comparative Export Performance in Pineapple

Annex 05 reveals that in 2020 Sri Lanka has a competitive advantage in pineapple exports in relation to all Asian countries except the Philippines which retained competitive advantage in relation to Sri Lanka throughout the study period. It suggests that the Philippines can be a major competitor for Sri Lanka's pineapple exports in the Asian region. The Philippine's pineapples of the MD2 variety are well received by the world market especially Chinese market due to their high brix levels and their year-round supply (FAO, 2020).

7.4.3 Comparative Export Performance in Mango

Annex 06 depicts that in 2020 Sri Lanka has a competitive disadvantage in Mango exports in relation to Asian countries as follows; Cambodia, India, Indonesia, Israel, Myanmar, Pakistan, Philippines, Thailand, Vietnam and Yemen. Of aforementioned countries India, Israel, Pakistan, Philippines, Thailand and Yemen have retained competitive advantage in relation to Sri Lanka throughout the study period, suggesting that these countries can be the major competitors for Sri Lanka's Mango exports with respect to the Asian region while India and Pakistan are dominant in the South Asian region.

7.4.4 Comparative Export Performance in Papaya

Annex 07 reveals that in 2020 Sri Lanka has a competitive advantage in Papaya exports in relation to most of the aforementioned Asian countries. Further, Sri Lanka's papaya exports have retained competitive advantage in relation to majority of Asian countries throughout the study period (2010 – 2020).

7.4.5 Comparative Export Performance in Avocado

Annex 08 depicts that in 2020 Sri Lanka has a competitive disadvantage in Avocado exports in relation to Asian countries as follows; China Hong Kong SAR, Israel, Lebanon, Philippines, and United Arab Emirates. Of aforementioned countries only Israel and Lebanon have retained competitive advantage in relation to Sri Lanka throughout the study period, indicative of their potential to become the major competitors for Sri Lanka's Avocado exports with respect to Asian region.

7.4.6 Comparative Export Performance in Lime & Lemon

According to Annex 09, in 2020 Sri Lanka has a competitive disadvantage in lime and lemon exports in relation to the following Asian countries; China(Mainland), Cyprus, Georgia, Jordan, Kyrgyzstan, Lebanon, Syrian Arab Republic, Thailand, Turkey, United Arab Emirates and Vietnam. Of them Cyprus, Lebanon, Turkey, and Vietnam have retained competitive advantage in relation to Sri Lanka throughout the study period. That means these countries can be the major competitors for Sri Lanka's lime and lemon exports with respect to the Asian region.

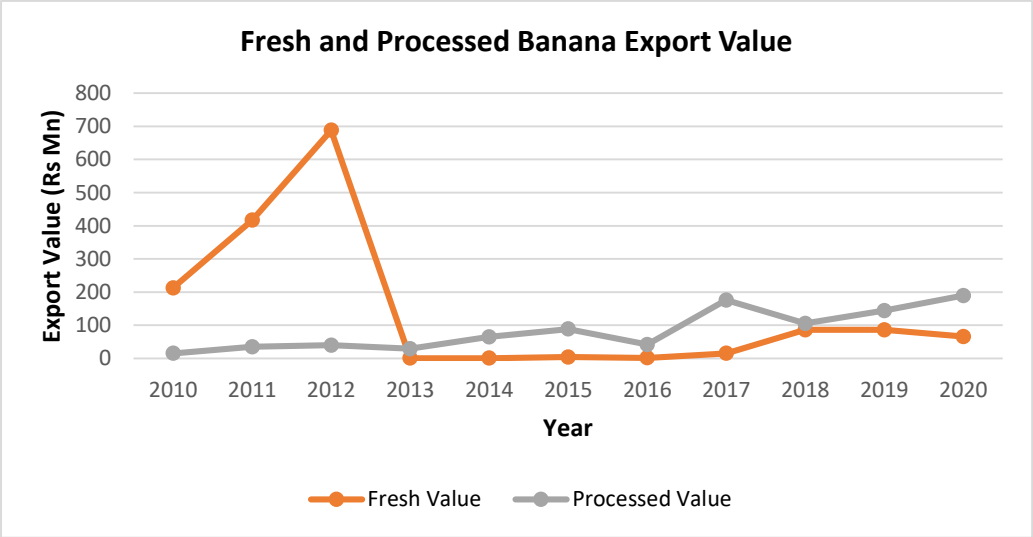
CHAPTER EIGHT

Growth Patterns and Trade Dynamics of Sri Lanka's Major Fruit Exports

8.1 Growth Patterns in Export of Fresh and Processed Fruits

8.1.1 Growth Pattern in Exports of Fresh and Processed Banana (2010-2020)

Sri Lanka's fresh banana exports have increased from 2010 to 2012, showing the highest export value in 2012. Thereafter, it recorded a huge decline in fresh banana exports in terms of value. From 2013 to 2017 it has exhibited a similar pattern and depicted a slight increment in 2018. However, from 2018 to 2019 fresh banana exports maintained a similar pattern and exhibited a slight decrease in 2020. Further, it is evident from Figure 8.1 that value of processed banana exports from Sri Lanka exhibited an upward trend through the years (2010-2020) with fluctuations.

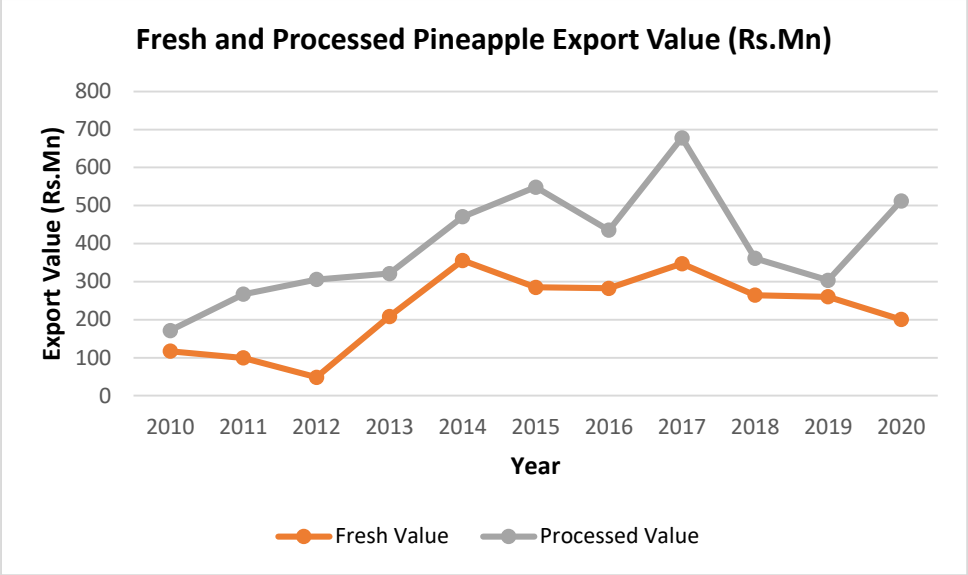


Source: Authors' Calculation based on Customs Data, 2021

Figure 8.1: Export Value of Fresh and Processed Banana (2010-2020)

8.1.2 Growth Pattern in Exports of Fresh and Processed Pineapple (2010-2020)

Export value of fresh and processed pineapples for the period 2010-2020 have been presented in Figure 8.2. From 2010 to 2012 fresh pineapple export value has decreased gradually and thereafter it has increased tremendously. In 2014 it has shown the highest export value. From 2014 to 2020 export value has shown a negative trend with some fluctuations (Figure 8.2). The export value for processed pineapple has shown a positive trend throughout the study period (2010-2020) with some fluctuations in 2016, 2018 and 2019 (Figure 8.2).

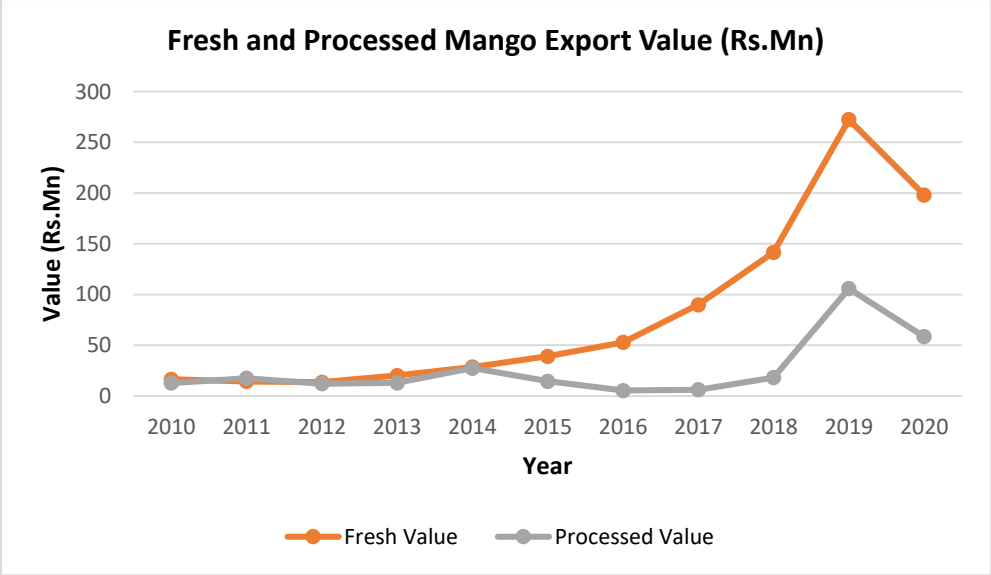


Source: Authors' Calculation based on Customs Data, 2021

Figure 8.2: Export Value of Fresh and Processed Pineapple (2010-2020)

8.1.3 Growth Pattern in Exports of Fresh and Processed Mango (2010-2020)

Export value of fresh and processed mango for the period 2010-2020 have been presented in Figure 8.3.

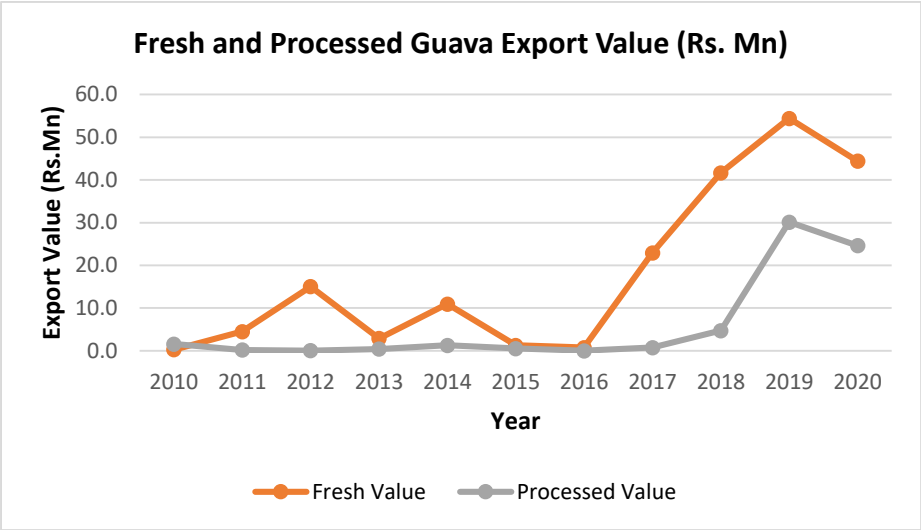


Source: Authors' Calculation based on Customs Data, 2021

Figure 8.3: Export Value of Fresh and Processed Mango (2010-2020)

As shown in Figure 8.3 except for the year 2020, there was an increasing trend for fresh mango export value. The highest value of both fresh and processed mango exports was recorded in the year 2019. This could be due to the highest production recorded in the same year. In 2020, the export value of both fresh and processed mango declined drastically.

8.1.4 Growth Pattern in Exports of Fresh and Processed Guava (2010-2020)



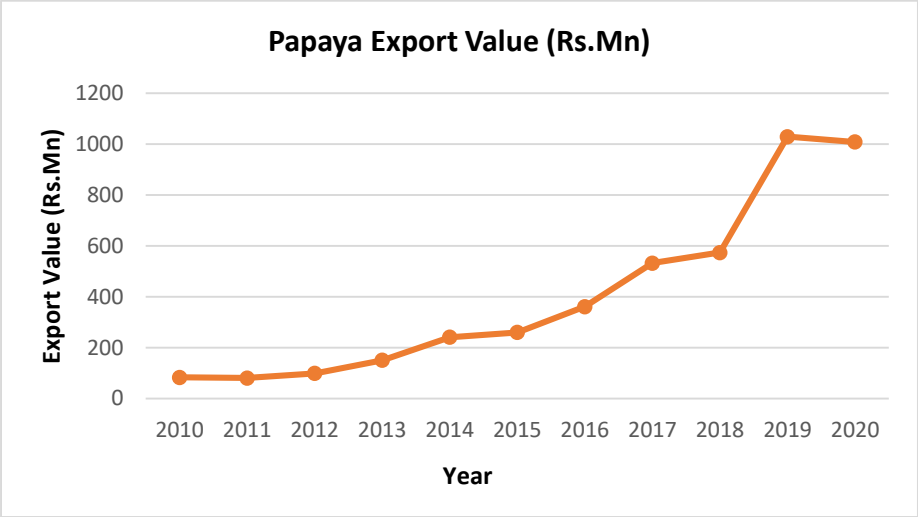
Source: Authors' Calculation based on Customs Data, 2021

Figure 8.4: Export Value of Fresh and Processed Guava (2010-2020)

As shown in Figure 8.4 the highest export value of both fresh and processed guava was recorded in the year 2019. However, in 2020 export value have declined due to low production.

8.1.5 Growth Pattern in Exports of Fresh Papaya (2010-2020)

Export value of fresh papaya for the period 2010-2020 have been presented in Figure 8.5. Export value of fresh papaya shown positive trend over the period and the highest value of papaya exports recorded in the year 2019. However, it has slightly declined in 2020.

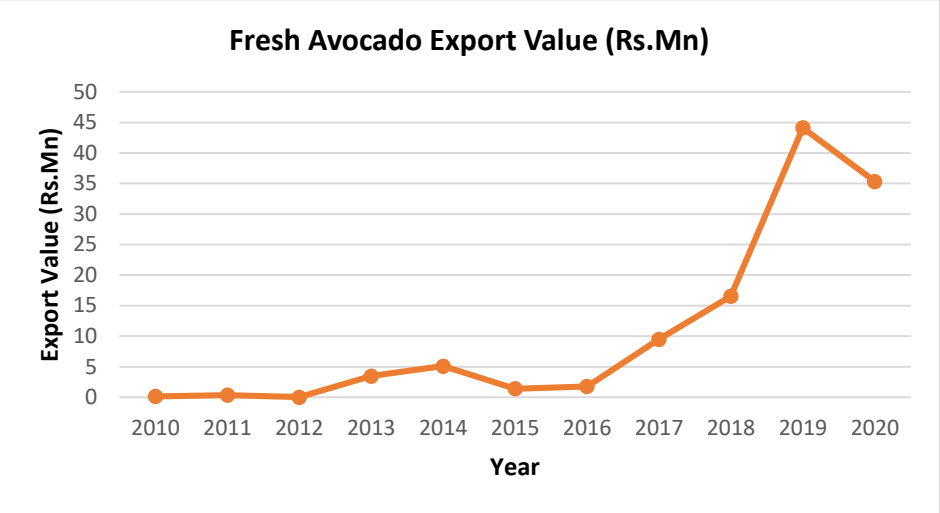


Source: Authors' Calculation based on Customs Data, 2021

Figure 8.5: Export Value of Papaya (2010-2020)

8.1.6 Growth Pattern in Exports of Fresh Avocado (2010-2020)

Export value of fresh avocado for the period 2010-2020 have been presented in Figure 8.6. Export value of fresh avocado shown positive trend over the period and the highest value was recorded in 2019. This could be due to the highest production in the same year.

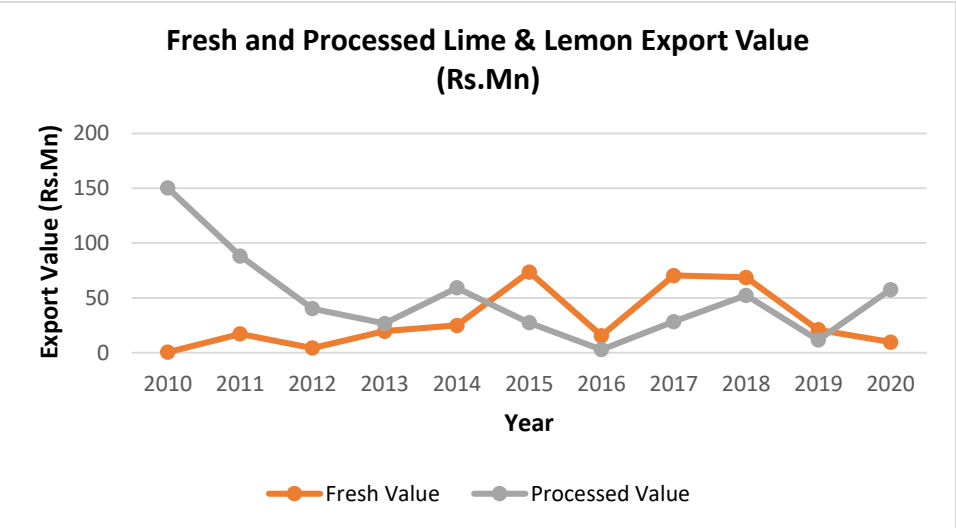


Source: Authors' Calculation based on Customs Data, 2021

Figure 8.6: Export Value of Fresh Avocado (2010-2020)

8.1.7 Growth Pattern in Exports of Fresh and Processed Lime & Lemon (2010-2020)

As shown in Figure 8.7, in overall period value of fresh lime & lemon exports exhibit significant fluctuations. During this time period the highest values for fresh lime and lemon exports in terms of value was recorded in the year 2015. This could be due to highest lime & lemon production in year 2015.



Source: Authors' Calculation based on Customs Data, 2021

Figure 8.7: Export Value of Fresh and Processed Lime & Lemon (2010-2020)

As shown in Figure 8.7, except 2014, 2018 and 2020, there was a decreasing trend for processed lime & lemon exports in terms of export value. The highest value was recorded in the year 2010 while the lowest was recorded in the year 2016.

8.2 Compound Growth Rates for Export Indicators of Fresh and Processed Fruits

Table 8.1: Compound Growth Rates for Different Export Indicators of Fresh Fruits (2010-2020)

Fruit	CGR (% Per Annum)		
	Quantity (Kg)	Value (Rs)	Unit Value (Rs/Kg)
Banana	-25.99^{NS} (0.3)	-9.15^{NS} (0.26)	22.71*(0.04)
Pineapple	-1.63^{NS} (0.05)	8.12^{NS} (0.04)	13.80*(0.01)
Mangoes			
Mango	26.80*(0.06)	39.01*(0.02)	8.40^{NS} (0.04)
Guava	22.14^{NS} (0.14)	43.91*(0.13)	16.76*(0.02)
Papaya	32.31*(0.01)	32.44*(0.01)	-0.75 ^{NS} (0.01)
Avocado	44.77 * (0.13)	68.60* (0.08)	43.30* (0.05)
Lime & Lemons	-12.08 ^{NS} (0.08)	8.76^{NS} (0.10)	10.47*(0.03)

Note: Figures in parentheses indicate standard errors, *significant at 5 per cent, NS –non significant
Source: Authors' Calculation based on Customs Data, 2021

It is evident from the Table 8.1, fresh avocado exhibited the highest positive growth rates in terms of quantity (44.77%), value (68.60%) and unit value of exports (43.30%) respectively. Consequently, these growth rates were statistically significant at 5 percent level. The results revealed that export quantity of all aforementioned fresh fruits except banana, pineapple and lime was found to be positively growing throughout the study period. Export value of banana (-9.15%) was found to be negatively growing while papaya (-0.75 %) exhibited negative growth in terms of unit value.

Table 8.2: Compound Growth Rates for Different Export Indicators of Processed Fruits (2010-2020)

Fruit	CGR (% Per Annum)		
	Quantity (Kg)	Value (Rs)	Unit Value (Rs/Kg)
Banana	19.61* (0.04)	25.52*(0.04)	5.29*(0.006)
Pineapple	-2.21^{NS} (0.02)	7.45*(0.03)	9.90 *(0.02)
Mangoes			
Mango	8.23 ^{NS} (0.09)	12.50 ^{NS} (0.08)	10.22*(0.03)
Guava	48.34* (0.02)	82.76* (0.11)	20.97* (0.05)
Lime & Lemons	-15.20* (0.06)	-10.73^{NS} (0.06)	5.33*(0.01)

Note: Figures in parentheses indicate standard errors, *significant at 5 per cent, NS –non significant
Source: Authors' Calculation based on Customs Data, 2021

As per the results in Table 8.2, processed guava exhibited the highest positive growth rates in terms of quantity (48.34%), value (82.76%) and unit value of exports (20.97%)

respectively. These growth rates were statistically significant at 5 percent level. Further, the results depicted that export quantity of all aforementioned processed fruits except pineapple and lime was found to be positively growing the period from 2010 to 2020. Export value of lime and lemon was found to be negatively growing.

8.3 Destination-wise Growth Rates and Instability in Export of Fresh and Processed Fruits

In here significant major importers of each fresh and processed fruit exports were selected. These selected importers belonged to top five to eight through the period from 2010 to 2020. However, destination wise growth rates were calculated by considering the sequential data availability from 2020 to backwards.

8.3.1 Destination - wise Growth Rates and Instability in Export of Fresh and Processed Banana from Sri Lanka

Table 8.3: Destination-wise Growth Rates and Instability in Export of Fresh Bananas (2017-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
AUSTRALIA	131.73	98.00	78.63	77.09
BAHRAIN	19.16	40.15	87.29	84.08
KUWAIT	2.92	17.97	76.89	74.94
OMAN	-33.73	-23.08	88.31	87.86
QATAR-DOHA	115.47	138.78	67.84	73.68
UAE	18.15	31.23	35.61	45.32
UK	223.32	292.61	108.91	126.80
Other	35.35	83.23	104.92	66.64
Total	27.93	56.42	53.90	53.17

Source: Authors' Calculation based on Customs Data, 2021

Major importing countries of Sri Lankan fresh bananas - Australia, Bahrain, Kuwait, Oman, Qatar-Doha, UAE, UK and others are presented in Table 8.3. Fresh banana exports to all major countries and others except Oman indicated positive growth in terms of quantity and value. Of Sri Lanka's major importers, United Kingdom recorded the highest positive growth rate of 223.32 percent and 292.61 percent in terms of quantity and values of exports respectively.

It was evident (Table 8.3) that fresh banana exports in terms quantity to Australia, Bahrain, Kuwait, Oman, Qatar-Doha, UK and other countries were relatively unstable compared to UAE (35.61%) as indicated by their coefficient of variation values (78.63%, 87.29%, 76.89%, 88.31%, 67.84%, 108.91%, and 104.92%). For UAE (45.32 %), the export of fresh banana in terms of value was found to be the most stable. Whenever the average quantity and the average value of exports were higher the variability co-efficient were low indicating stability in exports (Ushunde *et al.,* 2016).

Quantity of fresh banana exported to and value earned from UK (108.91% and 126.80%) were highly unstable due to changes in the volumes traded from 2017 to 2020.

Table 8.4: Destination-wise Growth Rates and Instability in Export of Processed Bananas (2014-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
France	19.84	24.68	73.59	78.84
Hungary	-15.40	-9.15	83.53	82.00
Japan	-8.78	-7.16	37.52	39.07
Saudi Arabia	-17.10	1.25	129.76	37.86
Other	17.74	22.19	46.44	51.31
Total	17.30	21.36	46.72	51.12

Source: Authors' Calculation based on Customs Data, 2021

Of major importing destinations of Sri Lanka's processed bananas presented in Table 8.4 France recorded the highest positive growth rate of 19.84 percent and 24.68 percent in terms of quantity and values of exports.

The instability was the highest in Saudi Arabia (129.76%) with respect to the quantity of processed banana exports and observed to be relatively low in terms of export value (37.86%). Processed banana exports to Japan were stable in terms of quantity (37.52%) and value (39.07%) respectively. It was observed in Table 8.4, that quantity of processed banana exported to and value earned from France (73.59% and 78.84%) and Hungary (83.53% and 82.00 %) were unstable during the study period.

8.3.2 Destination – wise Growth Rates and Instability in Export of Fresh and Processed Pineapples from Sri Lanka

Table 8.5: Destination-wise Growth Rates and Instability in Export of Fresh Pineapples (2010-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Germany	21.09	37.39	62.48	89.87
Maldives	13.09	24.54	63.21	78.81
UAE	-4.48	0.25	76.10	73.69
Other	-9.46	6.94	52.43	41.61
Total	-1.62	11.95	50.41	44.82

Source: Authors' Calculation based on Customs Data, 2021

As per Table 8.5, Sri Lanka's fresh pineapple exports to major import destinations: UAE, Germany, Maldives and others, recorded positive growth rates in value of exports respectively. Exports of fresh pineapples from Sri Lanka to Germany exhibited the highest positive growth rates of 21.09 percent and 37.39 percent in terms of quantity and value respectively.

It was observed from Table 8.5 that the exports of fresh pineapple in terms of both quantity and value to Germany (62.48% and 89.87%), Maldives (63.21% and 78.81%) and UAE (76.10% and 73.69%) were unstable as indicated by their co-efficient of variation values.

Table 8.6: Destination-wise Growth Rates and Instability in Export of Dried Pineapples (2011-2020)

Destinations	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Australia	-4.68	8.41	122.79	138.05
Germany	-14.89	-10.16	64.97	58.44
Japan	-1.43	-4.70	53.51	33.60
Netherlands	16.41	31.33	71.38	78.19
USA	0.51	8.93	72.85	94.29
Other	5.54	9.94	43.26	66.27
Total	-4.16	1.20	43.00	52.81

Source: Authors' Calculation based on Customs Data, 2021

Table 8.6 depicts the growth rates in export of dried pineapples from Sri Lanka to major importing countries and others. Major importing destinations of Sri Lankan dried pineapple exports were Australia, Germany, Japan, Netherlands and the USA Dried pineapple exports to Netherlands exhibited the highest positive growth rate of 16.41 percent and 31.33 percent in terms of export quantity and value respectively.

Quantity of dried pineapples exported to and value earned from Australia (122.79% and 138.05%) were highly unstable due to changes in the volumes traded throughout the study period. It was evident from Table 8.6 that, the export of dried pineapples in terms of quantity to Japan (53.51%) was unstable and observed to be relatively low in terms of export value (33.60%). The variability value for the quantity exported to other countries was observed to be relatively low compared to major export destinations mentioned in Table 8.6.

Table 8.7: Destination-wise Growth Rates and Instability in Export of Processed Pineapples (HS 200820) (2011-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Australia	5.66	8.21	79.73	81.33
Canada	-5.50	-1.16	46.31	43.81
Germany	-6.35	6.22	35.41	42.64
Italy	-6.29	-2.90	74.38	72.71
Other	-8.76	5.72	103.74	123.87
Total	-0.92	6.76	24.29	36.54

Source: Authors' Calculation based on Customs Data, 2021

Major importing destinations of processed pineapples (HS 200820) exports were Australia, Canada, Germany and Italy. Australia recorded the highest growth rates of 5.66 percent and 8.21 percent in terms of quantity and value.

The instability was the highest in case of other countries (103.74% and 123.87%) in both quantity and value of processed pineapple exports from Sri Lanka. For Germany, the export of processed pineapple (HS 200820) in terms of quantity and value were found to be most stable (35.41% and 42.64%) followed by Canada (46.31% and 43.81%). It was observed from Table 8.7 that, the export of processed pineapple in terms of quantity and value to Australia (79.73% and 81.33%) and Italy (74.38% and 72.71%) were unstable as indicated by their co-efficient of variation values.

Table 8.8: Destination-wise Growth Rates and Instability in Export of Processed Pineapples (HS 200949) (2014-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Australia	12.16	14.85	57.91	72.51
Germany	29.29	38.58	89.30	102.40
Other	12.99	20.07	141.41	136.87
Total	19.45	28.98	111.40	110.52

Note: HS 200949 denotes Pineapple juice
Source: Authors' Calculation based on Customs Data, 2021

Table 8.8 shows the growth rates in export of processed pineapples (HS 200949) from major importing destinations and others. Australia and Germany were the major importing countries. Germany recorded the highest growth rates of 29.29 percent and 38.58 percent in terms of quantity and value of processed pineapple exports respectively.

It was evident from Table 8.8 that the export of processed pineapples (HS 200949) in terms of quantity and value to other countries (141.41% and 136.87%) was most unstable followed by Germany (89.30% and 102.40%) and Australia (57.91% and 72.51%) respectively.

8.3.3 Destination - wise Growth Rates and Instability in Export of Fresh and Processed Mangoes from Sri Lanka

Table 8.9: Destination-wise Growth Rates and Instability in Export of Fresh Mangoes (2016-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Qatar-Doha	150.75	159.67	90.31	96.16
Switzerland	3.36	9.03	34.46	38.57
U.A.E.	68.55	80.88	63.44	71.89
Other	25.96	40.15	52.22	54.47
Total	38.35	45.53	53.87	57.78

Source: Authors' Calculation based on Customs Data, 2021

The major importing countries of Sri Lankan fresh mangoes are presented in Table 8.9. Export of fresh mangoes to Qatar-Doha recorded the highest positive growth rates of 150.75 percent and 159.67 percent in terms of quantity and value respectively.

Export of fresh mango to Switzerland (34.46%and 38.57%) was most stable in terms of quantity and value respectively while fresh mango exports to Qatar-Doha, UAE and other countries were unstable as indicated by their co-efficient of variation values in Table 8.9.

Table 8.10: Destination-wise Growth Rates and Instability in Export of Dried Mangoes (2018-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Australia	105.55	84.84	110.43	94.72
Bulgaria	347.21	280.84	97.71	95.78
Canada	38.02	29.76	65.38	61.47
Germany	171.40	152.99	78.94	79.58
Other	316.64	102.26	103.65	81.72
Total	294.05	103.96	99.25	77.29

Source: Authors' Calculation based on Customs Data, 2021

According to Table 8.10 dried mango exports from Sri Lanka to Bulgaria recorded the highest growth rates of 347.21 percent, 280.84 percent in terms of quantity and value of exports respectively. All major import destinations and other countries exhibited positive growth rates in quantity and value of Sri Lanka's dried mango exports.

For all major importing countries and others, the export of dried mango in terms of both quantity and value were found be unstable as indicated by their co-efficient of variation values in Table 8.10.

Table 8.11: Destination-wise Growth Rates and Instability in Export of Mango Pulp (2018-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Australia	431.48	254.42	83.33	77.84
Canada	-44.43	-39.71	104.01	102.14
Qatar-Doha	-58.84	-55.53	120.41	128.73
Other	-12.00	-48.89	25.13	56.32
Total	-12.51	-36.25	23.67	42.43

Source: Authors' Calculation based on Customs Data, 2021

It was evident that Australia, Canada and Qatar-Doha were the major importing countries of mango pulp exports from Sri Lanka (Table 8.11). Australia recorded the

highest positive growth rates of 431.48 percent and 254.42 percent in terms of quantity and value due to changes in volumes traded from 2018-2020 whereas, Canada, Qatar-Doha and other countries have shown negative growth rates in terms of quantity and value respectively.

The instability was the highest in case of Qatar-Doha (120.41% and 128.73%) with respect to quantity and value of mango pulp exports from Sri Lanka whereas, for other countries, the mango pulp exports in terms of value was found to be most stable (25.13%) while it was found to be relatively unstable in terms of value (56.32%). The quantity exported and value earned from Canada and Australia were highly unstable as indicated by their values of co-efficient of variation in Table 8.11.

8.3.4 Destination- wise Growth Rates and Instability in Export of Fresh Guavas from Sri Lanka

Table 8.12: Destination-wise Growth Rates and Instability in Export of Fresh Guavas (2017-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Bahrain	-17.89	-0.69	26.91	10.63
Kuwait	25.68	48.45	54.09	52.05
Maldives	130.17	121.48	100.66	83.61
Oman	-11.57	7.65	39.52	30.74
Qatar-Doha	61.98	78.42	52.03	57.21
Other	-6.48	14.17	24.90	24.84
Total	6.93	25.20	27.86	32.16

Source: Authors' Calculation based on Customs Data, 2021

Major import destinations of Sri Lankan fresh guavas are Bahrain, Kuwait, Maldives, Oman and Qatar-Doha as presented in Table 8.12. Maldives recorded the highest positive growth rates of 130.17 percent and 121.48 percent in terms of quantity and value of fresh guava exports respectively. Bahrain, Oman and other countries recorded negative growth rates in terms of quantity while only Bahrain recorded negative growth rate in terms of exports value.

For Bahrain, the exports of fresh guava in terms of value was found to be most stable (10.63%) followed by other countries (24.84%) and Oman (30.74%). Consequently, guava exports to other countries (24.90%) were found to be most stable in terms of quantity followed by Bahrain (26.91%) and Oman (39.52%). The instability was highest in case of Maldives (100.66% and 83.61%) with respect to quantity and value of fresh guava exports from Sri Lanka. Further, it was observed (Table 8.12) that the quantity exported to and value earned from Kuwait (54.09% and 52.05%) and Qatar-Doha (52.03% and 57.21%) were unstable.

8.3.5 Destination- wise Growth Rates and Instability in Export of Papaya from Sri Lanka

Table 8.13: Destination-wise Growth Rates and Instability in Export of Papaya (2012-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Australia	0.42	11.19	56.59	46.23
Bahrain	75.08	105.11	97.23	116.62
Germany	10.43	15.01	66.22	46.32
Other	31.94	34.46	76.21	74.50
Total	31.92	33.89	75.94	73.49

Source: Authors' Calculation based on Customs Data, 2021

Table 8.13 presents the growth rates in papaya exports from Sri Lanka to major importing markets and other countries. Exports of papaya to all major destinations and others have shown positive growth rates in quantity, value and unit value of exports respectively. Of major import destinations, Bahrain recorded the highest positive growth of 75.08 percent and 105.11 percent in terms of quantity and value respectively.

It is evident from Table 8.13 that the instability was highest in case of Bahrain (116.62% and 97.23%) in terms of value and quantity while the instability was lowest in Australia (46.23% and 56.59%) as indicated by their co-efficient of variation.

8.3.6 Destination- wise Growth Rates and Instability in Export of Fresh Avocados from Sri Lanka

Table 8.14: Destination-wise Growth Rates and Instability in Export of Fresh Avocados (2016-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Bahrain	81.46	122.71	59.41	77.27
Maldives	108.26	159.26	126.25	103.06
Saudi Arabia	114.06	186.64	103.44	99.44
UAE	-15.88	28.58	48.93	57.43
Other	187.01	200.55	67.09	73.81
Total	48.89	112.04	71.96	82.75

Source: Authors' Calculation based on Customs Data, 2021

Table 8.14 revealed that Bahrain, Maldives, Saudi Arabia and UAE were the major export destinations of fresh avocados from Sri Lanka. All the countries given here recorded positive growth rates in quantity of fresh avocado exports except UAE whereas, all major import destinations and other countries showed positive growth

rates in terms of value of avocado exports. Of major importing countries, Saudi Arabia recorded the highest positive growth rates of 114.06 percent and 186.64 percent with respect to quantity and value respectively. Further, other countries have shown the highest positive growth rates in terms of value (200.55%) and quantity (187.01%), which implies the need to explore and exploit the market potential of other countries.

The quantity of fresh avocado exported to and value earned from Maldives (126.25% and 103.06%) were highly unstable due to changes in the volumes traded from 2016-2020. The value earned by the exports of fresh avocado from Sri Lanka was also unstable for Saudi Arabia, Bahrain, other countries and U.A.E with co-efficient of variation of 99.44 percent, 77.27 percent, 73.81 percent and 57.43 percent respectively. However, the variability assessed for U.A.E (48.93% and 57.43%) was observed to be relatively low in terms of quantity and value (Table 8.14).

8.3.7 Destination- wise Growth Rates and Instability in Export of Fresh and Processed Lemons from Sri Lanka

Oman, Qatar-Doha, Saudi Arabia and UAE were the major import destinations of Sri Lankan fresh lemons from 2017 to 2020 (Table 8.15). All major importing countries and other countries recorded negative growth rates in quantity and value of exports except Qatar-Doha whereas, Qatar-Doha recorded the highest positive growth rates of 42.24 percent and 26.93 percent in terms of quantity and value of fresh lemon exports respectively.

Table 8.15: Destination-wise Growth Rates and Instability in Export of Fresh Lemons (2017-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Oman	-55.28	-50.88	75.34	62.14
Qatar-Doha	42.24	26.93	119.86	52.93
Saudi Arabia	-75.63	-70.06	102.39	95.47
UAE	-42.99	-36.16	105.47	67.84
Other	-19.76	-25.59	98.80	89.24
Total	-47.52	-51.23	81.47	74.86

Source: Authors' Calculation based on Customs Data, 2021

Instability was the highest in case of Qatar-Doha (119.86%) with respect to export quantity of fresh lemons and it observed to be relatively low in terms of value (52.93%). It was observed from Table 8.15 that, the exports of fresh lemons in terms of quantity and value to major import destinations and other countries were unstable as their co-efficient of variation values were almost greater than 50 percent.

Table 8.16: Destination-wise Growth Rates and Instability in Export of Dried Lemons (2017-2020)

Destination	Growth Rate (% Per Annum)		Instability (CV)	
	Quantity	Value	Quantity	Value
Maldives	-43.03	-39.30	54.71	50.72
Saudi Arabia	12.43	13.67	66.79	75.10
UAE	15.34	43.09	91.59	125.78
Other	-0.89	-6.44	90.20	76.70
Total	9.24	6.28	58.06	57.39

Source: Authors' Calculation based on Customs Data, 2021

Table 8.16 illustrates the growth rates in dried lemons exports from Sri Lanka in major importing markets. Other countries recorded negative growth rates in terms of quantity and value of exports respectively. At the same time, Maldives recorded negative growth rates of -43.03 percent and -39.30 percent in quantity and value of exports. Further, UAE exhibited the highest positive growth rates of 15.34 percent and 43.09 percent in terms of quantity and value of dried lemons exports from Sri Lanka.

The value earned by the exports of dried lemons from Sri Lanka was highly unstable for UAE with a Co-efficient of variation of 125.78 percent. The quantity exported to and value earned from Maldives (54.71% and 50.72%) were unstable and observed to be relatively low with respect to other export destinations (Table 8.16).

CHAPTER NINE

Potentials and Challenges for Fruit Export Sector

9.1 Potentials for Fruit Export Sector in Sri Lanka

9.1.1 Potential Commodities in Major Fruits in Sri Lanka: Weighted Average Score Analysis

Based on the methodology and the weightage given, researchers have analyzed major fruits produced in Sri Lanka and calculated their individual scores. The individual scores of the major fruits are exhibited in Table 9.1.

Table 9.1: Individual Scores of Major Fruits

Fruit Crop	Individual Score Calculated	Rank
Pineapple	7.72	1
Banana	8.12	2
Papaya	9.82	3
Mango	10.02	4
Avocado	10.32	5
Lemon	10.35	6

Source: Authors' Own Calculation Based on Agricultural Statistics, Department of Census and Statistics and Sri Lanka Customs

The scores depicted above are calculated on ranking basis, therefore lower the score the more is the export potential of the crop. The results revealed that pineapple has topped based on the scores above. Further, this is in accordance with the results shown in ADB (2017).

9.1.2 Potential Fruit Crops for Export: Key Informants' Insights

Sri Lankan pineapple, mangosteen, ripe jack fruit, avocado, rambutan, star fruit and anoda (soursop) have a unique flavour. Therefore, tropical produce of Sri Lankan origin such as pineapple, mango, rambutan, mangosteen, and passion fruits are very popular around the world due to their unique characteristics such as flavour, aroma and colour (Export Development Board, 2022). Owing to nutritional and health benefits of consuming these fruits the demand for these fruits, in both fresh and processed forms, are clearly on the rise. Table 9.2 presents the fruit exports that are in high demand as mentioned by key informants attached to EDB and FRDI and associations (LFVPPEA).

Table 9.2: Fruit Exports that are in High Demand

Product Type	Potential Fruit	Variety
Primary (fresh fruits)	Pineapple	Mauritius
	Banana	Cavendish
	Mango	TJC, Karthakollomban, Villard
	Papaya	Redlady,Tanin
	Passion fruit	
	Soursop	
	Mangosteen	
	Rambutan	Malwana special
	Avocado	Hass
Value Added Products	Jackfruit	
	Pineapple	
	Banana	
	Mango	
	Papaya	
	Fruit cocktail	
	Soursop Juice & Leaves	

Source: HARTI Key Informants Survey, 2021

Table 9.3 depicts the fruit varieties which are developed for export purposes and most of these varieties are currently exported by Sri Lanka as fresh or processed products.

Table 9.3: Fruit Varieties Developed for Export Purposes

Fruit Crop	Potential Exportable Varieties
Banana	Nadee (Sour Banana)
	Agra (Kolikuttu)
	Gannoruwa Rathambala (Red Banana)
Pineapple	Mauritius
	Kew
Mango	TOM EJC
Guava	Horana Rosy
	Pubudu
Papaya	Horana Papaya Hybrid
	Redlady
Avocado	Hass
Lime	Horana Lime 1
Passion Fruit	Horana Yellow, Rahangala
Durian	Horana Jambo, Kasun, Gannoruwa Sweet, Horana gold
Watermelon	Thilini
Rambutan	Malwana special

Source: HARTI Key Informant Survey Data, 2021

9.1.3 Potential Fruit Crops for Export: Exporters' Insights

Table 9.4: Potential Fruit Products for Export – Exporters' View

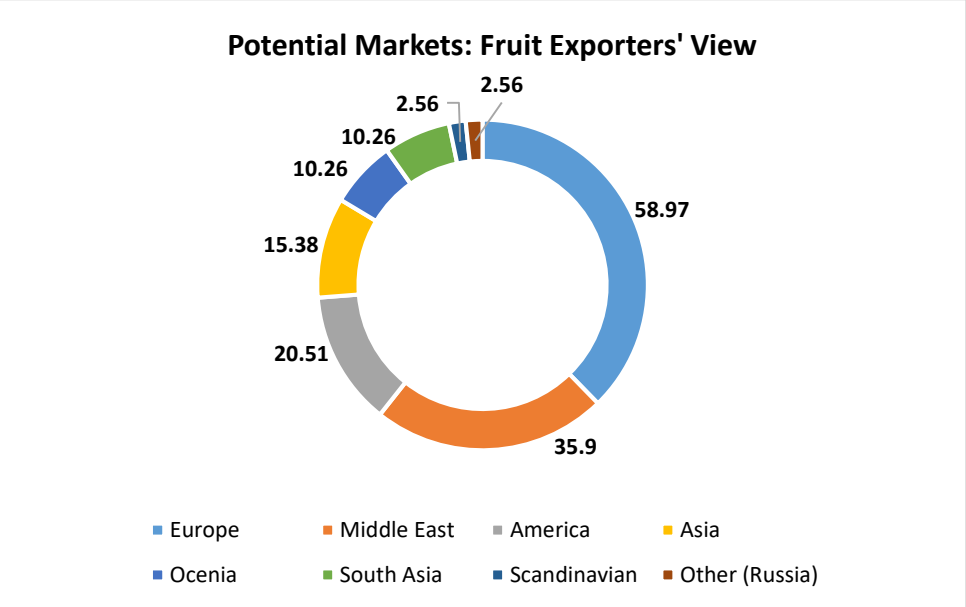
Type	Products
Fresh Fruits	Pineapple, Watermelon, Jackfruit, Mango, TJC Mango, Banana, Banana(Cavendish), Soursop, Durian, Passionfruit, Woodapple, Guava, Rambutan, Mangosteen
Processed	Organic products, vegan food, dehydrated fruits, value-added products

Source: HARTI Fruit Exporters' Survey, 2021

A vast majority of surveyed fresh and processed fruit exporters mentioned that above fruit products have the export potential (Table 9.4).

9.1.4 Potential Markets for Sri Lankan Fruit Exports

As stated by key informants, China, Jordan, Singapore, Korea, Japan and Russia are the potential new markets for Sri Lankan fruit exports. Figure 9.1 depicts the export regions that are believed to have export potential in future for Sri Lankan fresh and processed fruits.



Source: Authors' Compilation based on Survey Data, 2021

Figure 9.1: Potential Regions according to Fruit Exporters

According to the majority (58.97%) of the surveyed fruit exporters, Europe has the highest potential for Sri Lankan fresh and processed fruit exports, followed by Middle East (35.90%), America (20.51%), and Asia (15.8%). A similar percentage (10.26%) of fruit exporters mentioned that Oceania and South Asia are potential regions as well. However, five percent of exporters indicated that Scandinavian countries and Russia can be considered as potential markets for Sri Lankan fresh and processed fruits in future.

9.2 Estimation of Export Potential through Gravity Model

Data limitations restrict the study from employing disaggregate level data for each fresh and processed fruit exports. Therefore, aggregate data of major fresh and processed fruit exports such as banana, pineapple, mango, papaya, avocado, and lime were considered for the current analysis. Further, in here Stochastic Frontier Approach (SFA) was performed by applying a time-varying decay efficiency model because data limitations restrict the study from employing an elaborative inefficiency model which would have identified the specific factors that impede or enhance efficiency.

All statistical tests regarding the gravity model were done using STATA version 15. Prior to estimation, all time series variables were tested for unit root by employing the Harris-Tzavalis unit root test. This Harris-Tzavalis unit root test (1999) assumes that the number of time periods is fixed while the number of panels tends to infinity, that is a higher number of panels compared to the time periods required. The results show that GDPit, GDPjt, POPjt, POPit and REERijt are non-stationary. As stated in empirical analysis it is common that GDP and Population to have unit roots (Wickramarachchi, 2019). Therefore, another unit root test called Hadri (2000) was also employed. In this test the null hypothesis is that all panels are stationary, and the alternative hypothesis is that at least one panel has a unit root. Accordingly, all variables in time series nature were found to be stationary, and the results were also highly significant. The gravity model is estimated using SFA. In this study, SFA was employed with a time-varying decay efficiency model. This is justified by the eta value of the output which is statistically significant (p=0.000). The gamma value (ϒ) is 0.63 justifies the use of a stochastic frontier model to estimate export potential as it implies that both behind the border constraints and the country-specific beyond the border factors of importing countries are responsible for a major portion of the total variation in the model (Wickramarachchi, 2019).

Results of pooled OLS were presented in Table 9.5, but only as a reference, since OLS estimates are biased and inconsistent due to heterogeneity across countries (Wickramarachchi, 2019).

Table 9.5: Estimates of OLS

Predictors	Coefficient	Standard Error	P value
Log (GDPit)	-0.165	1.401	0.906
Log (GDPjt)	1.635***	0.430	0.000
Log (POPit)	22.718***	6.785	0.001
Log (POPjt)	-.571	0.394	0.149
Log (PCGDPDijt)	-.247	0.385	0.522
Log (DISTij)	-2.891***	0.307	0.000
Log (REERijt)	0.216***	0.075	0.004
Log (COLij)	-0.844*	0.445	0.060
No of Observations	165		
R^2	0.4810		
Adjusted R^2	0.4544		

Note: ***Variables significant at 1% **Variables significant at 5.0% * Variables significant at 10.0%
Source: Authors' Estimates, 2021

Table 9.6 summarizes the estimates of SFA. The GDP of Sri Lanka shows a negative sign and it is statistically significant at 10 percent. However, GDP of partner countries shows a positive sign though statistically not significant. Consequently, with the growth of GDP of partner countries the exports of Sri Lanka increase due to their higher income and demand. Both population parameters are positive and only POPit was statistically significant.

Table 9.6: Estimation Results for Fruit Exports

Predictors	Coefficient	Standard Error	P value
Log (GDPit)	-1.855*	1.085	0.087
Log (GDPjt)	0.311	0.426	0.465
Log (POPit)	12.108**	5.229	0.021
Log (POPjt)	0.381	0.382	0.318
Log (PCGDPDijt)	1.788***	0.462	0.000
Log (DISTij)	-3.117***	0.403	0.000
Log (REERijt)	0.234*	0.132	0.075
Log (COLij)	-1.391***	0.513	0.007
No of Observations	165		
eta	0.113*	0.021	0.000
Gamma	0.628	0.430	

Note: ***Variables significant at 1% **Variables significant at 5.0% * Variables significant at 10.0%
Source: Authors' Estimates, 2021

As per the results in Table 9.6, PCGDPD is positive and significant. Hence, the Hekscher-Ohlin theory holds for the exports of Sri Lanka. Differences in income level and factor endowments with respect to partner countries have a positive effect on fresh and processed fruit exports of Sri Lanka.

Distance is negatively correlated with Sri Lanka's fruit exports with statistically significance being at one percent, implying that even at present with modern transport facilities distance plays a crucial role.

REER is positive and significant as per the existing literature (Hulugalle, 1989; Weliwita and Tsujii, 2000). However, this result is in contrast with some past studies (Wickramarachchi, 2019). High domestic inflation sometimes results in appreciations of the real exchange rates. Therefore, the results further indicate that the growth in Sri Lanka's exports is positively influenced by the growth in incomes in the importing countries. Devaluation has failed to play a significant role in boosting fruit exports from Sri Lanka while the growth in the country's exports can be credited to effective export promotion programmes and improvements in the production base (Weliwita and Tsujii, 2000).

Coefficient for COL has a negative sign and it is statistically significant. Further, this depicts that Sri Lanka's fruit export performance is not supported by colonial relationships. Accordingly, most of the estimation results are in line with the existing literature even though some variables were found to be statistically not significant.

Table 9.7: Results of Sri Lanka's Potential Fruit Exports: 2010-2020 Average (Rs)

Country	Average of Actual Export	Average of Potential Export	Ratio of Actual to Potential	Unused Potential
Australia	14763190.45	112552817.30	0.131167	87%
Bahrain	13247919.41	32886702.68	0.402835	60%
Canada	19040751.82	22705239.86	0.838606	16%
Czech Republic	2638056.54	4557904.12	0.578787	42%
Japan	39362308.27	123320699.40	0.319187	68%
Kuwait	19987041.36	151878003.50	0.131599	87%
Maldives	33867801.60	59793556.34	0.566412	43%
New Zealand	10555341.82	10086644.79	1.046467	-5%
Oman	23067407.36	97233954.66	0.237236	76%
Qatar	48963932.09	381444010.10	0.128365	87%
Saudi Arabia	145929050.60	123095171.00	1.185498	-19%
Switzerland	20294583.27	160163072.30	0.126712	87%
UAE	409273786.30	378165462.60	1.082261	-8%
UK	22171353.22	31654866.21	0.700409	30%
USA	142327567.20	164184720.00	0.866875	13%

Source: Authors' Estimates, 2021

Maximum Likelihood Estimates of gravity stochastic frontier model was used to estimate the destination-wise potential of the fresh and processed fruit exports of Sri Lanka. Table 9.7 and Table 9.8 present the country-wise and region-wise results respectively. Table 9.7 shows that most of the countries except New Zealand, Saudi Arabia, and UAE have potential for trade during 2010-2020. Therefore, Sri Lanka can enhance fresh and processed fruit trade with above countries that have trade

potential for over the eleven years in place of the countries which have exceeded the trade potential.

Table 9.8: Region-wise Export Results: 2010-2020 Average (Rs)

Region	Actual Exports	Potential Exports	Ratio of Actual to Potential	Unused Potential (%)
European	45103993.04	196375842.60	22.97	77.03
American	161368319.00	186889959.80	86.34	13.66
Oceania	25318532.27	122639462.10	20.64	79.36
Middle East	660469137.20	1164703305.00	56.71	43.29
Asian	39362308.27	123320699.40	31.92	68.08
South Asia	33867801.60	59793556.34	56.64	43.36

Source: Authors' Estimates, 2021

According to the results in Table 9.8, the American region had been the preferred destination for Sri Lanka's major fresh and processed fruit exports followed by Middle East and South Asia. The results depict that Sri Lanka has not tapped more than 50 percent of its potential in the Oceania (79.36%), Europe (77.03%) and the Asian region (68.08%).

9.3 Challenges for Fruit Export Marketing Channel Actors

9.3.1 Problems Faced by Export-oriented Fruit Farmers

Challenges for export-oriented fruit farmers can be categorized into input related issues, labour issues, marketing issues, extension issues and other crop related issues.

Table 9.9: Input Related Issues

Input Related Issues	Frequency	Percentage of Cases*70
Fertilizer	60	85.71
Pesticides	41	58.57
Limited Land or have to rent land for cultivation	26	37.14
Difficult to buy quality seed materials	14	20.00
No proper equipment	13	18.57
Water issues	10	14.29
Total	164	234.29

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Compilation based on Field Survey, 2021

The majority (85.71%) of the surveyed fruit farmers lamented over lack of quality fertilizers while 58.57 percent of farmers are in a struggle to find effective pesticides. Further, 37.14 percent of sample farmers indicated that they have limited land and therefore have to rent land for cultivation. About 20 percent of farmers are faced problems in finding quality seed materials while 18.57 percent of farmers do not have proper equipment. The rest (14.29%) were affected by water issues.

Table 9.10: Labour Issues

Labour Issues	Frequency	Percentage of Cases *52
High cost of labour	33	65.38
Shortage of skilled labour	32	61.54
Total	66	126.92

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Compilation based on Field Survey, 2021

The majority (65.38%) of the respondent farmers are affected by high labour cost (Table 9.10). Around 61.54 percent of farmers mentioned that shortage of skilled labour is also a major issue.

Table 9.11: Marketing Issues

Marketing Issues	Frequency	Percentage of Cases *70
Low price	33	47.14
Difficulties in finding a suitable market	26	37.14
Delay of payment by the exporters	22	31.43
Transport difficulties	17	24.29
Price fluctuations	1	1.43
Total	99	141.43

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Compilation based on Field Survey, 2021

Nearly half of the surveyed fruit farmers (47.14%) said they have received low prices for their products. Some of the farmers said that they have signed agreements with exporters therefore they have to sell their products at previously agreed prices despite the high market price. Finding a suitable market for their products, delayed payments and transport difficulties were other major issues. Price fluctuations have affected fewer farmers.

Table 9.12: Extension Issues

Extension Issues	Frequency	Percentage of Cases*37
Lack of support from the government	34	91.89
Poor extension service	22	59.46
Total	56	151.35

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Compilation based on Field Survey, 2021

A vast majority (91.89%) of the respondent farmers suffer from a lack of support from the government while another sizable population expressed dissatisfaction over the existing extension services (Table 9.12).

Table 9.13: Crop Related Other Issues

Crop Related Other Issues	Frequency	Percentage of Cases*53
Pest & Diseases: Fungal attacks on papaya/mango seed weevil attack /especially *Kanda panuwa* incurs a huge loss to pineapple cultivation/Sigatoka disease in banana/ Mealy bug problem in Guava	51	96.23
Animal attacks: Monkey/toque macaque/squirrels/wild elephant /wild boar/ rat	6	11.32
Lack of infrastructure facilities for storage	2	3.78
Sudden Climatic changes	1	1.89
Total	60	113.21

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Compilation based on Field Survey, 2021

For a great majority (96.23 %) pests and diseases are the major crop-related issue. For instance, banana farmers have to face Sigatoka disease in their cultivations. Further, mango seed weevil and scale insects cause damage to mangoes as well as *kanda panuwa* makes a huge loss to pineapple cultivation. Animal attacks, sudden climatic changes, a lack of infrastructure facilities for storage are other pressing issues.

9.3.2 Problems Faced by Collectors

Table 9.14: Challenges Faced by Surveyed Fruit Collectors

Challenges	Frequency	Percentage of Cases*21
High risk of loss due to highly unstable prices	17	80.95
Low profit during the peak season	15	71.43
High cost of labour	9	42.86
They must bear the cost of wastage	8	38.10
Shortage of skilled labour	6	28.57
Pest Problems	3	14.28
Other	2	9.52
Total	60	285.71

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Compilation based on Field Survey, 2021

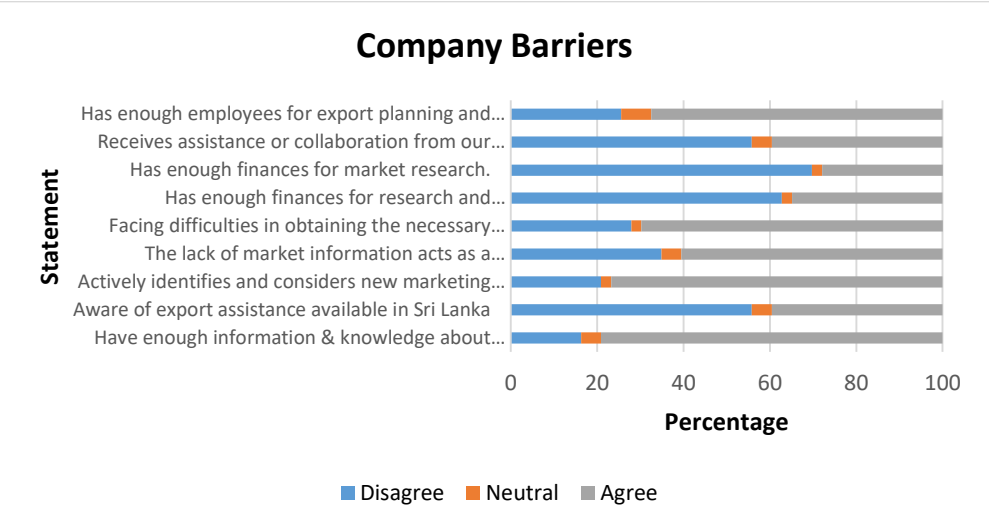
Challenges faced by surveyed fruit collectors were shown in Table 9.14. High risk of loss due to highly unstable prices affects the most (80.95%). Receiving low profits during the peak season, the high cost of labour, skilled labour shortage and pests damaging the crops were other daunting challenges. Fewer collectors cited the fertilizer shortage and lack of essential hormones that induce ripening and adverse effects of the pandemic as impediments.

9.3.3 Barriers to Fresh and Processed Fruit Exporters

9.3.3.1 Internal Barriers

Internal barriers can be further divided into company barriers and product barriers (Tesfom and Lutz, 2006).

Company Barriers



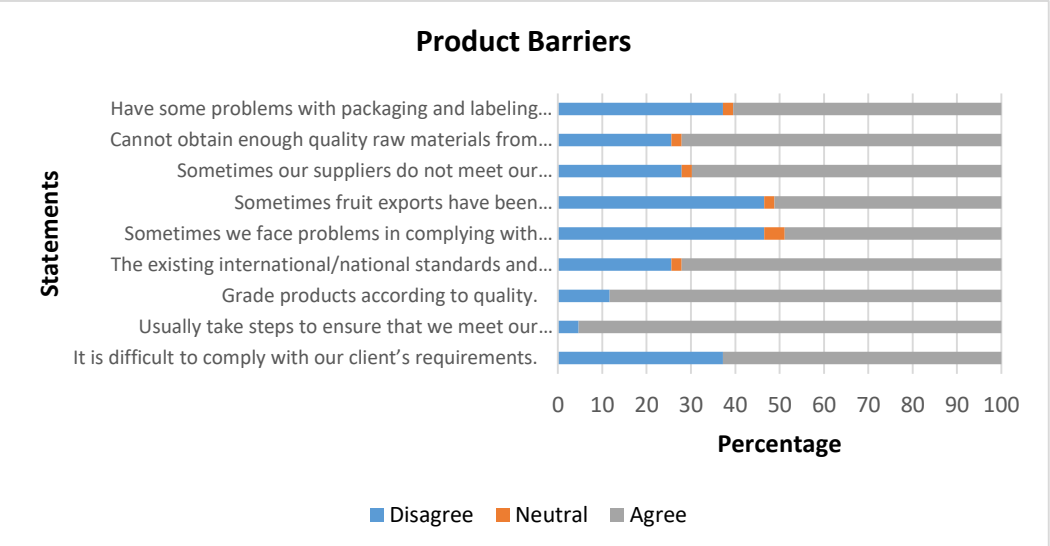
Source: Authors' Calculation based on Exporters' Survey, 2021

Figure 9.2: Exporters' Perception Regarding Company Barriers

Majority (79.07%) of the respondents said that they have enough information and knowledge about aspects related to export activity while 76.74 percent mentioned that their firm actively identifies and considers new marketing opportunities. Further, 67.44 percent of surveyed fruit exporters indicated that their firm has employee strength for export planning and other activities. Therefore, these aforementioned factors do not act as a barrier. However, 60.47 percent of respondents admitted that the lack of market information is a constraint in market selection and development. Majority face difficulties in obtaining funds to finance export operations. An increased number of fruit exporters lamented over lack of finances for research and development such as value-added product development. It was revealed by many that funds are inadequate even for market research. Further, majority (55.81%) mentioned that they did not receive assistance or collaboration from their clients.

Product Barriers

Most (62.79%) of the respondents indicated that it is difficult to comply with their client's requirements and a vast majority (95.35%) said they ensure that their client's specifications are met. Further, a great majority grade products according to quality. As per Figure 9.3, for 72.09 percent of the respondents mentioned that the existing international/national standards and regulations affect their business. Complying with standards is another major issue as fruit exports tend to get rejected/returned due to non-compliance with the standards. Further, suppliers not meeting their requirements and hardships in accessing quality raw materials as well as packaging and labeling issues have affected many.



Source: Authors' Calculation based on Exporters' Survey, 2021

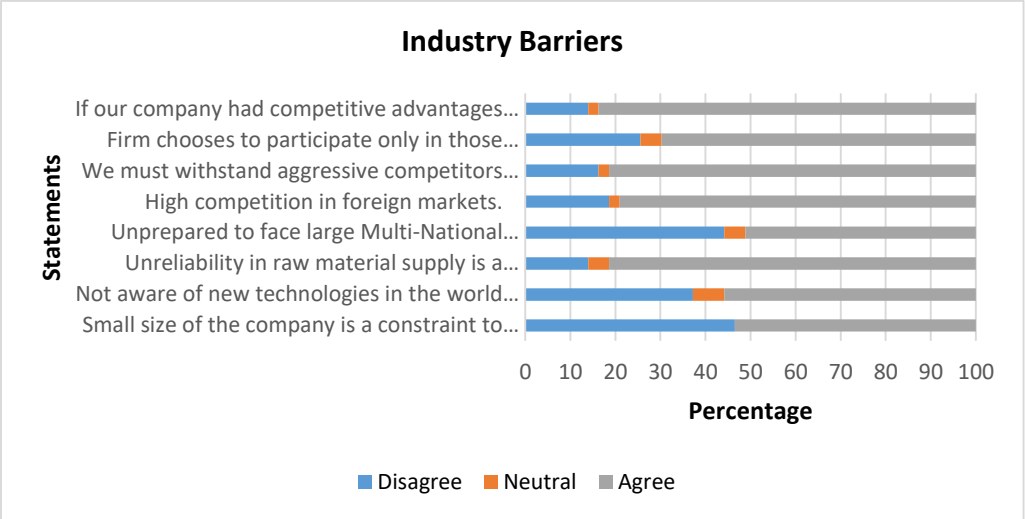
Figure 9.3: Exporters' Perception Regarding Product Barriers

9.3.3.2 External Barriers

Exporter's perception regarding external barriers as industry barriers, market barriers and macro-environmental barriers exhibited in Figure 9.4, Figure 9.5 and Figure 9.6 respectively.

Industry Barriers

Most of the surveyed fresh and processed fruit exporters indicated that the scale of the company is crucial to enter the export market; large scale firms benefit more. Lack of knowledge regarding new technologies in the world market (55.81%), unsteady raw material supply (81.40%), and high competition from foreign markets (79.07%) have hindered many. A vast majority have decided to withstand aggressive competitors in the foreign market. Therefore, about 69.77 percent of them chooses to participate only in those markets where they have an advantage over their competitors. Further, a great majority indicated that if their company had competitive advantage in the international market, they would pursue those markets.

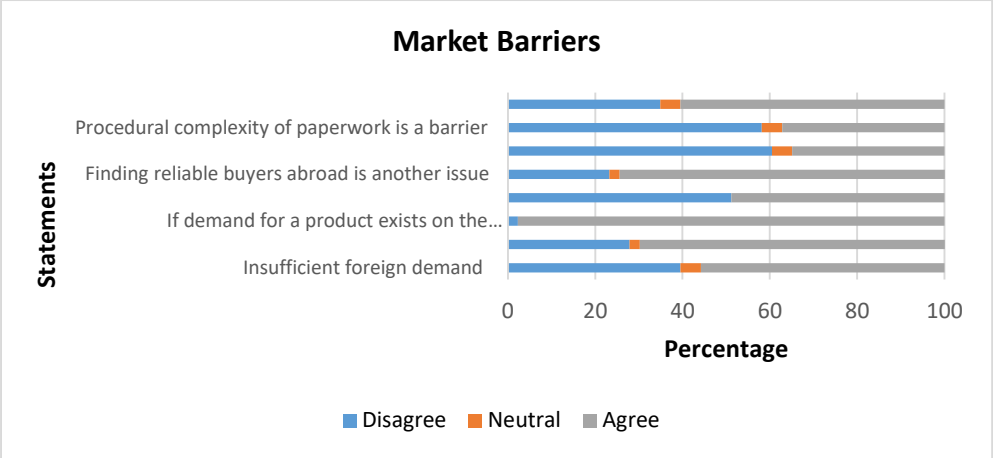


Source: Authors' Calculation based on Exporters' Survey, 2021

Figure 9.4: Exporters' Perception Regarding Industry Barriers

Market Barriers

More than half of the respondents stated that finding reliable foreign buyers, poor demand, fluctuations in demand at the export markets and delay of payments/ delay in duty drawbacks are issues in export procedures. A vast majority agreed that if demand for a product existed on the international market, they would be interested in pursuing it. However, more than half of the respondents postulated that they did not pursue markets that are only constituted of their predetermined "ideal" characteristics. However, majority of the respondents denied claims that language and cultural differences being challenges in addressing customer preferences and procedural complexity of paperwork.

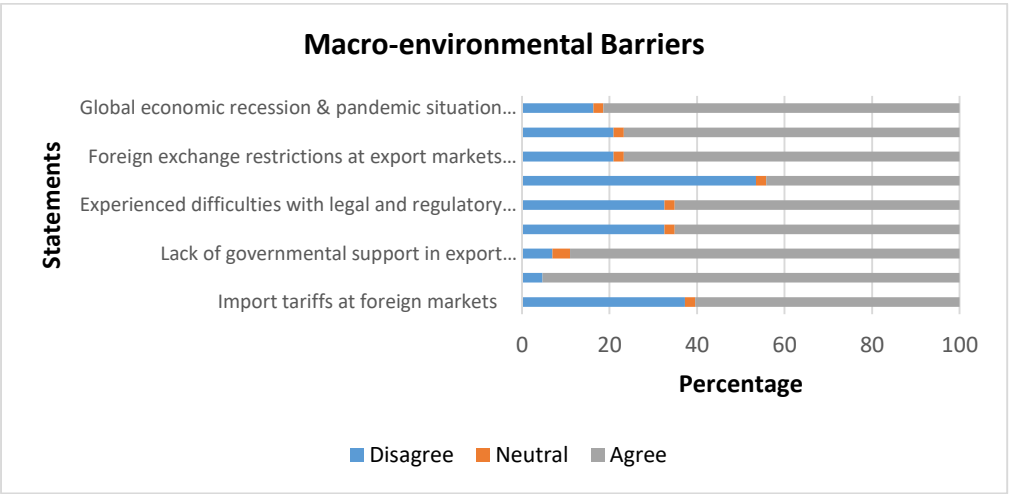


Source: Authors' Calculation based on Exporters' Survey, 2021

Figure 9.5: Exporters' Perception Regarding Market Barriers

Macro-environmental Barriers

A vast majority of the surveyed fruit exporters cited high transportation cost to export market (95.35%) as well as lack of governmental support in export marketing and promotion (89.05%) as major issues. A similar percentage of respondents (76.74%) were inhibited by foreign exchange restrictions and foreign currency fluctuations at export markets. Consequently, 60.47 percent of respondents identified that import tariffs at foreign markets as an issue. A similar percentage of respondents (65.12%) indicated that there is a lack of gathering and provision of information on available export opportunities and viewed the legal and regulatory framework they have experienced as impediments in their business growth. Further, more than half of the respondents expressed dissatisfaction over the current government policies as being non-supportive. Moreover, majority (81.40%) of the respondents indicated that global economic recession periods and current pandemic situation have severely affected their business.



Source: Authors' Calculation based on Exporters' Survey, 2021

Figure 9.6: Exporters' Perception Regarding Macro-environmental Barriers

9.3.4 Challenges for Fruit Export Companies

Annex 10 presents the challenges for fruit export companies in Sri Lanka. Most (74.42%) of the surveyed fruit exporters mentioned that the high cost of exporting is the most serious challenge for their company. About 60.47 percent of fruit exporters indicated that there is no continuity in supply of raw materials while 46.51 percent have issues regarding quality of the raw materials. Nearly half of the respondents said strong international competition is a serious challenge. Especially, fruit prices of our competitors like India, Vietnam and Thailand are low due to low cost of production and high productivity. Therefore, government should find remedies to reduce the cost of production and expand fruit cultivation in Sri Lanka. However, a sizeable population of surveyed fruit exporters was not satisfied with assistance provided by the government.

9.4 Suggestions to Improve Fruit Export Industry in Sri Lanka

9.4.1 Fruit Exporters' Suggestions to Improve Fruit Export Industry in Sri Lanka

Suggestions provided by surveyed fresh and processed fruit exporters in order to enhance the fruit export industry in Sri Lanka are given in Annex 11. They suggested that the production of exportable fruit varieties should be increased, state and export authorities should provide concessions to exporters and farmers and their issues should be addressed on a common platform. For example, all export products can be transported by a chartered ship. Further, government intervention to improve the fruit export industry in Sri Lanka was also requested. Surveyed fruit exporters also sought government intervention to address the problems in this sector and to improve regulatory frameworks. There is a need for effective and stringent policies. Moreover, there is a need to identify potential farmers accordingly and a direct link between farmer and exporter should be established without intermediaries. It was suggested to improve extension services while introducing new technologies in fruit cultivation, harvesting, packaging and processing. The need for consistent supply of quality inputs and raw materials was also stressed.

Further, a need to identify new market opportunities and conduct export promotion programmes to improve the fruit export industry in Sri Lanka and establishing strong supply chains and systematic business models targeting the export market were also suggested. Conducting business forums to find reliable customers and introducing price regulations for inputs such as organic fruit products would also boost the export trade. Cost effective production and exportation is vital when competing with other fruit exporting countries, hence the cost of production of fruits need to be streamlined with information given and knowledge of farmers. Importance of conducting research on how to keep produce fresh until it reaches the destination and developing strong databases of fruit cultivators in entire country was also highlighted.

9.4.2 Fruit Farmers' Suggestions to Improve Fruit Export Industry in Sri Lanka

Suggestions of surveyed export-oriented fruit farmers are summarized in Annex 12. A consistent supply of quality inputs and increased availability of fertilizers and pesticides at a reasonable price were identified as important by many. Especially, pineapple farmers pointed out the need to provide good quality fertilizer and pesticides at a reasonable price because they perceived that pineapple is a crop that cannot be cultivated under organic conditions as its disease vulnerability. Hence most of the fruit farmers indicated the significance of fertilizers and pesticides availability. Surveyed farmers suggested to provide fertilizer and pesticides at a reasonable price in place of subsidies.

Government intervention is expected by a significant number of fruit farmers. Extension services should also be improved to enhance the status of Sri Lankan fruit export industry. Further, training programmes and demonstrations should be conducted on new methods of cultivation, high yielding exportable varieties, harvesting and how to export directly. Fewer farmers proposed to introduce new technologies to enhance fruit cultivation cost effectively. Government and other relevant authorities should extend assistance to encourage farmers. For example, there are commercial level farmers who lack arable lands for cultivation so need government intervention. Financial institutes also can provide loan systems to develop commercial and small-scale fruit cultivations. Providing duty free equipment to farmers or providing agri equipment at a reasonable price were suggested. Infrastructure facilities such as buildings to store harvest, transport facilities and water supply systems should be improved. Only a small percentage (2.86%) of farmers mentioned that packaging cost should be reduced and packaging materials (plastic crates)should be provided. Further, a need for skilled labour force was also highlighted.

The surveyed fruit farmers mentioned that it is essential to introduce stable price for fruit farmers and higher prices should be offered to the organic farmers. Consequently, the need to introduce proper practices of organic cultivation and conduct research was also suggested.

Quick measures should be taken to prevent wild animal attacks to avert the huge wastage that occurs. Monkeys, toque macaques, wild elephants, hedgehogs, squirrels and wild pigs are the common pests that invade the fruit cultivation.

The government-led programmes should encourage the potential farmers towards direct exportation while the younger generation should be encouraged to cultivate export-oriented fruits. Commercial level fruit cultivation should be promoted for higher gains.

Strong linkages should be developed between farmers and exporters. For that places should be established for collecting harvest directly from farmers without involving intermediaries. Further, 2.86 percent of the fruit farmers mentioned that some associations should be organized in village level as well as in cities.

There is a need for marketing support as well. It is vital to maintain a sustainable market. Further, a need to increase the number of fruit export companies in Sri Lanka was also highlighted. Moreover, value addition should be enhanced and farmers should be encouraged on getting quality standards in order to increase the value of Sri Lankan fruit exports.

9.4.3 Fruit Collectors' Suggestions to Improve Fruit Export Industry in Sri Lanka

Annex 13 summarizes the suggestions provided by the surveyed fruit collectors. One third of the surveyed fruit collectors indicated that extension services should be increased. For example, creating model farms is important. Further, there is a need to conduct training programmes regarding organic fruit cultivation, quality standards and direct exportation. Government intervention was sought by the farmers. Further, they mentioned that government should make favourable policy changes. Infrastructure facilities should be increased to enhance the fruit export industry in Sri Lanka. Especially, they said that cool room facilities should be established to reduce the wastage of fruits. Increasing quality production to maintain continuous supply for exports is another suggestion. There should be continuous supply of quality inputs to implement the above.

Further, government and other relevant authorities should aid farmers, collectors, and exporters. Government can support to provide arable lands for fruit cultivation and introduce loan systems via government banks. For example, since water supply is not consistent and fuel cost is high solar power can be a good solution. Providing financial support/loan to help install solar power was suggested. Further, a price discrimination for organic and non-organic fruits can promote organic fruit production. The similar percentage of fruit collectors suggested that government should encourage farmers, collectors and export companies to export fruits from Sri Lanka. Introduce new market opportunities and build strong links with farmers and exporters and effective management of seasonal and off-seasonal cultivation were also proposed.

CHAPTER TEN

Conclusion and Recommendations

10.1 Conclusion

- The highest quantity of total fruit exports was recorded in 2014. This could be an effect of the highest production that was reported in the same year 2014. However, the highest value of total fruit exports was recorded in 2019.

- According to Compound Growth Rate Analysis, lime recorded the highest growth rate in terms of production (14.79 %) and productivity (16.36 %) respectively. However, avocado marked the highest growth rate (23.17 %) in terms of cultivated land extent. Further, avocado reported the highest growth rates in terms of quantity (44.92%), value (69.28%) and unit value of exports (43.85%) respectively. Consequently, these growth rates were statistically significant at five percent.

- According to the Balassa's Index of revealed comparative, papaw and pineapple have retained the comparative advantage as RCA values are greater than one, during the study period 2010 – 2020. Further, Balassa's RCA index values for papaw remained highest throughout the study period.

- The results of the Comparative Export Performance Index revealed that in 2020 Sri Lanka has a competitive advantage in pineapple exports in relation to almost all Asian countries except the Philippines. Further, Sri Lanka's papaya exports have retained competitive advantage in relation to majority of Asian countries throughout the study period (2010 – 2020).

- The Weighted Average Score Analysis revealed that pineapple has the highest potential for export.

- According to Augmented Gravity Model, importing country's GDP and population have positive impact on Sri Lanka's fruit exports whereas distance has negative and significant impact on Sri Lanka's fruit exports. In addition, the difference between the factor endowments has a positive and significant impact on Sri Lanka's major fruit exports, which is in accordance with the Heckscher-Ohlin Theory. However, real exchange rate has a positive and significant impact on Sri Lanka's fruit exports, implying that the exchange rate policy did not play a significant role in Sri Lanka's fruit exports. Therefore, the growth in the Sri Lanka's fruit exports can be credited to effective export promotion programmes and improvements in the production base.

- The Gravity Model found that the American region was the preferred destination for Sri Lanka's major fresh and processed fruit exports followed by the Middle East and South Asia. The results depict that Sri Lanka has not tapped more than 50 percent of its potential in the Oceania (79.36%), Europe

(77.03%) and Asian regions (68.08%). Therefore, Sri Lanka can enhance fresh and processed fruit trade with above regions in place of the countries which have exceeded the trade potential.

- Most (74.42%) of the surveyed fresh and processed fruit exporters cited the high cost of exporting as the most serious challenge for their company. About 60.47 percent of fruit exporters indicated that there is no continuity in supply of raw materials while 46.51 percent have issues regarding the quality of the raw materials. Nearly fifty percent said that strong international competition is a serious challenge.

- High risk due to unstable prices (81.00%) and low profits during the peak season (71.43%) were the major challenges faced by fruit collectors in Sri Lanka.

- The majority (85.71%) of the surveyed fruit farmers lamented over inadequate supply of quality fertilizers while 58.57 percent of farmers said finding good pesticides was the biggest challenge. Nearly half of the surveyed fruit farmers have received low prices for their products.

- Quality standards play a significant role in maintaining the quality of the exportable fresh fruit produce. Descriptive statistics revealed that, majority of the surveyed farmers (80.00 %) were aware of quality standards. However, the majority (72.86 %) of the surveyed fruit farmers do not have a quality certificate. Consequently, the surveyed fruit collectors stated that most of their suppliers (66.67%) do not have quality certifications. Further, the results revealed that the majority (75.71%) of the fruit farmers expect more assistance to improve quality/ security of their produce. Therefore, it is necessary to encourage farmers on getting quality standards to increase the value of Sri Lankan fruit exports.

- The results of the key informant interviews and case studies highlighted the factors as follows; need of effective and stringent policies, requirement of connectivity and link between departments and institutes related to fruit exportation, need of direct linkages between farmers and exporters, prerequisite of extension programmes, necessity of conducting researches on how to keep fruits fresh until it reaches the destination, enhance commercial level cultivation of suitable varieties, requirement of strong databases of fruit cultivators in entire country and enhancement of value addition to increase export earnings of the country.

10.2 Recommendations

- Investment in research and development especially in areas of value addition and varietal development is key to enhance the export competitiveness of fruits. Therefore, further research efforts are recommended for identifying

the quantitative and qualitative factors that affect the export competitiveness.

- There is an increased demand for value-added fruit products in the world. Therefore, the value-addition process should be strengthened, and fruit exporters should be motivated to export processed fruit products. Extension and training programmes can be implemented by the various government institutes such as Department of Agriculture, Export Development Board and National Institute of Post-Harvest Management.

- Sri Lanka should pay more attention to adoption of effective export promotion strategies to evolve and diversify the trade area to find prospective markets besides expanding the existing markets. Sri Lanka can increase fresh and processed fruit trade with regions such as Oceania, Europe, and Asia in place of the regions which have exceeded the trade potential. Further, Sri Lanka can promote its share in above markets by introducing trade representatives, having bilateral trade agreements, observing international quality standards, and expanding exporters' knowledge of marketing and advertising.

- Exportable fruit varieties that are in demand should be identified through surveys. These types of market surveys can be done by the Export Development Board which is Sri Lanka's apex organization for the development and promotion of exports. Further, suitable varieties or qualities of particular fruit crops should be developed through research by Fruit Research and Development Institute.

- Commercial cultivation of suitable fruit varieties should be encouraged in order to achieve higher gains. Nucleus commercial farmer with an out-grower model is recommended to enhance the exportable fruit supply. In the first stage, this model can be used for most potential fruit crops such as pineapple, banana, papaya, and mango. When applying this model government can provide facilities like arable lands, financial assistance, and technical support to potential fruit farmers.

- A close linkage should be established between farmers and fruit exporters in order to guarantee reasonable prices to farmers and supply quality products to export destinations. For that, a database should be maintained for fruit farmers, export-oriented fruit farmers as well as collectors. The fruit farmers' database, export-oriented fruit farmers' database, and fruit collectors' database can be maintained by the Department of Agriculture, Export Development Board, and Ministry of Commerce respectively.

- Quality is a significant factor considered in the fruit export market. Therefore, a traceability system should be established to maintain the quality of the fruit products. In that sense traceability information management system should be developed according to the different roles of the various entities in the

export market channel. For that as an initiation awareness programmes, training and monitoring programmes should be implemented under government involvement.

- Farmers should be correctly directed from cultivation to reach the export market by establishing a mechanism to build linkages among responsible and related institutes in order to work together with a purpose. Consequently, in consultation with relevant stakeholders in the export industry, a long-term and consistent national agriculture export policy should be formulated.

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ANNEXES

CASE STUDIES

The export industry plays a major role in a country's economic development. Mainly private sector involvement in export industry can contribute largely to strengthen our foreign earnings. Among exports, perishable products exportation occupies a significant place by earning US $ 66.9 million for Sri Lanka during 2021. Perishables, mainly categorized as fruits and vegetables, fruit export performance holds US $ 39.46 million in 2021, according to the Sri Lankan Export Development Board records. Aligning with the objectives of the study, the narratives of major fruit exporters, export-oriented farmers and processors became important testimonies. Information provided by the respondents was included here. However, the companies and respondents remain anonymous due to ethical considerations.

CASE STUDY 01

Success Story of Company A. Pvt Ltd[1]

Company A Pvt. Ltd has been in the export industry for 27 years and it is a leading player in the industry. The company has emerged a market leader with extensive expertise in the perishable exporting industry. They become the largest exporter of fresh fruits and vegetables in Sri Lanka due to higher productivity. They use their strengths to overcome barriers to build their reputation. Higher quality is guaranteed through their skilled personnel conduct, stringent quality assurance observations on the perishables that they deliver to ensure freshness, twenty-seven years of expertise in the sector, which offers the competitive advantage in the market, obtaining various quality standards, efficient delivery services and network of farmers and suppliers make them thrive in the export industry. They have a workforce of over hundred. Among the perishables that they export, fruits exportation holds a noticeable share. Fruits exported include, Pineapple (Mauritius variety), Mango (TJC variety), Papaw (Red Lady variety), Avocado, Mangosteen, Guava, Durian, Passion fruit and Rambutan (Malwana special). As one of the major export leaders in our country, their export 144,000kg of pineapple, 96,000kg of mango, 336,000kg of papaya, 240,000kg of avocado, 24,000kg of guava, 24,000kg of passion fruit every year and 36,000kg of mangosteen, 12,000kg of durian every three months. In addition, 120,000kg of Rambutan is available for six months (include three months' season and another three months' off-season) production.

Company A's main cost factors include the packaging costs that consist of materials such as Cardboard and Styrofoam boxes. It is a major barrier to their export operations. Additionally, labour issues, export transportation costs such as airfare and shipping costs are also roadblocks. They further explained about higher prices for fruits and supplier costs become a burden for business expansion. Due to these issues, they hold the idea of expanding their business to produce value-added products. They stated value addition is led by concerns such as high cost of fruit

[1] Name of the company is not exposed due to ethical consideration

production, lack of continuous supply, high risk of profit gaining and quality threatened due to prolonged transportation. Major challenges that affect quality and quantity of the fruits are lack of continued supply of quality products and climatic changes. As a leading company, they also face various barriers consisting of a lack of export assistance in Sri Lanka, facing difficulties related to obtaining funds for finance export operations and lack of funds for research and development.

Company A invades the international markets by finding clients/buyers from Middle East countries. 100% of fresh products send to Middle East countries while making it Company A's main export destination. Company A claimed that Middle East clients are not involved in strict observation of quality measures hence, they became a comfortable export destination. Ten to 20 clients are currently involved in its exports and their main requirements are related to quality and price. According to the order quantities, they learn about clients' preference. Clients have changed their preferences to seasonal products quality concerns are also changed and, competitors are involved in changing their preferences over time. Company A mainly characterizes their relationship with their principal clients by using the level of trust. They maintained the payments due to date and time, so their D-day payments were assured. Additionally, they shared lots of information via social media and over the telephone. Due to strict government procedures, some clients leave. Sometimes, Company A shares their information with other exporters. Information based on technical supportiveness, supplier rates, certain qualities, etc. When dealing with clients, they confronted challenges such as credit risks with new clients, price and quality issues and mismatching of varieties with existing clients. Main barriers related to clients stated as certain difficulties to comply with their clients' requirements. Although it is a barrier, they usually take steps to ensure that they meet their clients' specifications.

Farmers (individual producers) and suppliers (intermediaries) were their sources. Suppliers include collectors and fruit delivery people. Total of 20 to 25 producers work with them. They characterize the suppliers according to their trustworthiness and continuous supply of products. Hence, Company A communicates with main suppliers regarding their requirements and the main suppliers already created their network and deliver the information to producers. They rejected the orders if suppliers were unable to comply with their requirements. Suppliers face difficulties concerning quality. Recent incidents stated as mangosteen fruits confronted the burning issue with its' quality. The latex of mangosteen fruit leaks into the fruit cause quality differences. They investigated the issue with the relevant authorities and gave instructions to producers to prevent quality concerns. Due to higher demand for organic fruits, Company A preferred that their suppliers would reduce the chemical fertilizer usage (reduce Maximum Residual Level-MRL of chemicals) and move towards organic cultivation. They provide information and instructions to producers. Further, they facilitate relevant requirements hence, most of the farmers encourage to obtain GAP certificates.

They have their own quality assurance agents to examine the required quality. To encourage farmers, they gave adequate prices for required quality fulfillments.

Likewise, they motivate growers to produce more quality products. Available suppliers are not capable enough to fulfil the current demand. Further, Company A sees the potential of productivity improvements of the existing stock of crops. They claimed several barriers related to suppliers, fruit exports have been rejected due to quality issues due to suppliers unable to meet with their requirements, and the received products also lack in desired quality. Additionally, they face unreliability in supplying products because they previously started the buy-back project and it failed due to the unreliable behaviour of the suppliers.

They grade the products to select the best quality products. Grades are named as one, two, three and selection criteria mentioned as formal shapes, required weights and required appearance (peel characteristics). They have obtained ISO, HACCP standards for quality assurance and those standards are mandatory for Middle East countries. They obtained information regarding standards through SGS Lanka company and government bodies. Authorized agents of SGS Lanka audit the standards once in three to six months. Quality maintenance is a major issue in complying with standards. Hence, they experienced fruit export rejections with some order quantities.

India, Taiwan, Malaysia, South Africa, Thailand and Australia are the major competitors. Among these countries, Australia is a major mango competitor and Thailand become the major pineapple competitor. Company A use strategies like quality control and trust maintenance used to make their product different from that of competitors. The local competitive advantage of products from Sri Lanka is mentioned as, tropical characteristics of fruits, higher Brix value (the higher sweetness of fruits), higher demand for seasonal fruits, etc. Company A believed that European countries have more export potential in future and mangosteen, rambutan, guava and the original variety of Papaya have higher export potential in future. The main barriers with competitors mentioned as, unawareness of new technologies to compete with competitors, high competition in foreign markets, need to withstand aggressive competitors in the foreign market. Furthermore, they choose to participate only in those markets where they have an advantage over their competitors and when they find any competitive advantage on the international market, tend to pursue those markets.

Government tax policy is helpful in business operations. The government gave tax-free facilities and also direct duty-free facilities for fruit exporters. They suggested that providing subsidies to rebate and need proper procedures to farmers' guide and need proper maximum residue level (MRL) examination. Company A mentioned the system of examining fruits that quarantine services implying cause difficulties and procedural complexity of paperwork done by manual methods and not evolving with the online facility cause wastage of time and effort. Additionally, some legal issues and airfare issues caused difficulties to grow the business. The local government contributed to providing awareness regarding export activities. But core issues were not addressed such as, not identifying export-oriented products and not involve for increase the production of products that have export value. Barriers with the business environment and supporting services consist of fluctuations in demand at

the export market, finding reliable buyers abroad is another barrier. Sometimes payments and duty drawbacks delay cause issues during export procedures. Macro environmental barriers stated as, higher import tariffs at foreign markets, foreign exchange restrictions at export market cause issues and finally with the pandemic situation cause enormous profit loss and lack of necessary materials pulled back their business for some period. Now they tried to bounce back from the situation that they experienced before and hope to continue with their activities. Company A is a proud member of The Ceylon Chamber of Commerce, The National Chamber of Commerce of Sri Lanka, Export Development Board and National Chamber of Exporters. Their major suggestions to develop the fruit exportation in Sri Lanka explained as, proper facilitation for the cost-effective production process and need to encourage farmers to become international demanded producers.

CASE STUDY 02

Success Story of Company B Pvt. Ltd[2]

Company B has appeared in the export industry 19 years ago as a tropical fruit and vegetable cultivation and supply business in Sri Lanka. In present, this company has been expanded and over 1000 out-growers attached to the company during the last 10 years and produced 5.5 million kg of fresh fruits and vegetables per year. Currently, they produce 3.2 million kg of the best fresh pineapple to serve their customers in different export destinations. Consequently, Company B has become the Sri Lanka's largest and best quality pineapple producer during the last few years. Company B markets a growing line of processed tropical fruits and vegetables since 2007 and maintains a considerable market share. Apart from fruit and vegetable business, they produce a good quality planting material in our nurseries to fulfill grower's requirements. Further, their out-grower network is benefited by the free agricultural advisory service provided by the company, aiming towards the optimum productivity of farming systems in an environmentally friendly manner. They are the key supplier of the popular supermarket chain and leading exporters for some of products as follows; fresh fruits, fresh vegetables, fresh coconut, dehydrated products, frozen products, canned and bottle products and fresh milk.

Company B has its own and out-grower cultivation of fruit and vegetables with over 1500 acres in different climatic regions in Sri Lanka. They grow pineapple as a mono-crop, intercropped with coconut and banana in wet and intermediate zones. Their key product is fresh pineapple (variety Mauritius) and it covers over 1000 acres to produce a harvest throughout the year targeting 5 million kilograms annually.

They mentioned that the estimated target of new cultivation of pineapple for the next five years is 3000 acres, targeting 15 million kilograms of annual production. The second most demand product is passion fruit where the estimated target of cultivation is 1000 acres within the next five years, targeting 7 million kilograms' annual production. The estimated target cultivation extent for papaya, banana, mango, and rambutan are 400, 300, 200, and 100 acres, respectively, during the next five years.

[2] Name of the Company is not Exposed Due to Ethical Consideration

Company B maintains its own and out-grower nurseries to fulfil the planting material requirement of cultivators and agriculture promoters island-wide. A wide range of nurseries of various kinds of fruits, vegetables and ornamental plants are available in different parts of the country. They produced pest and disease-free high-quality genotypic planting materials in their nurseries which is the key factor of quality agricultural production. Further, as they mentioned they have developed a unique system to select mother plants and propagation system to produce best quality planting materials. Supplying of high-quality fertilizer and agro chemicals to our growers at a concessionary rate including the special recommendations for their lands is another key service. Company B has linked with popular suppliers and distributors of fertilizer and agro chemicals in order to provide this service for their valued customers.

Company B is an independent and leading provider of agricultural consultancy. They provide a wide range of agri-business and management services for individuals, groups, Non-governmental organizations and companies in Sri Lanka. Their consultants have a unique combination of insight and practical experience underpinned by robust, informed, science-based information. They provide total solution for small, medium or large scale investors to invest in cultivation, processing, packaging, factory management, and quality assurance.

Further, Company B provides all types of technical and marketing support, free of charge, to over 1000 growers in its supply network at present to enhance the productivity of their agribusiness. Their goal is to obtain a quality harvest from our growers with minimum post-harvest losses. Apart from that all registered farmers in their network have been protected with a buy-back guarantee for their total harvest. They have carried out special buy-back agreements with marginalized farmers. This effort is to support them to enhance their income and thereby uplift the livelihood. Helping conflict affected peasant farmers is another CSR initiative of our company.

Another special programme is free distribution of planting materials among peasant farmers to enhance their production and to train them on sustainable agricultural practices through continuous monitoring and technical advices.

Company is committed to ensure farm activities carried out ethically and comply with government regulations. Further, it goes extra mile to minimize the adverse impacts on environment and to preserve the biodiversity.

Higher management has more than fifty years' experience in this field. Their fresh products are exported to the Maldives and processed fruits exported to Europe countries. They exported the products as joining the other exported companies. There are more than 50 numbers of employees in the company. They exported as a volume 70 percent of 2.5 - 3.0 Kg Million per year. Key strengths of company are skilled and effective labour force, regular customer basis (Supplier, Farmer, Buyers) and availability of resources to production.

Furthermore, our respondent also mentioned the challenges in the fruit export industry in Sri Lanka. First one lacks skilled labourers, most of young generation are willing to work in 8 to 5 work as government, they do not like to work in hard as thinking their own company. As to face the challenges they should change the attitudes of labours, as not only the salary focus but also the output of the work. Second one is Government policies. There is lack of Pure National Agriculture Policy.

Company B mostly engaged with direct exporters. Little amount is exported indirectly, other than that he worked with small local super markets. Company B is the member of fruits and vegetable producers, processes, exporters in Sri Lanka Business Association. As values of being association, they could be able to meet new buyers, exchange the products and knowledge, update the new products and markets and training programmes.

As stated by them when selecting the good buyers, they should have good purchasing power (get high amount of goods) and skills and trustworthy. There are so many needs when getting the harvest from buyers. First is quality, two is quantity, three is time and four is competitive price.

The company has enough knowledge regarding the export market. They aware of export assistance in Sri Lanka. They considered repetition of work processes in custom duties, as negative point. Companies are not satisfied with state intervention. They stressed the need for change of negative attitudes of the Government sector.

Now the cost of production is increased while the export price remains unchanged. As the company runs at a loss for six months, in beginning they have 70 percent the export quality but now it has declined to 30-40 percent.

Suppliers gave 70-80 percent level satisfaction while providing their requirement. Seasonally they can obtain adequate quality raw materials from buyers but not off seasonally.

As the company they are aware of new technologies and prepared to compete with multinational companies. Foreign market competition can be both an opportunity and a challenge.

Fluctuations in demand at export market are an issue. As company they maintain sharing work base, since they must satisfy all actors of export chain as farmer to supplier. Finding reliable buyers abroad is another issue, unable to go Europe market, foreign exchange restrictions and fluctuations are barriers for them. Government does not intervene in market operations or fining markets. Current government policies severely affect the industry.

Export destinations that have export potential in future are Europe, USA, New Zealand and Australia. All fruits have good demand especially tropical fruits as dragon fruit, pineapple, and mango. Finally, they made suggestions to improve the fruit

export industry. With state intervention arable lands and non-growing coconut lands should be provided for fruit cultivation.

CASE STUDY 03

Success Story of Company C[3]

In this study a leading mango export farmer in Sri Lanka was the focus. Company C was initiated in 2008 as a result of business diversification strategy. Currently, their mangoes are grown in an area of 650 acres located in intermediary and dry zone districts in Sri Lanka. The number of trees planted in this area are 60,000. Their mango is one of the world's biggest and juiciest mangoes and it is unique to Sri Lanka. The average weight of this delicious mango is about 600 g. The first generation of this variety of mango was first introduced to Sri Lanka from Australia in the 1980s and then subsequently developed in Sri Lanka to create this unique mango variety. The specialty of Company C's mangoes is the beautiful golden orange fruit and its unblemished, smooth skin. It has a deliciously sweet flavour, silky-smooth flesh and low fiber content.

Their production is 1,000,000 kg per year and the average local price is 350 rupees per mango but it fluctuates Rs.750-800 in April and May. When it comes to harvesting fresh mango with 1/2 feet of the stalk and piled up in plastic containers carefully and bring those harvested mangos to the pack house. The carbon quoted bag is still there with the mango until it arrives at to pack house. Inside the pack house, they removed the outer cover and started the sorting process. During the sorting process, they separate the damaged fruits due to mealybug attack, physical bruises, patched fruits and ripen ones. Afterwards, they remove the stalk with extra care without contacting latex.

Fruit cover bag includes outer paper layer and inside black polythene layer. This bag protects the mango fruits from fruit fly damage. Hence, with this solution, they managed to eradicate the fruit fly damage successfully. Mango fruit was covered over 75 to 90 days. And the bag includes information such as the tree number, bag number, date of first covered and the grade.

After the sorting process, the grading of mango fruits starts, and they mainly focused on grading according to the export quality. The export quality grading criteria stated as, according to the weight, the shape of the fruit, outer appearance consists of the colour of the fruit and ripens stage of the fruit. According to the weight, both below 450g and above 750g of fruits are rejected. The shape should be ideal mango shape and reject the parrot beak shape fruits and apple shape. The scale should be clean without any patches. And the correct ripening stage with the ideal colour. Export quality criteria fulfilled fruits are separated and the remaining fruits were graded as first grade which are sent to supermarkets. The first grade can have smaller patches and with the second and third grades, the number of patches increase respectively. As quality standards, they hold the Global GAP certificate and SLS standard.

[3] Name of the Company is not Exposed Due to Ethical Consideration

Carbon quoted bag (Source: Field Survey,2021)

Company C intends to extend their business from producing fresh mango to the processing plant. They expect to complete the processing plant by 2022. Pandemic situation has affected the operations of processing plant construction and construction work is still held up. Their expected processing plant includes operations such as dehydration, juices and pulping of mango.

Presently, they are involved in indirect exportation through two leading fruit and vegetable exporters in Sri Lanka. Direct exportation ceased recently due to the pandemic and other marketing issues but previously they expanded their export market by conducting direct export to Qatar, Singapore, Malaysia, Germany, Oman, Dubai, Russia, Switzerland, UK, Sweden, Bahrain, and Norway. Demand changes with clients with the time and clients reject the orders directly if there are any issues. Despite that, they received technical support from Thailand to develop the mango farm.

They have huge network of information and technology aspects and most of the time machinery purchasing and further operations were done with the support of foreign clients and companies. In addition, resource person support is obtained by the farm for further development. Furthermore, authorities such as the Department of Agriculture, SL GAP and National Plant Quarantine Service conduct the field observations and audit activities within the farm.

They mentioned issues and challenges faced by them as follows. Diseases such as ‘Lenticels’ that occurred as a post-harvest issue. After harvesting mango, if it is exposed to the rain which caused a small dot, it is referred to as Lenticels. It is the effect on quality for the export market. Additionally, ‘Anthracnose’ is a major disease

that affect the mango cultivation. When it comes to insect damage, mainly mealybugs attack and as a control measure, they practise grass cutting and pruning. Another pest that causes major damage to cultivation is scale insect. Scale insects mainly stayed on leaves and with the rainwater it washed off towards the mango fruits. They suck up the essence of the plant, so it leads to the average weight loss of the mango fruit and quality concerns. As a control measure, the removal of infected tree branches is practiced.

Scale insects (Source: Field Survey, 2021)

The main challenges faced by the farmers are, labour shortage, the peak time of harvest and field activities enhance the labour demand and they mostly use contract labour to fulfil their requirement. High labour cost due to the contract labour involvement, holds 60 percent of the cost-share. Unable to obtain essential equipment due to pandemic situation is another challenge. They expect to use pruning machines to avoid the higher labour cost but are unable to import due to the pandemic situation.

CASE STUDY 04

Export Oriented Small-Scale Fruit Processors in Embilipitiya

For this study, Company D[4] acts as a collector of fruits from farmers and extends to their activities as export-oriented fruit processors and *E* Agri Production Society[5] includes the farmers and collectors and also extend to fruit processing as a subcontractor for leading processed fruit export companies.

Company D is an export-oriented fruit processor and get supplies from farmers. Then as a processor, they are mainly involved in banana, papaya, jackfruit, pineapple and mango processing. Dehydration, canning, bottling of fruits as operations of fruit processing. Before processing they mainly grade the products that they obtain. First and second-grade types are used for grading and first grade mainly go for the export market, second grade is used for processing. The grading criterion is fruit size. ISO

[4] Name of the Company is not Exposed Due to Ethical Consideration
[5] Name of the Society is not Exposed Due to Ethical Consideration

standards affect the business. The company provide equipment to growers that are essential for their cultivation and their clients give support on quality requirements. Main issues related to exportation include higher complexity in procedural activities. They want to involve in direct exportation but the difficulty in the registration process is discouraging for new companies. Issues with custom registration discouraged their plans on exportation. And less capacity also held back the direct exportation. Hence, they focus on indirect exportation. Finding raw packaging materials becomes an issue. Due to the pandemic situation, these materials have become rare and costly. As the initial step, enhancing fruit production is recommended. In addition, finding new arable lands for cultivation and providing those lands to growers with proper agreements is recommended. Additionally, fixed prices for fruit products are needed. Continuous fluctuations of prices cause rejections of orders and huge losses. Organic cultivation is a niche market; adequate facilities for cultivation should be provided.

E Agri Society started two years ago is involved in fruits such as banana (Seeni and Embul), papaya (red lady) and jackfruit. They started this society as a project established by the Provincial Agriculture Unit. They placed a processing unit which was established with the union of farmer production societies. They act as subcontractors for large scale processed fruit export companies. Extension services are conducted by the private sector. Export companies supervise the quality and instruct to maintain the quality as same as the company standards. Issues concerning exportation stated as certificates in the export market is highly costly and it is needed to have satisfactory economic strength to obtain certain certificates. In addition, need to invest in these types of places for further improvements and maintain it successfully. Prices that paid for farmers for fruits were not satisfied and less production causes low income. Due to the pandemic situation higher shipment costs ceased fruit exportation for over two months and they had to store those fruits during that period. People have less knowledge regarding fruit processing and are not much concerned of practising it. As suggestions, direct involvement and contribution of the government institutes like IPHT (Institute of Post- Harvest Technology) is essential.

Need to develop post-harvest technology as a subject taught in colleges and need to train people on this field for better outcomes of production. Need a proper authority to handle the fruits and vegetable exportation. Extension services are essential to transfer technology and information, but lack of extension service providers is a major issue. Hence, it is needed to work on promoting extension services for fruit and vegetable cultivation and processing. The lack of technology transfers to grassroots level occurred with the lack of extension services. So, supervising farmers at some level is needed. Requirement of factories and processing plants in each area or division about a particular crop, reducing the wastages while transporting and other hazards, as well as farmers, may have an exact market to sell their products. When it comes to other exports, all the channels act as one network and they are inter-connected but fruit exportation lacks connectivity and linkage between departments and institutes.

Annex 01: Constituent Countries in Sri Lanka's Major Fresh Fruit Export Market Region in 2020

Market Region	Country	Fruits
European Union	Germany	Mango, Papaya, Pineapple, Banana
	Italy	Papaya, Pineapple, Banana
	Lithuania	Banana
	Netherlands	Mango, Papaya, Pineapple
	Poland	Papaya, Pineapple
	France	Pineapple
	Greece	Pineapple
	Slovenia	Pineapple
	Sweden	Pineapple
European Free Trade Association (EFTA) countries	Switzerland	Mango, Pineapple
	Norway	Mango, Pineapple
Other (European)	United Kingdom	Lemons, Mango, Papaya, Pineapple, Banana
Middle East	Bahrain	Guava, Lemons, Mango, Papaya, Pineapple, Banana
	Kuwait	Guava, Lemons, Mango, Papaya, Pineapple, Banana
	Oman	Guava, Lemons, Mango, Papaya, Pineapple, Banana
	Qatar	Guava, Lemons, Mango, Papaya, Pineapple, Banana
	Saudi Arabia	Guava, Lemons, Mango, Papaya, Pineapple, Banana
	United Arab Emirates	Guava, Lemons, Mangosteen, Mango, Papaya, Pineapple, Banana
Asian	South Korea	Banana
	Singapore	Mango
	Japan	Mango, Papaya, Pineapple
	Hong Kong	Mango
South Asian	Maldives	Guava, Lemons, Mangosteen, Mango, Papaya, Pineapple, Banana
American	USA	Mango, Papaya, Pineapple
	Canada	Mangosteen, Mango, Papaya, Pineapple
Oceania	Australia	Mango, Papaya, Pineapple, Banana
	New Zealand	Papaya, Pineapple, Banana
Commonwealth of Independent States(CIS) countries	Azerbaijan	Mango

Source: Authors' Compilation based on Sri Lanka Customs Data, 2021

Annex 02: Constituent Countries in Sri Lanka's Major Processed Fruit Export Market Region in 2020

Market Region	Countries	Fruits
European Union	Denmark	Pineapple, Banana
	Germany	Pineapple, Guava, Lemons, Mango, Banana
	Italy	Pineapple, Mango, Banana
	Netherlands	Pineapple, Mango, Banana
	Poland	Pineapple, Mango, Banana
	Belgium	Pineapple
	France	Pineapple, Mango, Banana
	Czech Republic	Pineapple, Banana
	Cyprus	Guava
	Austria	Avocado, Banana
	Bulgaria	Mango, Banana
	Lithuania	Banana
	Hungary	Banana
European Free Trade Association (EFTA) countries	Norway	Pineapple, Mango, Banana
	Switzerland	Pineapple, Mango
Other (European)	United Kingdom	Pineapple, Banana
Middle East	Bahrain	Pineapple, Mangosteen
	Kuwait	Pineapple
	Oman	Mango, Lemons
	Qatar	Pineapple, Guava, Mango, Lemons, Avocado
	Saudi Arabia	Pineapple, Lemons, Mango, Banana
	United Arab Emirates	Pineapple, Guava, Mango, Lemons, Mangosteen, Banana
Asian	Japan	Pineapple, Guava, Mango, Banana
	Philippines	Pineapple, Banana
	South Korea	Pineapple, Banana
	Macau	Pineapple, Banana
	Singapore	Guava, Banana
	Cambodia	Lemons
South Asian	Maldives	Pineapple, Guava, Lemons, Mangosteen, Mango, Banana
	India	Pineapple
American	USA	Pineapple, Lemons, Mango, Banana
	Canada	Pineapple, Mango, Lemons, Mangosteen, Banana
Oceania	Australia	Pineapple, Mango, Mangosteen, Banana
	New Zealand	Pineapple, Banana
African	South Africa	Banana
Commonwealth of Independent States(CIS) countries	Azerbaijan	Pineapple, Lemons, Mango

Source: Authors' Compilation based Sri Lankan Customs Data, 2021

Annex 03: Recommended Fruit Varieties

Fruit Crop	Recommended Varieties	Remarks
Banana	Nadee - Embul-AAB Kandula - Dual Purpose-AABB Pulathisi - Cooking banana-ABBB Agra – Kolikuttu-AAB Parakum - Seeni Kesel-ABB Millewa Suwandel – Suwandel-AAB Gannoruwa Seeni – Seeni Kesel-ABB Gannoruwa red banana - Rath Kesel-AAB	Exportable variety Exportable variety Exportable variety
Pineapple	Mauritius, Kew	Exportable varieties
Mango	Horanahiru Karthacolomban Velleicolomban Villard TOM EJC Malwana Dampara Giraamba	Exportable variety Exportable variety Exportable variety
Guava	Horana Rathu Horana Sudu Pubudu Lanka Giant Horana Sweet Red Jiant Horana Rosy	 Exportable variety Exportable variety
Papaw	Horana papaya hybrid 1 Rathna Red lady	 Exportable varieties
Avocado	Simmonds Pollock Grotfaris Peradeniya purple hybrid Fuerte Tower 2 Booth 7 Hass	 Exportable variety
Lime	Horana Lime 1	Can use for fruit processing industry

Source: Authors' Compilation based on FRDI, 2021

Annex 04: The Index of Comparative Export Performance (CEP) in Banana

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bahrain	0.00	0.00	0.56	4.30	-	-	-	-	10176.88	579.94	-
Bangladesh	-	-	-	0.02	0.10	-	0.27	2.89	194.20	5875.29	6.73
China, Hong Kong SAR	0.00	0.00	2.94	0.08	0.02	0.28	0.27	2.72	209.55	156.54	7.34
China, Mainland	0.00	0.00	11.60	0.11	0.19	0.85	0.26	1.17	76.11	48.61	5.92
Cyprus	-	-	-	0.01	0.03	0.03	0.01	1.75	49.99	-	8.57
Georgia	0.00	0.00	0.07	0.02	0.01	0.03	0.00	0.02	1.03	0.32	0.05
India	0.00	0.00	0.42	0.00	0.00	0.01	0.00	0.05	3.30	1.91	0.10
Indonesia	0.00	0.00	111.79	0.56	0.36	0.45	0.03	1.56	12.90	7.84	1.37
Iran (Islamic Republic of)	0.00	0.00	0.57	0.01	-	-	-	-	-	2265.12	92.88
Japan	0.00	0.00	-	31.13	22.21	-	-	-	-	-	-
Jordan	0.00	0.00	3.88	-	0.20	1.08	-	0.38	21.32	8.69	0.92
Kazakhstan	0.00	0.00	258.89	0.43	1.56	4.21	35.58	-	419.26	138.06	5.64
Kuwait	-	0.00	163.22	0.00	0.00	0.01	0.01	0.04	1.30	10.30	0.20
Kyrgyzstan	0.00	0.00	-	-	-	0.18	0.07	1.37	20.72	7.42	0.27
Lao People's Democratic Republic	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.19	0.00
Lebanon	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.10	0.18	0.01
Malaysia	0.00	0.00	1.09	0.01	0.01	0.07	0.02	0.20	16.58	14.15	0.98
Oman	0.00	0.00	-	-	-	-	-	-	-	21.58	2.47
Pakistan	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.01	0.62	0.32	0.03
Philippines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.00
Qatar	-	-	-	-	0.04	0.16	0.07	9.01	-	-	-
Republic of Korea	-	0.00	189.98	73.10	0.55	4.19	80.09	445.33	170571.54	30370.04	889.03
Saudi Arabia	0.00	0.00	5.24	0.08	0.04	0.18	0.05	0.29	35.98	73.12	1.03
Singapore	0.00	0.00	79.14	1.17	0.89	5.14	1.80	34.66	29113.50	3071.77	347.54
Syrian Arab Republic	-	-	-	-	0.41	-	-	-	25.14	56.79	15.81
Thailand	0.00	0.00	0.56	0.01	0.00	0.03	0.01	0.10	5.20	4.31	0.52
Turkey	0.00	0.00	128.78	-	19.65	12.58	18.09	175.57	5551.33	0.58	0.06
United Arab Emirates	0.00	0.00	3.89	0.02	0.05	0.30	0.15	0.70	40.63	33.44	2.57
Vietnam	0.00	0.00	1.14	0.01	0.00	0.03	0.00	0.03	1.32	0.68	0.06
Yemen	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.00

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

Annex 05: The Index of Comparative Export Performance (CEP) in Pineapple

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bahrain	91.03	101.46	36.65	151.51	302.03	149.99	32.46	79.13	30.87	21.21	-
Bangladesh	-	-	-	351.99	1889.98	15561.69	13378.85	-	-	3039.23	2155.15
China, Hong Kong SAR	70.79	22.02	16.18	45.64	43.10	53.82	156.71	554.38	1065.94	167.31	226.57
China, mainland	201.38	159.77	166.23	264.32	526.16	447.26	198.19	148.74	180.66	57.28	160.29
Cyprus	-	53.19	-	585.84	344.07	263.94	142.10	363.82	-	-	-
India	56.18	41.42	32.88	45.79	49.04	51.70	32.10	27.44	48.26	12.78	19.91
Indonesia	842.40	17862.65	266.54	495.05	1144.91	110.50	37.36	12.68	11.87	2.02	8.26
Iran (Islamic Republic of)	1386.15	23173.51	17475.47	2025.91	4600.68	5629.15	-	-	14108.54	2538.73	447.89
Japan	56168.51	1642.22	-	-	-	8342.88	5620.96	11038.73	14385.05	1267.74	1927.92
Jordan	33.44	15.11	48.93	109.43	-	69.72	152.34	-	-	19.47	31.84
Malaysia	6.30	7.38	6.62	11.79	13.68	13.31	9.76	11.83	19.59	6.06	8.88
Oman	94.26	75.85	186.89	555.28	-	153.44	82.79	80.46	340.11	-	-
Philippines	0.27	0.13	0.08	0.11	0.18	0.27	0.10	0.15	0.20	0.03	0.04
Qatar	5469.94	5023.03	-	4412.27	-	38.24	-	-	-	-	-
Republic of Korea	5671.81	-	-	162385.38	27707.12	126582.50	27136.19	12091.44	47150.45	11969.61	19720.49
Saudi Arabia	121.63	175.41	189.27	175.35	203.27	53.25	38.23	46.56	183.79	2526.47	25.09
Singapore	4814.04	5530.08	4705.29	4251.43	4756.31	3188.23	3959.72	3935.46	4598.71	1006.36	820.59
Thailand	14.79	13.66	14.53	34.70	40.93	63.54	51.49	17.50	13.29	3.84	5.92
Turkey	1558.08	1821.83	819.74	743.75	2130.88	718.45	1467.27	1277.31	2544.09	26.36	21.03
United Arab Emirates	14.78	36.95	46.12	23.27	15.43	33.72	28.55	14.97	13.00	3.81	4.15
Vietnam	15812.87	17012.51	3694.72	7662.26	276.96	186.79	323.94	227.67	313.63	123.37	159.52

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

Annex 06: The Index of Comparative Export Performance (CEP) in Mango

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	10.10	6.95	47.57	-	39.90	25.91	12.97	20.38	9.04	68.99	1291.52
Bangladesh	-	-	-	1.33	1.59	-	1.81	3.64	20.70	25.98	8.78
Cambodia	-	199.10	66.01	-	24.00	3.64	0.48	0.08	0.22	1.65	0.19
China, Hong Kong SAR	9.17	6.04	4.84	7.36	5.58	5.07	2.01	4.70	37.87	111.75	34.23
Cyprus	43.52	-	-	8.54	48.06	64.51	10.67	32.38	-	1170.09	-
India	0.03	0.04	0.06	0.04	0.07	0.06	0.05	0.11	0.57	0.73	0.37
Indonesia	4.60	2.98	2.92	3.28	4.46	3.23	8.96	11.16	48.40	32.62	0.91
Israel	0.11	0.08	0.09	0.06	0.10	0.09	0.06	0.12	0.61	0.58	0.33
Jordan	10.91	4.25	3.59	7.18	6.27	7.30	6.64	12.63	104.32	12.75	4.41
Kazakhstan	-	-	-	-	-	-	-	475.63	4307.68	2774.25	1066.17
Kuwait	1086.03	1516.18	2003.00	126.98	2327.28	36.54	457.79	84.27	472.91	-	75.95
Lebanon	-	-	-	-	1.82	7.09	10.37	2.69	25.18	38.96	4.12
Malaysia	2.67	2.12	2.68	0.70	0.84	1.23	0.86	2.89	6.36	38.56	5.74
Myanmar	67.21	13.72	6.23	1.78	0.08	0.04	0.04	0.09	0.49	0.34	0.16
Nepal	4.43	27.29	0.17	0.97	0.41	4.03	0.34	25.57	1.78	-	2.02
Oman	9.55	7.52	9.05	2.34	22.89	1.03	2.32	1.73	7.35	156.21	138.54
Pakistan	0.02	0.02	0.02	0.01	0.03	0.02	0.01	0.03	0.09	0.08	0.04
Philippines	0.04	0.01	0.02	0.02	0.02	0.03	0.03	0.06	0.32	0.39	0.18
Rep, Korea	-	-	-	2366.52	967.53	2578.35	6535.20	2471.40	56992.84	183741.60	9411.35
Saudi Arabia	32.08	5.76	12.02	8.01	16.16	6.55	7.07	11.58	90.25	1809.12	28.10
Singapore	40.60	29.03	31.41	23.66	36.00	13.93	7.50	22.58	69.98	133.35	84.38
Syrian Arab Republic	-	-	-	-	-	-	-	12.27	176.39	-	79.70
Thailand	0.07	0.07	0.06	0.03	0.05	0.05	0.05	0.06	0.23	0.13	0.07
Turkey	1767.42	1335.54	151.07	585.31	21.75	257.05	184.57	269.95	3577.23	239.36	10.08
United Arab Emirates	1.97	2.59	4.14	1.81	1.94	2.10	2.62	5.38	6.77	6.72	2.76
Vietnam	3.25	2.51	3.27	4.69	0.07	0.08	0.05	0.04	0.21	0.26	0.28
Yemen, Rep.	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.02	0.05	0.01

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

Annex 07: The Index of Comparative Export Performance (CEP) in Papaya

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bahrain	-	-	1633.28	-	-	598.43	53.00	1181.62	56.09	159.12	1016.06
China,Hong Kong SAR	1004.24	419.64	905.01	20373.27	624.42	1420.76	5175.95	9390.30	20379.63	39338.16	52854.52
China	1581.70	208.75	95.42	97.04	63.18	34.45	36.03	48.27	72.23	75.38	99.40
India	5.11	4.34	4.10	5.58	8.83	5.97	7.90	13.28	35.18	42.26	56.58
Indonesia	130.53	28.03	541.41	612.76	846.28	850.06	868.55	2471.03	2060.94	2294.37	5242.88
Iran, Islamic Rep.	719.45	4681.13	8951.42	10358.66	-	1155.73	-	-	-	-	-
Israel	-	799.67	5221.00	760.16	77.11	231.79	126.64	186.11	323.45	748.33	513.52
Malaysia	1.85	1.92	2.22	2.66	3.84	3.60	5.00	7.33	17.37	18.86	18.60
Oman	30.28	27.83	10.21	63.98	250.85	125.56	656.07	842.88	2245.75	22783.59	-
Philippines	2.21	1.04	1.16	1.06	2.11	8.09	7.50	8.41	9.86	7.90	6.64
Rep, Korea	-	-	-	-	46768.45	-	19853.88	176350.30	162635.61	-	-
Saudi Arabia	-	-	-	-	-	-	-	-	3517.84	4397.61	2050.36
Singapore	29983.55	9681.49	16871.25	23410.13	22598.60	63603.68	79462.89	11479.52	74023.95	57477.18	26187.82
Thailand	18.63	9.49	19.74	36.68	38.83	39.89	52.90	17.41	78.40	70.51	66.45
Turkey	-	4784.22	-	-	-	-	-	-	-	35464.88	10893.18
United Arab Emirates	256.29	235.41	391.07	1123.88	176.06	498.69	633.38	983.50	537.64	645.33	206.61
Yemen, Rep.	-	13.23	42.86	-	90.84	38.41	-	-	-	-	9.28

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

Annex 08: The Index of Comparative Export Performance (CEP) in Avocado

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bahrain	-	-	-	-	-	5.23	7.44	1.07	5.16	53.75	25.32
China, Hong Kong SAR	-	66.76	0.00	1.22	1.25	0.05	0.03	0.10	0.48	0.76	0.66
China, Mainland	-	-	-	-	-	-	-	-	39109.50	3067.84	666.01
Cyprus	-	-	-	-	3.64	-	-	1.82	158.91	6.47	4.72
India	-	-	0.00	118.97	-	254.05	-	331.90	2553.97	11544.77	1193.54
Indonesia	0.27	0.75	0.00	1.73	16.01	3.96	5.61	13.19	32.94	51.45	30.15
Israel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.02
Jordan	0.02	1.17	0.00	-	1.52	-	1.76	5.95	-	2.57	1.67
Lebanon	0.00	0.00	0.00	0.02	0.03	0.01	0.01	0.03	0.11	0.15	0.03
Malaysia	23.09	11.14	0.00	-	13.02	31.60	36.81	18.06	106.63	58.88	28.41
Pakistan	0.21	-	-	-	-	10.47	-	-	-	-	-
Philippines	-	-	0.00	2.46	3.57	0.80	4.18	3.37	1.89	1.88	0.59
Saudi Arabia	-	-	-	-	-	-	7.12	7.15	98.51	332.56	12.19
Singapore	0.22	0.80	0.00	3.17	2.37	0.40	0.41	1.74	9.38	9.19	6.00
Thailand	5.62	65.23	0.00	604.39	392.59	101.60	41.78	145.81	345.95	8765.86	83.32
Turkey	0.55	3.04	0.00	15.82	27.37	4.94	2.04	3.87	10.51	5.41	2.44
United Arab Emirates	0.06	0.31	0.00	4.71	1.48	0.26	0.27	2.16	1.68	1.61	0.87
Yemen	-	1.42	-	-	-	-	-	0.05	-	-	-

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

Annex 09: The Index of Comparative Export Performance (CEP) in Lime & Lemon

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Azerbaijan		1091.87	1207.25	-	-	583.64	80.10	-	-	302.60	3.83
Bahrain	12.22	5.85	2.49	5.92	16.37	6.46	0.35	3.27	1.54	2.14	32.86
Bangladesh	-	-	-	6.81	9.46	-	1.51	6.40	9.28	3.05	2.52
Brunei Darussalam	-	-	-	-	19.94	-	14.89	-	-	-	-
China, Hong Kong SAR	10.20	6.92	2.19	2.23	0.68	2.32	0.22	1.11	3.01	1.93	2.82
China, Macao SAR	-	-	-	-	-	-	-	16.02	7.23	-	-
China, Mainland	23.27	18.44	3.29	2.99	13.58	4.52	0.25	2.35	2.00	0.50	0.68
Cyprus	0.09	0.09	0.03	0.03	0.13	0.21	0.03	0.19	0.70	0.18	0.27
Georgia	4.33	1.64	0.84	0.17	0.34	0.15	0.03	0.63	0.85	0.13	0.08
India	4.50	3.78	1.33	1.18	1.84	1.75	0.37	1.94	3.71	1.56	1.26
Indonesia	509.76	449.39	22.53	14.32	26.33	20.91	2.91	14.57	21.30	6.09	7.05
Iran (Islamic Republic of)	1.24	0.41	0.13	0.11	1.99	3.27	1.12	2.94	0.94	1.94	1.25
Israel	4.45	11.64	3.12	2.42	1.02	2.91	0.15	4.17	1.77	4.00	2.24
Japan	39792.24	26056.23	-	1194.23	1870.54	785.08	-	13257.60	-	4349.21	-
Jordan	0.55	0.43	0.03	0.09	0.13	0.20	0.04	0.34	0.48	0.72	0.27
Kazakhstan	-	8008.46	-	-	411.12	54.80	6.14	183.41	53.68	10.27	18.25
Kuwait	-	969.56	439.90	5.83	6.85	4.17	0.97	11.23	6.40	-	24.39
Kyrgyzstan	272.32	62.64	23.36	24.06	-	6.76	-	-	12.80	1.15	0.55
Lebanon	0.26	0.05	0.07	0.04	0.07	0.09	0.11	0.24	0.52	0.15	0.12
Malaysia	24.86	12.90	5.52	4.20	3.09	8.30	1.39	8.50	12.08	4.93	7.84
Oman	12.90	8.96	2.51	2.20	20.77	7.56	0.21	1.74	1.94	79.57	46.88
Pakistan	3320.27	22.96	3.66	125.86	-	-	17.79	3.96	10.75	3.71	1.00
Philippines	-	-	-	-	-	-	-	3913.50	5310.23	1093.01	-
Qatar	211.37	247.00	144.67	208.68	-	914.23	-	-	-	-	-
Republic of Korea	-	52722.55	547.78	-	2329.73	-	605.47	1054.01	-	1285.54	473.97
Saudi Arabia	65.46	60.76	13.91	3.30	13.61	7.32	0.53	1.66	4.28	21.97	1.84
Singapore	55.85	33.04	11.22	4.31	2.60	2.18	0.68	6.39	13.53	6.56	9.02
Syrian Arab Republic	0.06	1.06	0.38	0.10	-	-	-	-	-	0.46	0.41
Thailand	14.07	3.70	0.67	0.26	0.26	0.19	0.02	0.08	0.18	0.03	0.01
Turkey	0.10	0.06	0.03	0.03	0.05	0.05	0.01	0.05	0.06	0.03	0.04
United Arab Emirates	2.83	7.75	3.55	1.68	1.03	1.24	0.15	0.46	0.19	0.09	0.11
Uzbekistan	327.88	222.33	156.56	50.48	28.84	5.89	1.40	3.47	9.58	363.66	1.64
Vietnam	2.92	2.00	0.47	0.13	0.08	0.04	0.00	0.01	0.02	0.01	0.02
Yemen	18.07	3.54	3.42	4.79	6.50	29.23	-	13.30	-	-	25.41

Source: Authors' Calculation based on FAO Statistics and WDI Data, 2021

Annex 10: Most Serious Challenges for Fruit Export Companies

Challenges	Frequency	Percentage
High cost of exporting	32	74.42
No continuity in supply of raw materials	26	60.47
Lack of quality supply of raw materials	20	46.51
Strong international competition	20	46.51
Lack of government assistance	19	44.19
Insufficient capital	16	37.21
Trade barriers and tariffs/non-tariff barriers	15	34.88
Unfavourable foreign exchange rates	12	27.91
Restrictive rules and regulations	12	27.91
Limited information about foreign markets	11	25.58
Rigid quality standards	10	23.26
Management strategies for export activities	9	20.93
Labour issues	7	16.28
Different customer culture	5	11.63
Cargo Issues/ High cargo rate cost	2	4.65
Competition within country	2	4.65
Lack of proper supply chain	1	2.33
Lack of new market opportunities via business forums	1	2.33
Fruit price is high/ no control	1	2.33
Lack of packaging materials	1	2.33
Climatic changes cause quality issues	1	2.33
Total	223	518.60

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses

Source: Authors' Calculation based on Survey Data, 2021

Annex 11: Exporters' Suggestions

Suggestions	Frequency	Percent of Cases*42
Increase the production of exportable fruit varieties	16	38.10
Provide assistance to farmers, collectors and exporters (credit, land, subsidies, and solve problems)	11	26.19
Government involvement should be increased	11	26.19
Enhance extension services	7	16.67
Enhance supply of quality inputs and raw materials continuously	6	14.29
Explore new market opportunities	6	14.29
Reduce freight costs and cargo rates	5	11.90
Need export promotion programmes	4	9.52
Build strong supply chains/systematic business models targeting export market	4	9.52
Introduce or develop new technologies (harvesting, storing, packaging and processing)	3	7.14
Price regulations for fruits	3	7.14
Link farmers, exporters and institutes	3	7.14
Cost effective production and exportation	2	4.76
Other (Conduct researches, develop databases)	2	4.76
Total	83	197.62

Note: Total Percentage of Categories Exceeds 100 due to Multiple Responses
Source: Authors' Calculation based on Survey Data, 2021

Annex 12: Export-Oriented Fruit Farmers' Suggestions

Suggestions	Frequency	Percent of Cases*70
Need continuous supply of quality inputs	29	41.43
It is important to have enough quantities of fertilizers and pesticides at reasonable price	27	38.57
Increase government involvement	18	25.71
Enhance extension services	17	24.29
Provide assistance to farmers	16	22.86
Introduce new technologies to enhance fruit cultivation cost effectively	8	10.00
Need stable price for farmers	7	10.00
Improve infrastructure facilities	7	10.00
Encourage farmers to direct exportation	7	10.00
Increase commercial level fruit cultivation	6	8.57
Take measures to control wild animal attacks	4	5.71
Need to introduce good practices of organic cultivation and need to conduct research	4	5.71
Build strong linkages between farmers and exporters	4	5.71
Need marketing support	4	5.71
Encourage younger generation and more growers to cultivate export-oriented fruits	2	2.86
Need to increase the number of fruit export companies	2	2.86
Reduce packaging cost and supply of packaging materials (Plastic crates)	2	2.86
Establish places for collecting harvest directly from farmers without involving intermediaries	2	2.86
Need skilled labour force	2	2.86
Establish Associations	2	2.86
Should offer higher prices to the organic farmers than others	1	1.43
Enhance value -addition	1	1.43
Encourage farmers to follow quality standards	1	1.43
Total	173	245.71

Note: Total percentage exceeds 100 dues to multiple responses.

Source: Authors' Compilation based on Survey Data, 2021

Annex 13: Fruit Collectors' Suggestions

Suggestions	Frequency	Percent of Cases*21
Enhance extension services	7	33.33
Government involvement should be increased	6	28.57
Improve infrastructure facilities	6	28.57
Increase quality and productivity of fruits	5	23.81
Provide support (credit, land, incentives and information)	5	23.81
Continuous supply of quality inputs	4	19.05
Solve price issues of fruits	3	14.29
Encourage fruit exports	3	14.29
Introduce new market opportunities	2	9.52
Build proper links with farmers and exporters	2	9.52
Seasonal and off seasonal cultivation should be properly managed	1	4.76
Total	44	209.52

Note: Total percentage exceeds 100 dues to multiple responses.
Source: Authors' Compilation based on Survey Data, 2021

Annex 14: Key Informants List

Name of the Key Informant	Designation	Representative Organization	Contact Address
Mr. W.D. Lesley	Director (Covering)	Fruit Research and Development Institute	Fruit Research and Development Institute, Kananwila, Horana.
Ms. T.U. Wimalagunasekara	Assistant Director (Tea, Fruits & Vegetables, Coconut & coconut- based products)	Export Development Board	Sri Lanka Export Development Board No 42, Nawam Mawatha, Colombo 02, Sri Lanka.
Mr. S. Ellawala	Immediate Past Chairman	Lanka Fruit and Vegetable Producers, Processors and Exporters Association	Ellawala Horticulture (Pvt) Ltd. No 14, Carlwil Place, Colombo 03.