Sri Lankan Fruit Exports: Potentials, Barriers and Prospects

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A.K.A. Dissanayake[1] and U.D.R. Udari
Hector Kobbekaduwa Agrarian Research and Training Institute
[1]akadissanayake@gmail.com

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Abstract

With regard to the fresh and processed fruit export industry, Sri Lanka has not tapped its full potential as only a speck of the total production reaches offshore markets. The study analyses potentials and barriers of the fruit export industry in Sri Lanka. Purposive sampling technique was applied to select the sample from export-oriented fruit farmers, collectors, and fresh and processed fruit exporters. Both qualitative and quantitative analyses were used. Weighted Average Score Analysis and the Augmented Gravity Model were employed to estimate the export potential, while descriptive analysis was used to analyze the barriers. The results depicted that pineapple has the highest potential for export. 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. High transportation cost, no continuity in supply of quality raw materials, strong international competition and a lack of governmental support in export marketing and promotion were identified as barriers. This study suggests formulating a long term and consistent export policy, in consultation with relevant stakeholders in the industry. A comprehensive study on export potential of vegetables in Sri Lanka is recommended.

Key Words: *Export Barriers, Fruit Exports, Gravity Model, Weighted Average Score Analysis*

1. Introduction

It is predicted that the world's population will reach 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). The processed food and fruits and vegetables sectors have

been identified as sectors 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 factors that led to an expansion in global shipments of fruits (FAO, 2019).

Latin America and the Caribbean constitute the world's most important exporting region for banana and four major tropical fruits; mangoes, pineapples, avocados, and papayas. India, the second largest producer of fruits after China, ranks first in the production of mango, banana, lime, and lemon (Kusuma, 2014). Global production of tropical fruits has been increasing over the years due to growing demand in the major producing areas. Developing countries account for nearly all tropical fruit production, which is dominated by small-scale farmers (Altendorf, 2017).

Sri Lanka has 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 for fruits (Dahanayake, 2015). Moreover, specialties associated with Sri Lankan products, such as superior flavours, vicinity and organic yield, have enhanced 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).

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 Sri Lankan agriculture to draw a lucrative income from export crops. In this context, identifying and addressing the issues looming in Sri Lanka's fruit export subsector despite the rising global demand is a positive step (Perera *et al.,* 2015). With the recognition of proper niche markets, Sri Lanka may have the potential to develop exports of 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). Previous literature provided substantial evidence on the use of the gravity model to identify export potential but not on estimating export potential as well as untapped potential of major fruits in Sri Lanka. Similarly, challenges for fruit export industry in Sri Lanka (Hathurusinghe *et al.,* 2012; Dissanayake, 2012; Madanayake, 2016; Gamage *et al.,* 2020) have been found but no substantial study has investigated the issues affecting the grassroots level to export markets. In a similar vein, Shand (2002) underscores the need to study export crops' potential in international markets.

Hence, this study was carried out to identify the highest potential fruit crops for export from Sri Lanka, analyze the potential markets for Sri Lankan major fruit exports, and identify challenges of the Sri Lankan fruit export sector.

The rest of the paper is organized as follows. Section 2 literature review which provides the existing literature regarding fruit export potential and challenges for fruit export sector. Methodology section contents the materials and methods which were used to achieve the study objectives. Section 4 presents results and discussion, followed by the conclusion and recommendations.

2. Literature Review

A comprehensive review of existing literature and relevant research gaps are identified subsequently. 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 dates 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 % of its export potential to European countries. More than half of the export potential to Germany, Italy, Denmark, and Sweden remained unexploited.

Wickramarachchi (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 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 % 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 & Wijeratnam, n.d.). As stated by Gamage *et al.,* (2020) a 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, inconsistency in supply, small land holding, lack of awareness in 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 certain hitches 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 confronted by pineapple exporters.

3. Materials and Methods

The secondary data was mostly collected from such sources as data bases at the Department of Customs, Export Development Board, Department of Census and Statistics, Central Bank of Sri Lanka, CEPII (Centre d'Etudes Prospectives et d'Informations Internationales), World Development Indicators (WDI) and publications in the Department of Agriculture and its affiliated institutions.

Questionnaire surveys and key informant interviews were used to collect primary data. Purposive Sampling method was employed in sample selection. Three questionnaire-based telephone surveys were conducted to collect primary data from farmers, collectors/intermediaries and exporters engaging in the fruit export marketing channel in Sri Lanka. The farmer survey covered 70 export-oriented farmers. In addition to the farmer survey, another questionnaire survey was conducted with collectors attached to fruit export marketing channel. The initial sample size was 30 but only 21 collectors responded to our telephone-based questionnaire survey. In parallel, another questionnaire survey was conducted with fresh and processed fruit exporters registered with the Export Development Board. There were 84 fresh and processed fruit exporters registered in the EDB in 2021. Further, 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 and Vegetable Producers, Processors, and Exporters Association (LFVPPEA).

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

Firstly, researchers used a quantitative matrix for ranking various fruits based on five major parameters - production, cultivated extent, the potential for processing, export value, and export volume. Banana, pineapple, mango, papaya, avocado, and lemons were among the major fruit exports considered. The fruit crops were screened and prioritized based on a Weighted Average Score Analysis. The process involved the calculation of the score of each crop for each selected parameter. The scores were calculated on a ranking basis, therefore the lower the score, the higher the potential of the crop.

Augmented Gravity Model was employed to analyze the export potential and potential markets for major fruit exports in Sri Lanka. Major fresh and processed fruit exports: banana, pineapple, mangoes, papaw, avocado, and lemon were considered. The major importing countries were selected for the sample based on Sri Lanka's fruit export value as well as data availability. Fruit exports to 19 major destinations in terms of export value can be modelled as follows from 2010 to 2020:

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

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 the export potential of Sri Lankan fruit exports. Sri Lanka has exported potential to countries whose values of (A/P) are less than one (Rahman, 2010). The value of [1- (A/P)] is the unused export potential.

4. Results and Discussion

Researchers analyzed the major fruits produced in Sri Lanka and calculated their individual scores based on the methodology and weightage provided. Table 1 displays the individual scores of the major fruits.

Table 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 a ranking basis; lower the score, the greater the export potential of the crop. The results revealed that pineapple topped the list based on the scores above. This is also consistent with the results shown in ADB (2017).

As stated by key informants, China, Jordan, Singapore, Korea, Japan, and Russia are the potential new markets for Sri Lankan fruit exports. Figure 1 depicts the export regions that are believed to have export potential in the future for Sri Lankan fresh and processed fruits.

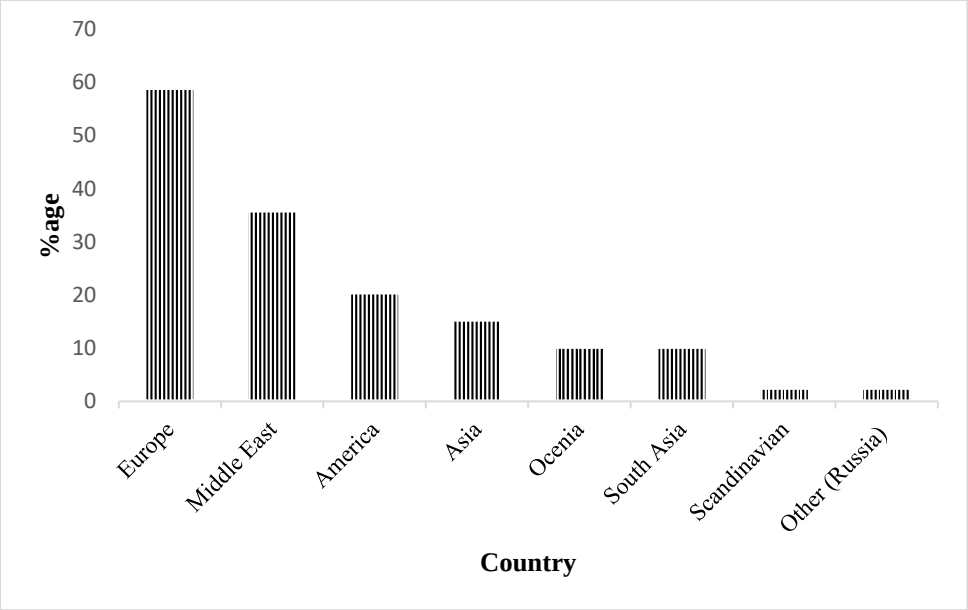

Figure 1: Potential Markets: Fruit Exporters' View

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

According to the majority of fruit exporters surveyed (58.97%), Europe has the greatest potential for Sri Lankan fresh and processed fruit exports, followed by the Middle East (35.90%), America (20.51%), and Asia (15.8%). A similar proportion (10.26%) of fruit exporters mentioned Oceania and South Asia as potential markets. However, 5 % of exporters indicated that Scandinavian countries and Russia could be potential future markets for Sri Lankan fresh and processed fruits.

Due to data limitations, the study is unable to use disaggregate level data for each fresh and processed fruit export. As a result, for the current analysis, aggregate data from major fresh and processed fruit exports such as banana, pineapple, mango, papaya, avocado, and lime were used.

All statistical tests regarding the gravity model were done using STATA version 15. All-time series variables were tested for unit root by employing the Harris-Tzavalis unit root test (1999). The results show that GDPit, GDPjt, POPjt, POPit and REERijt are non-stationary. As stated in empirical analysis it is common for GDP and population to have unit roots (Wickramarachchi, 2019). Therefore, another unit root test called Hadri (2000) was also employed. All variables of a 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).

Table 2 summarizes the estimates of SFA. The GDP of Sri Lanka shows a negative sign, and it is statistically significant at 10 %. However, the 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 increased due to their higher income and demand. Both population parameters are positive, and only POPit was statistically significant.

Table 2: Estimation Results for Major 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 (2022)

As per the results in Table 2, PCGDPD is positive and significant. Hence, the Hekscher-Ohlin theory holds for the exports from 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 a statistical significance of 1%, 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 & 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 programs and improvements in the production base (Weliwita & Tsujii, 2000).

The coefficient for COL has a negative sign and 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 3: Region-wise Fruit Export Results: 2010-2020 Average (LKR)

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

Maximum Likelihood Estimates from the gravity stochastic frontier model were used to estimate the region-wise potential of the fresh and processed fruit exports of Sri Lanka. According to the results in Table 3, the American region has been 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 % of its potential in the Oceania (79.36%), Europe (77.03%) and the Asian region (68.08%).

Issues related to input, labour, marketing, extension, and crops are the most common challenges for export-oriented fruit farmers. The majority (85.71%) of the surveyed fruit farmers lamented over lack of quality fertilizers while 58.57 % of farmers struggled to find effective pesticides. Further, 37.14 % of sample farmers indicated that land limitations forced them to obtain land on lease. About one fifth of farmers have faced problems in finding quality seed materials while around a same percentage do not have proper equipment. The rest (14.29%) were affected by water issues.

The majority (65.38%) of the respondent farmers are affected by high labour cost. A shortage of skilled labor is also cited as a major issue by 61.54 % of farmers.

Almost half of the fruit farmers considered (47.14%) said they had received low prices for their products. Some farmers stated that they have signed contracts with exporters and must sell their products at previously agreed-upon prices despite the high market price. Other significant issues included locating a suitable market for their products, dealing with delayed payments, and experiencing transportation difficulties. Fewer farmers have been impacted by price fluctuations.

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

Pests and diseases are the most serious crop-related issues for the vast majority (96.23%). Banana farmers, for example, must contend with Sigatoka disease in their cultivation. Furthermore, mango seed weevil and scale insects harm mangoes, just as *kanda panuwa* harms the pineapple cultivation. Other pressing issues include animal attacks, erratic climatic changes, and a lack of storage infrastructure.

Loss occurred due to highly unstable prices is a major setback for majority fruit collectors (80.95%). Receiving low profits during the peak season, the high cost of labour, the skilled labour shortage, and pests damaging the crops were also daunting. Fewer collectors cited the fertilizer shortage and less availability of essential hormones that induce ripening and adverse effects of the pandemic as impediments.

Internal barriers faced by fresh and processed fruit exporters are twofold: company barriers and product barriers. Further, external barriers can be divided into three major categories: industry barriers, market barriers, and macro-environmental barriers.

Company Barriers: The majority of respondents (79.07%) stated that they have adequate information and knowledge about aspects of export activity, while 76.74 % stated that their company actively identifies and considers new market opportunities. Further, 67.44 % 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 barriers. However, 60.47 % of respondents admitted that the lack of market information is a constraint in market selection and development. The majority face difficulties in obtaining funds to finance their export operations. An increased number of fruit exporters lamented over the 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, the majority (55.81%) mentioned that they did not receive assistance or collaboration from their clients.

Product Barriers: Most of the respondents (62.79%) indicated that it is difficult to comply with clients' requirements and a great majority (95.35%) said they ensure that their client specifications are met. Furthermore, majority of people rate products based on their quality. 72.09 % of the respondents mentioned that the existing international/national standards and regulations affect their business. Complying with standards is another challenge, 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.

Industry Barriers: Most of the surveyed fresh and processed fruit exporters indicated that the scale of the company is crucial to entering the export market; large-scale firms benefit more. Many have been hampered by a lack of knowledge about new technologies in the global market (55.81%), unstable raw material supply (81.40%), and high competition from foreign markets (79.07%). The vast majority have decided to face aggressive foreign competitors. As a result, approximately 69.77 % of them choose to participate only in markets where they have a competitive advantage. Furthermore, a large majority of respondents indicated that if their company had a competitive advantage in international markets, they would pursue those markets.

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 there was international demand for a product, they would be interested in pursuing it. However, more than half of respondents stated that they did not pursue

markets that only had their predetermined "ideal" characteristics. However, most of the respondents denied claims that language and cultural differences pose challenges in addressing customer preferences and the procedural complexity of paperwork.

Macro-environmental Barriers: A majority of the surveyed fruit exporters cited high transportation costs to the export market (95.35%) as well as lack of governmental support in export marketing and promotion (89.05%) as major issues. Foreign exchange restrictions and foreign currency fluctuations at export markets affected a similar percentage of respondents (76.74%). As a result, 60.47 % of respondents identified import tariffs at foreign markets as a problem. A similar proportion of respondents (65.12%) stated that there is a lack of gathering and dissemination of information on available export opportunities, and viewed the legal and regulatory framework they have experienced as impediments to their business growth. Further, more than half of the respondents expressed dissatisfaction over the existing government policies as being non-supportive. Furthermore, the majority of respondents (81.40%) stated that global economic recession and the current pandemic situation have had a negative impact on their businesses.

5. Conclusion and recommendations

According to the Augmented Gravity Model, the importing country's GDP and population have a positive impact whereas distance has a 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, the real exchange rate has a positive and significant impact on Sri Lanka's fruit exports, implying that the exchange rate policy does not play a significant role in Sri Lanka's fruit exports. Therefore, the growth in Sri Lanka's fruit exports can be credited to effective export promotion programmes and improvements in the production base. 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 % of its potential in Oceania (79.36%), Europe (77.03%), and Asian regions (68.08%). Therefore, the country can enhance its fresh and processed fruit trade with the above mentioned regions in place of the countries that have exceeded their trade potential.

The Weighted Average Score Analysis revealed that pineapple has the highest potential for export. The high cost of exporting is the most serious challenge for the majority (74.42%) of the fresh and processed fruit exporters in Sri Lanka, followed by other challenges identified as dis-continuity in the supply of raw materials (60.47%), strong international competition (50.00%) and quality related issues in raw materials (46.51 %). 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. An inadequate supply of quality fertilizers (86.00%) and pesticides (59.00%) was the greatest challenge for fruit exporting farmers. Further, most of the fruit farmers (50.00%) have received low prices for their products.

Sri Lanka should prioritize the implementation of effective export promotion strategies in order to evolve and diversify the trade area in order to find prospective markets while also expanding existing markets. Sri Lanka can increase fresh and processed fruit trade with regions such as Oceania, Europe, and Asia in place of regions where trade potential has exceeded. Furthermore, Sri Lanka can increase its market share in the aforementioned markets by introducing trade representatives, establishing bilateral trade agreements, adhering to international quality standards, and expanding exporters' marketing and advertising knowledge.

A close linkage should be established between farmers and fruit exporters 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.

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