RESEARCH REPORT

POTENTIALS AND CONSTRAINTS TO SCALE UP THE FLORICULTURE SECTOR IN SRI LANKA:

A COMPREHENSIVE ANALYSIS FOR SUSTAINABLE FLORICULTURE SECTOR DEVELOPMENT

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Potentials and Constraints to Scale up the Floriculture Sector in Sri Lanka: A Comprehensive Analysis for Sustainable Floriculture Sector Development

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FOREWORD

The floriculture sector of Sri Lanka carries a huge untapped potential to contribute to sustainable economic growth, rural development, and export diversification. The presence of diverse climatic conditions, rice biodiversity, and the geographical location of the country mark its position to become a global competitor. The floriculture sector of Sri Lanka became an industry during the 1970s; however, the industry remains at an infant stage compared to its global counterparts due to various challenges faced by the sector.

The floriculture sector of Sri Lanka can be categorized into two: as locally oriented floriculture industry and export-oriented floriculture industry. The challenges and opportunities faced by the two subsectors may differ; hence, the strategies and interventions to address these issues should be tailored to their specifics and needs. Therefore, this study has attempted to bridge this existing knowledge gap by systematically analysing the present status, and key potentials and constraints associated with scaling up both the local and export-oriented floriculture sector. The study has collected primary data from locally oriented floriculture growers covering major floriculture growing areas of the country, and also from major export-oriented floriculture companies.

The findings provide a comprehensive understanding of the present status and constraints faced by the floriculture industry of Sri Lanka. The constraints faced can be mainly categorized into two groups and institutional-level challenges and value-chain-level challenges, broadly in the case of both the sub-sectors. One of the key recommendations to develop the industry at the case of the institutional level is to create an umbrella institute to coordinate all the stakeholder institutes thus which helps coordination between institutes and resolve issues as they arise. At the value chain level, infrastructure development is one of the key focuses. I sincerely hope that the findings and recommendations of this research will contribute to the sustainable development of the floriculture sector of Sri Lanka.

Prof. A.L. Sandika
Director/Chief Executive Officer

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Without your support, this will not be possible.

Uthpala Jayasinghe
Sagarika Hitihamu
G.V.Norica Aiome

EXECUTIVE SUMMARY

The floriculture sector of Sri Lanka is a significant contributor to the country's export earnings, with a contribution of USD 16 million in 2016. While foliage exports are the biggest contributor to export earnings, the cut flowers contribute only a small share. The foremost major export destinations include the Netherlands, Japan, Saudi Arabia, the United States of America, and Australia. Despite the huge potential associated with the industry, Sri Lanka remains in an early stage compared to global players due to constraints such as limited large-scale investment, weak marketing channels, and insufficient institutional support. In recent years, macro-economic shocks, including the Easter attacks, the COVID-19 pandemic, and the 2022 economic crisis, reduced demand and disrupted supply chains in both the cases of local and export-oriented floriculture sectors. Some of the major challenges include high production costs, logistical issues, limited varieties, and quality concerns. Meanwhile, Sri Lanka continues to import cut flowers, showing unmet domestic demand despite favourable climatic conditions and growth potential.

The sector offers significant opportunities for income diversification, which would help sustainable rural development and women's empowerment. However, there are no recently conducted studies in the floriculture sector to identify the overall floriculture sector situation in the country and the potentials and constraints associated with scaling up to domestic and export markets. Therefore, this study aims to identify the potentials and constraints of scaling up Sri Lanka's floriculture sector in both local and export markets.

The study aimed to be conducted as action research where the first phase assessed the current status of the Sri Lankan floriculture sector, identified key issues pertaining, and explored possible solutions. The second phase aims at developing a logical framework to address the issues and implementing an action plan as a pilot project to develop the floriculture sector of Sri Lanka. The first phase included conducting a stakeholder analysis, collecting secondary data by reviewing existing literature. The study collected primary data by conducting a structured questionnaire survey with 401 small and medium-scale floriculture growers proportionally allocated among 17 floriculture growing districts of the country, while conducting key informant interviews with the leaders of Suwahas mal Floriculture Growers Associations. Primary data from export-oriented floriculture companies were collected using key informant discussions. Data was analyzed using SWOT analysis techniques and case study approach.

The export-oriented floriculture industry can be divided into two groups: direct exporters, whose parent companies are in Sri Lanka, and exporters whose parent companies are situated in foreign countries. Major floriculture export items include cut foliage, floriculture seeds, rooted cuttings, and pot plants. The study collected information from both types of companies and revealed that direct exporters are comparatively more vulnerable to external environmental shocks than those affiliated with parent companies, as the latter benefit from a certain level of safety and support

networks. The challenges faced by the export-oriented floriculture sector can be identified in two main categories: the institutional level and supply chain level. Key institutional challenges include complex and costly export procedures, inadequate institutional support and interventions to address issues faced by the industry, poor coordination between stakeholder institutions, and the absence of a central authority to oversee all the stakeholder institutions and make necessary interventions wherever needed. At the supply chain level, issues such as high production costs, limited transport and cold storage facilities, and a lack of locally developed market-oriented export-quality varieties hinder growth and competitiveness.

The local market-oriented floriculture industry, which is present in almost all the districts of the country, and the study considered only 17 districts, faces similar challenges. The main issues include rising input costs and limited availability, poor access to quality planting materials, poor adoption of modern technologies, and reduced local demand. Many growers struggle with inadequate resources such as land, capital, and technical expertise. Although there is a growing trend of producers selling directly to consumers, structural weaknesses in the value chain—particularly related to input supply and marketing—continue to restrict profitability and expansion opportunities.

To strengthen the local floriculture sector, the study recommends focusing on self-sufficiency and strengthening the business of local market-oriented producers. This includes improving research and development to produce new varieties, high-quality tissue culture plants, and mother plants, as well as enhancing training and technology transfer to meet the needs of growers. Establishing a separate regulatory body to oversee the floriculture sector, offering subsidies for key inputs, and developing provincial marketplaces would also help sustain local businesses. For the export-oriented sector, the study recommends forming a national umbrella organization to coordinate stakeholders, streamline institutional processes, and enhance research and innovation. Improving logistics infrastructure—especially cold chain facilities—promoting large-scale cultivation through farmer companies, and supporting skill development and technology adoption are essential for positioning Sri Lanka as a competitive global player in the floriculture industry.

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ABBREVIATIONS

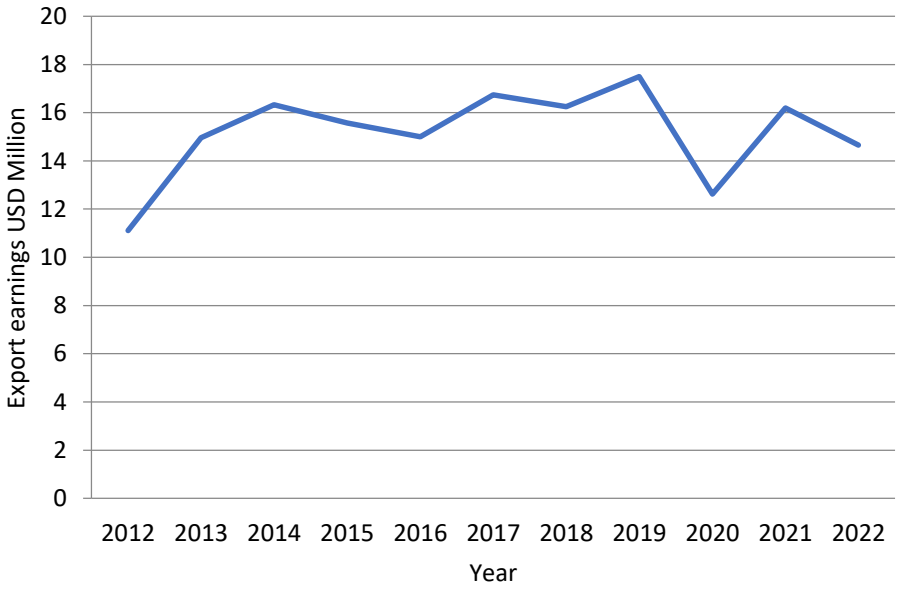
EDB	-	Export Development Board
EU	-	European Union
FAO	-	Food and Agriculture Organization of the United Nations
FDI	-	Foreign Direct Investment
IPM	-	Integrated Pest Management Service
USDA NASS	-	United States Department of Agriculture, National Agricultural Statistics
GSP	-	Generalized System of Preferences

CHAPTER ONE

Introduction

1.1 Background

In 2021, Sri Lanka's floriculture sector generated USD 16 million in export revenue (Export Development Board, 2022). The change in export earnings over the past 11 years is shown below:



Source: Sri Lanka Export Development Board, 2022

Figure 1.1: Export Revenue from Floriculture Products

The main export destinations for Sri Lanka's floricultural products in 2023 included the Netherlands (USD 3.58 Million), Japan (USD 3.32 million), Saudi Arabia (USD 1.59 Million), the United States of America (USD 1.06 Million), Australia (USD 0.9 Million), the United Kingdom (USD 0.52 Million), Denmark (USD 0.52 Million), Germany (USD 0.46 Million), United Arab Emirates (USD 0.43 Million), and Kuwait (USD 0.33 Million). In 2022, 88% of Sri Lanka's floriculture export earnings came from foliage exports, while 9% came from floricultural seeds. Aquatic plants contributed 1.4% and cut flowers accounted for only 1.2% of total export earnings. According to the literature, there is an optimistic outlook in the horticultural industry. While stakeholders recognize that Sri Lanka, despite exporting floriculture products for decades, is still at an infant stage as an export country compared to global players and compared with some other countries in the region. There are various underlying reasons for this situation. However, on the other hand, there is an eagerness in the sector to overcome these challenges and a strong willingness within the sector to collaborate with stakeholders and drive the industry forward (Marambe, Benaragama and Leeters, 2016). Benaragama and Pieris (2015) identified insufficient investment in large-scale

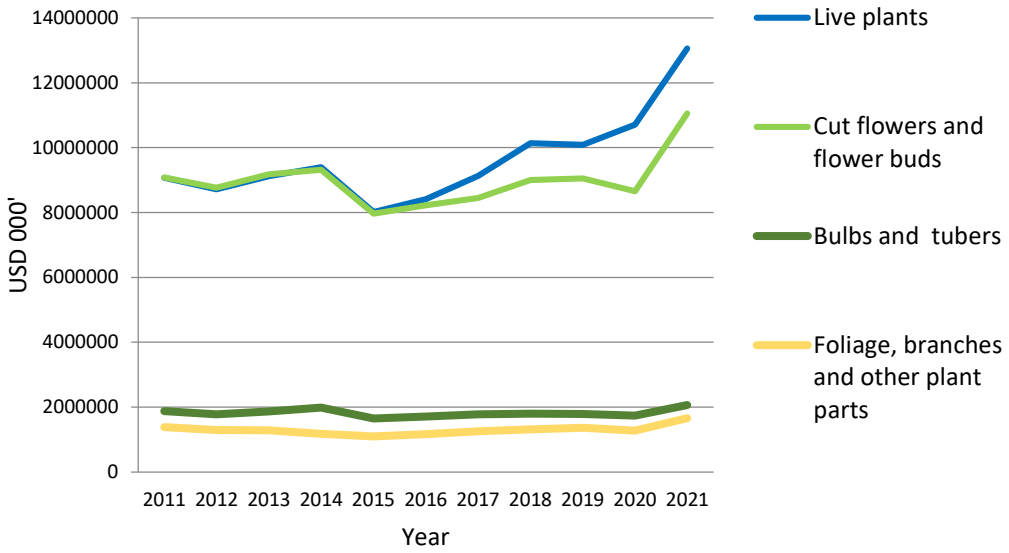
ventures as a major constraint in Sri Lanka's floriculture sector, resulting in predominantly small and medium-scale businesses that struggle to compete globally due to limited production capacity. In addition, another research study performed by Padmini and Kodagoda (2017) emphasized the importance of developing proper marketing channels for floriculture products, nationally and internationally, similar to the tea industry in the country. Further, they stated that institutional support is most important to promote the floriculture industry.

Background of the Research Question

The research question for this study first emerged in November 2022, based on the study "Income Diversification as a Sustainable Livelihood Strategy for Rural Development: An Assessment of Optimal Conditions." The study examined four selected case studies of income diversification initiatives in Sri Lanka, implemented by selected government and non-government organizations, and assessed their sustainability. During the study, the research team came across the floricultural village of Hettigedara in the Kappetipola area of the Badulla District.

In this village, income diversification into the floriculture sector began under the Gamidiriya Project in 2006. The project initially functioned efficiently but faced setbacks during the Easter attack and the COVID-19 pandemic. A more severe impact occurred during the 2022 economic crisis, when most of the farmers were unable to sell their produce. Their main floricultural products included ornamental plants such as cactus, gerberas, and African violets.

Before the economic crisis, households earned around Rs. 2,000 per day from floriculture. However, demand drastically reduced due to supply chain disruptions such as the fuel crisis and decreased disposable income among consumers. As a result, villagers began seeking alternative income sources. This situation is not limited to the Hettigedara village. According to discussions with key informants, including floriculture growers and exporters, the economic crisis has significantly affected both the domestic and export markets. As shown in Figure 1.2, there is a growing demand for floricultural exports each year, with the highest increase seen in cut flowers and live plants. Despite Sri Lanka's significant potential, the country's main floriculture exports remain cut foliage. As a tropical country with diverse climatic conditions, Sri Lanka is well-positioned to expand into other areas of floriculture. However, this potential remains largely untapped due to quality issues, quantity problems, lack of suitable varieties, high cost of production (COP), high freight charges, logistical challenges, and other constraints.



Source: UN Com Trade Data

Figure 1.2: Global Floricultural Export Market from 2011 to 2021

In addition, Sri Lanka imports cut flowers, indicating that local production is insufficient to meet domestic demand. For example, in 2022, Sri Lanka spent approximately USD 42,490 on cut flower imports—products that could potentially be grown locally. This sector also has a significant potential to increase rural household Income, especially by empowering women. However, it is observable that there is a noticeable lack of innovative ideas among floricultural growers.

Despite the ongoing economic crisis, the floriculture sector has the potential to provide livelihoods for many rural households and contribute to national income. However, there are no recently conducted studies in the floriculture sector to identify the overall floriculture sector situation in the country and the potentials and constraints associated with scaling up to domestic and export markets (Padmini and Kodagoda, 2017). Therefore, this study aims to identify the potentials and constraints of scaling up Sri Lanka's floriculture sector in both local and export markets, to develop a holistic business model for its growth.

The study seeks to answer the following research questions:

Research Questions

1. What are the potentials and constraints in scaling up Sri Lanka's export-oriented floricultural industry?
2. What are the potentials and constraints in scaling up Sri Lanka's domestic floricultural industry?

1.2 Objectives

Major Objective

To identify the potentials and constraints for scaling up Sri Lanka's floriculture sector in both local and export markets.

Specific Objectives

1. To identify the potentials and constraints of scaling up the domestic floricultural industry in Sri Lanka.
2. To identify the potentials and constraints of scaling up the export-oriented floricultural industry in Sri Lanka.

CHAPTER TWO

Literature Review

2.1 Floriculture Industry in Sri Lanka

2.1.1 Major Floriculture Commodities and Values (both domestic and export)

The horticulture sector includes fruits, vegetables, floriculture, and landscaping. In Sri Lanka, it has strong potential for growth, as a variety of horticultural products can be cultivated year-round across different agro-climatic zones.

Floriculture in Sri Lanka began as an industry in 1970 and has grown significantly in recent years to become a major foreign exchange earner. The country's rich biodiversity and varied climatic regions have helped establish Sri Lanka as one of the best quality floriculture production centers in the world, with a product range from tropical to temperate flora. (Padmini and Kodagoda, 2017). These plants are grown under optimal micro-climatic conditions in controlled poly or shade houses. The availability of natural growing media like coco-peat, and a skilled, knowledgeable workforce are key strengths of the industry. The floriculture industry is a high-income agri-business activity with strong potential for socio-economic development in Sri Lanka. The business involves a few exporters, medium-scale growers, and many small-scale growers.

The Democratic Socialist Republic of Sri Lanka, 2010 aimed to develop the floriculture sector as an income source for unemployed women. Limited literature and a lack of data remain major barriers to policy development in this sector. Today, Sri Lanka is recognized as a producer of high-quality floriculture products. Currently, Sri Lankan growers produce a wide range of products, including foliage plants, flowering plants, cut flowers, climbers, and grasses (Anuruddi *et al*., 2020). Sri Lanka's floriculture products include ornamental foliage plants, cut decorative foliage, cut flowers, aquarium plants, landscaping plants, tissue-cultured plants, and flower seeds. In exports, the contribution of foliage (60%) is higher than that of live plants (38.8%) and cut flowers little less than 1%. (Yakandawala, 2023).

Cut flowers grown in Sri Lanka fall into two main categories based on temperature requirements: temperate cut flowers (such as Gerbera, Roses, Madonna, Lily, Chrysanthemum, Aster, Dalia, Baby's breath) and tropical cut flowers (such as anthuriums, orchids, heliconias, and ginger flowers) Among tropical flowers, Anthuriums and Orchids are the most popular tropical cut flowers that are being grown commercially for exports as well as for the local markets (Padmini and Kodagoda, 2017).

Table 2.1: Key Products and Varieties in Sri Lanka

Key Products	Varieties
Decorative Foliage	*Draceana sanderiana, Draceana massengeana, Cordyline, Aglaonema, Adiantum, Calathea, Maranta, Codiaeum, Monstera, Pothos, Pandanus, Thaloide,Philodendron, Miscanthus, Anthuriums, Diffenbachia, Scindapsus, Caryota urens, Chrysalidocarpus, Differnbachia, Aspidistra*
Rooted/Un-rooted Young Plants and Indoor Pot Plants	*Draceana sanderina, Draceana massengeana, Codiaeum, Agloanema, Scindapsus, Draceana marginata, Cordyline, Pleomele reflexa, Polyscias, Livistonia*
Cut Flowers	*Roses, Carnations, Gerbera, Chrysanthemum, Lilies, Gypsophila, Limonium, Anthurium, Orchid, Iddda, Marigold, Jasmin,*
Landscaping Plants	*Plumeria, Gardenia, Codiaeum, Ixora, Hibiscus, Cassia, Bouhinia, Bougainvella, Allamanda, Jasmine, Acalypha, Neem*
Tissue-cultured Plants	*Ananas, Musa sp, Cordyline, Dracaena, Syngonium Philodendron, Ficus*
Aquarium Plants	*Anubious, Cryptocoryne, Ceratophyllum, Echinodorus, etc.*

Source: Export Development Board (EDB), Sri Lanka, Industry Capacity Report, 2022

2.1.2 Geographical Distribution of Producers and Exporters across the Country

The Western, North Western, and Central Provinces are the major commercial floricultural production regions in the country (Padmini and Kodagoda, 2017). The sector employs more than 10,000 families in semi-urban and rural areas. Approximately 350-450 ha of land in the upcountry region are dedicated to floricultural crops.

a) Major Production Regions
Western Province – Gampaha, Kalutara, and Colombo Districts
North-Western Province – Kurunegala, and Puttalam Districts
Central Province – Kandy, Kegalle, Matale, Nuwara Eliya, and Badulla Districts

b) Possible Areas for Expansion
Southern Province and Sabaragamuwa Province, North Central and Uva Province

Key Players in the Sector in Floriculture Exporters in 2021

- Quality Seeds Co. Limited
- Mike Flora (Pvt) Ltd
- The Leaf Company (Pvt) Ltd
- Ceylon Foliage (Pvt) Ltd
- Hayleys Agro Biotech (Pvt) Ltd
- Spado International (Pvt) Ltd
- Mike Flora International (Pvt) Ltd

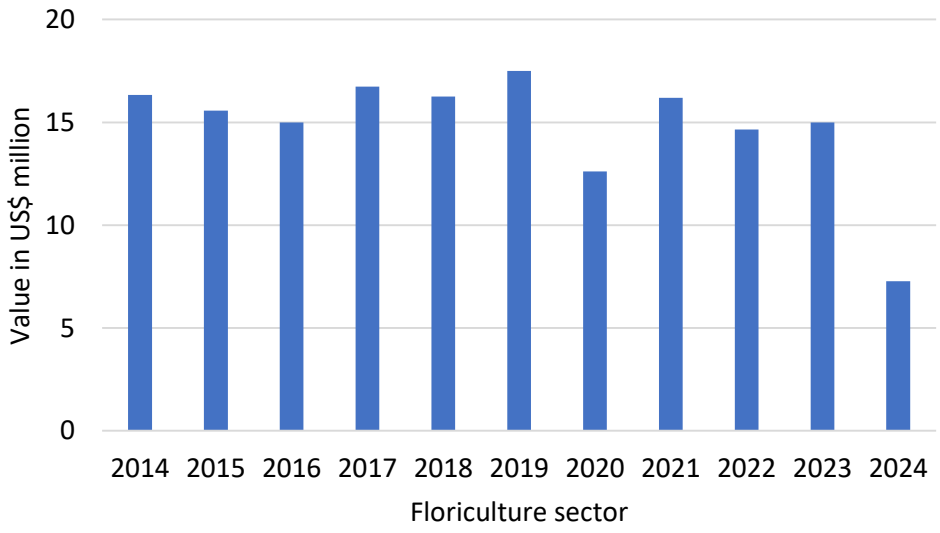
- Star Flora (Pvt) Ltd
- Borneo Exotic (Pvt) Ltd
- Tropi Flora (Pvt) Ltd

2.1.3 Sri Lanka's Contribution (Total and Commodity-wise)

Economic reports show a 5% growth in foreign exchange earnings from floriculture exports in 2021 compared to 2020, totaling USD 5.2 million. This indicates growing foreign demand for Sri Lankan floriculture products. Figure 2.1 indicates the export performance of floriculture from 2014 to June 2024. In 2023, exports reached USD 15 million. Despite this growth, Sri Lanka contributes less than 0.2% to the global floriculture trade.

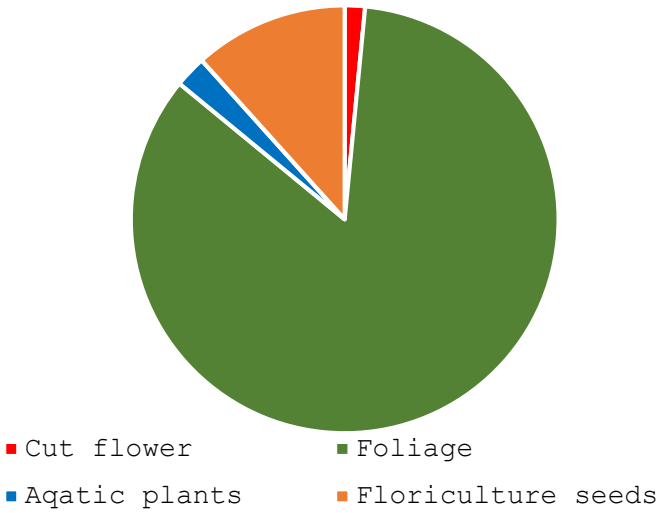
The main buyers of Sri Lankan floricultural products are Europe (40%), Asian countries (40%), and the USA (3%). Globally, Taiwan is the largest producer by shipment volume, while the Netherlands leads in income from orchids. Orchids are important in the global floriculture market both as cut flowers and potted plants, accounting for 10% of fresh flower sales. In 2021, more than 40 countries exported orchids, and 60 countries imported them. The total global orchid market value is USD 504 million (Tiwari et al., 2022).

The government now recognizes floriculture as a fast-growing industry in Sri Lanka, with development programmes and export promotions underway nationwide to boost the sector (Atapattu *et al*., 2023). Figure 2.2 demonstrates the composition of floriculture exports in 2023.



Source: Export Development Board (EDB), Sri Lanka. Data retrieved and graph developed by the author, 2023

Figure 2.1: Export Performance – Floriculture, 2014-2024 June



Source: Export Development Board (EDB), Sri Lanka. Data retrieved, and graph developed by the author, 2023

Figure 2.2: Composition of Exports in the Floriculture Sector in 2023

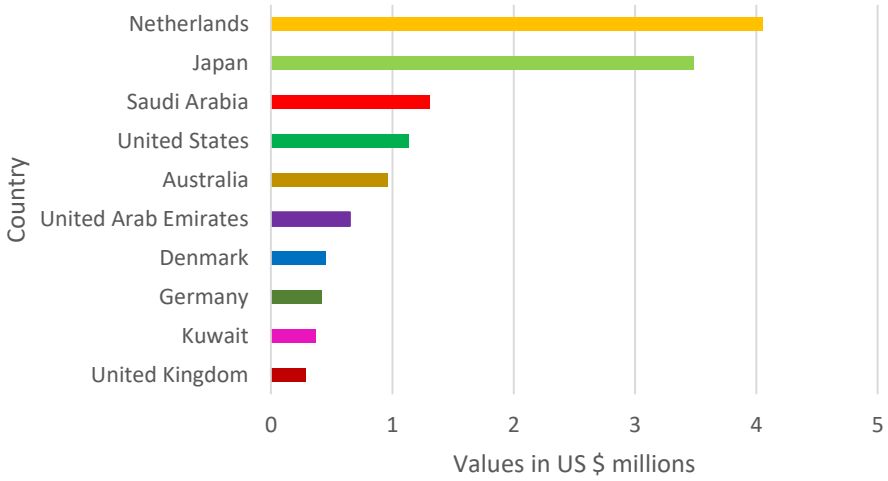
2.1.4 Labour Force Participation and Employment Creation

The floriculture sector not only generates significant foreign income for Sri Lanka but also generates employment opportunities. It provides direct employment opportunities to around 4,000 people in urban and semi-urban areas in the country. The industry is divided into three groups: large commercial ventures, middle-level growers, and village-level producers. Large-scale growers, often partnering with foreign companies, focus on ornamental and cut foliage plants for export. Middle-level and village-level growers mainly supply to the local market, usually using traditional methods without advanced technology. Most small-scale growers sell their products from home nurseries, street vending, or traveling to fairs, exhibitions, or any occasion where they can find customers. Street vendors typically serve pedestrians and build customer relationships by operating consistently in one location (Anuruddi, Fonseka and Wickramaarachchi, 2020). The sector can provide year-round employment at a rate of 5-7 workers per acre. It currently supports around 5,000 direct jobs and over 15,000 indirect jobs throughout growers supplying export companies. The rising export trend shows growing demand for Sri Lankan floriculture products worldwide. The sector generates significant foreign exchange earnings and contributes to employment in rural and suburban areas. (Export Development Board of Sri Lanka, 2022)

2.1.5 Export Destinations

Sri Lanka is recognized as one of the top producers of high-quality floriculture products in the world. This sector generates significant foreign earnings and supports employment in both urban and rural areas. Europe is the main market, accounting for 60% of exports in 2023, as shown in Figure 2.3. Other key markets include Japan, the

Middle East, the USA, and South Korea. Sri Lanka exports a variety of floriculture products to these markets, such as ornamental foliage plants, decorative cut foliage, cut flowers, aquarium plants, tissue-cultured plants, and flower seeds. An increasing trend in exports indicates the rising demand for Sri Lankan products in many markets around the world. However, there is a significant level of demand for floriculture products, while there is also strong local demand and profit potential (Herath., 2018).



Source: EDB Sri Lanka, 2023

Figure 2.3: Major Export Destinations-2023

2.1.6 Major Importing Countries

Flower imports in Sri Lanka depend on the seasonal demand. Sri Lanka is one of the main importers of Jasmine from South India, with volumes varying by season. The main demand periods are the wedding season (May-July) and Buddhist religious festivals, such as the Jasmine Pooja in Anuradhapura. Importers help fill seasonal supply gaps and meet the special demands of retailers and consumers (Basnayake *et al.,* 2021). Flowers are commonly used by Sri Lankans in religious places sites such as Buddhist and Hindu temples. Sudhagar (2013) noted that Sri Lanka imports floriculture products from India, including Jasmine flowers for the jasmine flower ceremony (*Pichcha mal pujawa*) held at the sacred Buddhist site, Jaya Siri Maha Bodhi, in Anuradhapura. In response, the Department of National Botanical Gardens and the Department of Agriculture jointly launched a programme to cultivate jasmine locally to meet this demand (Padmini and Kodagoda, 2017).

2.1.7 Export Volumes and Growth

The floriculture industry in Sri Lanka started around 23 years ago as a small sector with only a few companies. Today, it is a significant industry, reaching nearly one billion rupees in exports last year. Around 10000 people are directly involved in the industry. According to De Silva, 2019 the floriculture industry in Sri Lanka has huge growth

potential, and turnover could double if fully realized. While the global industry grows at about 15% annually, Sri Lanka's growth has been only 4–5% in recent years. According to De Silva, 2019 the floriculture industry in Sri Lanka has huge growth potential, and turnover could double if fully realized. De Silva cites high production costs in Sri Lanka as a key reason for the slower growth.

Because the sector is highly scattered, it is difficult to determine the exact production size. In 2021, Sri Lanka earned USD 16 million from floriculture exports.

Table 2.2: Export Performance and Main Markets-Exports (Value in US$)

Description	2019	2020	2021
Foliage	15,475,849	10,642,623	14,020,009
Floriculture seeds	1,235,721	1,312,246	1,107,216
Aquatic plants	688,967	572,527	905,068
Cut flowers	103,523	94,598	162,140
Total:	17,504,060	12,621,994	16,194,433

Source: EDB, 2022

The improved performance was driven by increased exports of apparel and textile (40.83%) and coconut-based products (29.69%), with flowers and foliage ranking as the 7th best export item. In Sri Lanka, floricultural products contribute about 25% of annual export income. In 2021, cut flower exports totaled USD 5.7 million (Sri Lanka Export Development Board, 2022). In 2011, orchid exports amounted to approximately 17.3 metric tons, generating Rs. 25.37 million for the Sri Lankan economy (Sri Lanka Export Development Board, 2021; Atapattu et al., 2023)

2.1.8 Women Empowerment

Floriculture is a high-income agri-business that offers great opportunities, especially for women growers. It uses less water in poly-tunnels and net houses. Income per unit area from floriculture is much higher than other agricultural crops. However, the potential of floriculture as an industry has not been fully exploited in Sri Lanka. Growers produce a wide range of floricultural items, including cut flowers, foliage plants, flowering plants, pot plants, climbers, and grasses (Padmini: 2016). Sri Lanka is home to an enormous botanical diversity and a wide range of floricultural species. Floriculture is a high-income generating agribusiness with strong potential for socio-economic development, offering great opportunities, especially for women growers. The Government of Sri Lanka plans to establish 1,500 floriculture villages and generate 30,000 jobs in suburban and rural areas (National Policy Framework, 2010). Various government agencies and non-government organizations have developed support networks to provide training, planting materials, and infrastructure facilities to empower women floriculture growers. Women play a major role in Sri Lanka's agricultural sectors, including tea, rubber, paddy, and horticultural crops such as fruits, vegetables, and floriculture. The Department of Census and Statistics, 2012 by the Department of Census and Statistics in Sri Lanka reported that the unemployment rate

among women (6.2%) was higher than that of men (2.8%). Economic and social statistics of Sri Lanka (2013) showed that female migration for employment rose to 49.1% of total migration (137,151), with 42.3% employed as housemaids. To reduce poverty and close the gender employment gap, empowering women is a key development goal in Sri Lanka (Kodagoda, 2013).

2.1.9 Related Institutions/Stakeholders

The Department of National Botanic Gardens is a leading institute that provides training programmes for floriculture growers in Sri Lanka. Additionally, the National Plant Quarantine Service under the Department of Agriculture plays a vital role in developing the floriculture industry by providing extension services on pest and disease control. On the side of the government, various tax concessions, loan facilities as well as encouragement of foreign direct investments support the floricultural sector. The Botanic Gardens are renowned for their extensive collection of plants from around the world, including rare and endangered species. The floriculture sector encompasses the cultivation and sale of flowers, such as cut flowers, potted plants, and ornamental trees and shrubs. Several commercial florists operate in Sri Lanka, including Lassana Flora, Kapruka, Shirohana Petal Puru, Blooms Flower Shop, Greenet Plants & Flowers Private Limited, among others (Padmini and Kodagoda, 2021). These businesses encourage local flower cultivators to produce high-standard, quality products. As product quality improves, growers' profits also increase. Commercial-scale tissue culture plant producers such as K Orchids, Serandib Flora, and Heyleys Agro Biotec supply quality plantlets to the market, helping to maintain high standards in flower cultivation across Sri Lanka (Padmini and Kodagoda, 2021; Atapattu *et al*., 2023).

To facilitate the safe transportation of plants and related products, the Department of Agriculture has established a well-equipped plant quarantine service. Officials regularly visit floriculture nurseries, providing supervision and advice on integrated pest management and disease control practices. Additionally, the `Green Channel' at Sri Lanka's major international airport offers expedited clearance to support the efficient export of floriculture products.

2.1.10 Supply Chain

The floriculture industry employs advanced cultivation and marketing technology. Products are grown under optimal microclimatic conditions within poly or shade houses. The entire supply chain is managed by experienced nursery professionals to ensure high-quality products for export. Consequently, innovative and skillful human resources are essential for the industry's development and improved performance. Notably, innovative production technologies are more commonly adopted in the private sector than in the state sector in many cases (Herath, H.M.W.A., 2018).

2.1.11 Relevant Policies and Strategies

1. Quality Certifications

To facilitate safe movement of plants and plant products, a well-equipped plant quarantine facility is available, with quarantine officials conducting regular visits to floriculture nurseries to closely supervise and provide guidance on integrated pest management and disease control. Export companies have obtained environmental and quality certifications such as GLOBALGAP, MPS, and FAIR TRADE, GAP, and GMP to meet international market requirements. This ensures consistent product quality and reliable delivery.

2. Legislations

Floriculture production and exports are regulated by the following Acts and legislations:

- Forest Ordinance
- Wildlife Protection Act
- Convention for International Trade of Endangered Species (CITES)
- Pesticides Control Act
- Regulations under the Pesticides Control Act
- Enactment of the New Plant Variety Protection Act
- Seed Act
- Regulations under the Seed Act
- Plant Protection Act
- Regulations under the Plant Protection Act

3. Related Institutions

- Department of Agriculture
- National Plant Quarantine Service - NPQS
- Department of National Botanic Gardens
- Forest Department
- Department of Wildlife Conservation
- Department of Commerce
- Sri Lanka Customs

2.1.12 Potential Strengths, Weaknesses, Opportunities, and Threats

The Government has identified the floriculture sector as a potential sector for development, and export promotion has formulated a strategic plan to support this. Training programmes for growers are provided by the Department of National Botanic Gardens, while the National Plant Quarantine Service under the Department of Agriculture provides extension services for pest and disease control. The government also encourages Foreign Direct Investments (FDI) in the floriculture sector. The Export Development Board supports the industry by providing market intelligence and assistance with export marketing. There is significant potential to increase supplies of existing varieties in demand and to expand the product range by introducing new varieties. The export of tissue-cultured ornamental plants is an emerging opportunity

due to advantages such as the production of disease-free plants, uniformity in large quantities, multiplication of desirable traits from small plant parts, predictable production, efficient use of space during transportation, and reduced costs.

Research and Development and Product Development Facilities Available

- Through its Action Plan 2016-2020, EDB is assisting the growers/exporters in promoting new/innovative products to the international market.
- With the achievement of the GSP+ concessions from the EU market, the floriculture sector is eligible to receive zero-duty benefits on export products.
- A World Bank-funded project received by the Sri Lankan government for agriculture sector modernization includes the export-oriented floriculture sector as a potential area for support.
- The National Botanical Gardens is involved in developing new floriculture varieties, while the EDB is assisting growers/exporters in commercializing these products for the international market.
- A National Committee for Floriculture Research and Development, consisting of public and private industry stakeholders, has been established to streamline resources and set research priorities for industry.
- An annual symposium organized by the Council for Agriculture Research Policy (CARP) provides an opportunity for scientists from universities and research institutions to present important floriculture research to the industry.

Infrastructure/Logistics: Requirements/Availability for the Sector

a) Availability

- International airport
- Highways for easy transportation
- Availability of coco peat as a growing media
- Electricity in the industrial tariff category

b) Requirements

- Cultivable land to expand cultivation
- Cold storage facilities at the airport
- Direct flights to a major floriculture market, the Netherlands
- Competitive airfreight rates
- Modern technology at an affordable rate
- Availability of required inputs without shortage

Stakeholders and the Strengths and Weaknesses of the Sector
Strengths

- Climatic variations and diverse topography enable the cultivation of a wide range of products, from tropical to temperate.

- The country's geographical location facilitates the supply of products to any destination in the world within 24 hours.
- Knowledge and technology to produce finished products that meet international standards. Availability of an educated, skilled, and trainable labour force.
- Availability of coco peat as a growing media.
- Established reputation as a supplier of quality products. Strong institutional support.
- Application of Good Agricultural Practices to protect the environment, safeguard workers, and ensure the sustainable use of natural resources.

Weaknesses

- Limited product assortment
- Lack of R&D to develop new products
- Relatively small production units
- Unavailability of national policies
- Lack of responsible institute

Exporters' Strengths and Weaknesses

The flower exporters in Sri Lanka have raised several issues. Some of the exporters are dissatisfied with the local pricing mechanism, where flowers of varying quality often receive the same price, disadvantaging producers of higher-quality flowers. Transport and handling costs are high, especially when collecting flowers from individual farmers in Nuwara Eliya, and this method does not guarantee a continuous supply of consistently high-quality flowers. Managing fields under these conditions is also challenging. Consequently, exporters find it more convenient and cost-effective to operate their own flower farms.

Discussions with the EDB personnel revealed that Sri Lanka's cut flower export volumes remain unsatisfactory amid intense international competition. Although the demand for certain flowers like roses, carnations, and lilies remains steady and peaks around occasions such as Valentine's Day, Mother's Day, Sri Lanka struggles to meet continuous, high-quality supply demands. Certain varieties with strong international demand, such as Victory, Sandriana, Sancervaria, Cordiana are produced insufficiently. Price fluctuations further hinder consistent financial returns for exporters. To make this venture profitable, the selling price must increase in line with rising production costs. However, once exporters have entered the international market, it becomes practically difficult for them to raise prices. Doing so could result in losing their market position, as many competitors offer flowers at lower prices, potentially pushing them out of the international market (Rathnayake, S. and Rathnayake, S., 2019).

Challenges Faced by the Mobile and Street Flower Vendors

A lack of authorized marketplaces to sell their goods was identified as the main challenge by the majority (85.2%) of respondents. This issue is compounded by adverse weather conditions such as heavy rain and intense sunlight. Most vendors operate from temporary huts, display their plants on make shift tables and racks, and some hang their plants on walls and trees. Such setups expose plants to sunburn and frequent fungal infections. Without proper shelter, it becomes difficult for vendors to continue operations during heavy rain or scorching heat, often forcing them to suspend sales.

Transportation costs are also a burden, especially for those using hired vehicles, as payments for drivers and fuel are high. According to Padmini and Kodagoda, 2017, many growers begin their operations in home gardens and only attempt to scale up once they identify market opportunities. However, this expansion is often hindered by financial and logistical constraints.

The same survey further highlights several other challenges faced by growers, including the lack of proper market spaces, taxes imposed on temporary huts, the absence of net houses and established nurseries, and limited financial support. Despite these issues, government incentives and support have positively impacted growers' incomes. Additionally, the adoption of new technologies such as poly-tunnels and net houses is helping to improve productivity in the sector (Anuruddi, Fonseka and Wickramaarachchi, 2020).

2.2 Global Floriculture Industry

The global floriculture industry is mainly concentrated in developed countries and demonstrates an annual growth rate of 8 – 10%. More than 120 countries are actively engaged in this sector. The main exporters include countries in Europe and America, as well as the Middle East, Colombia, and Ecuador (Ghule and Menon, 2013). The Netherlands is the largest floriculture producer in the world, with a highly mechanized and specialized industry. It relies heavily on fossil fuels, borrowed capital, chemical fertilizers, and pesticides to maintain operations (Hulst, 2012). The extensive use of these inputs ensures high productivity and efficiency, enabling the Netherlands to meet the substantial global demand for floriculture products. Canadian floriculture producers primarily export their products to the U.S. market. The U.S. floriculture industry features a dual market structure: large-scale producers supply major retailers ("big box" stores) and compete with imports, while small-scale producers focus on local markets by offering superior customer service or catering to 'niche' consumer preferences (Reid et al., 2009). This structure allows both large and small producers to thrive in the U.S. floriculture industry, ensuring a numerous and responsive market that caters to various consumer needs.

The South African floriculture industry employs more than 17,500 people, offering significant rural employment and showing strong potential in the international market

(Matthee et al., 2014). However, research by the South African Flower Export Council highlights key shortcomings: a low commitment to exporting (with only a small percentage of total sales going abroad), limited participation in international floriculture programmes, and a lack of product differentiation or value addition. To fully realize its potential, the South African floriculture industry needs to address these issues by increasing export efforts, engaging more actively in international programmes, and adding value to its products. This shift in focus from the saturated domestic market to the more profitable global market is essential (Matthee et al., 2014). Colombia is the second-largest producer of fresh-cut flowers globally, serving as the main supplier to the United States and the fourth-largest to Europe. This success is attributed to the availability of ample land, a favourable climate, low labour costs, and relatively low shipping expenses to European markets (Miller et al., 2012). Kenya is also a major exporter of fresh flowers to the European market, and, similar to Colombia, favourable weather conditions and low shipping costs contribute to higher income from exports. However, in both countries, most floriculture companies are owned by European investors, and local workers often receive low wages (Miller et al., 2012). European companies often provide local employees with lower salaries, highlighting the importance of enhancing working conditions in the sector.

European investment has extended to Ethiopia as well, particularly in rose cultivation, where more than 90,000 jobs have been generated around flower farms (Janko and Alemu, 2014; Wei et al. 2013) highlighted the vast potential of the global floriculture market and emphasized its capacity to empower women. Research findings from Papua New Guinea demonstrate that women play a significant role in the floriculture sector, supported by various networks and initiatives. This example underscores the importance of promoting and strengthening women's participation in the floriculture industry globally, recognizing their crucial contributions to its development and sustainability.

The emergence of new global flower centers, strong local demand, inadequate infrastructure, and rising production costs have hindered the growth of India's floriculture exports, which increased by only 16% between 2012-13, compared to 23% the previous year.

The Agricultural and Processed Food Products Export Development Authority is responsible for export promotion and floriculture development in India, and provides subsidies for cold storage, pre-cooling units, refrigerated vans, and greenhouses, as well as airfreight for exports. Commercial floriculture has been recognized as having higher potential income per unit area than other field crops, establishing it as a profitable industry (Malviya, A., 2022).

2.2.1 Value of the Global Floriculture Industry

The floral industry began in the United Kingdom in the late 19th century, with large-scale flower cultivation on vast estates. By the 1950s and 1960s, cut flower production shifted closer to major consumer centers, resulting in predominantly local production

(Armitage, A.M., 1993, Dole, J.M. and Wilkins, H.F., 1999 and Larson, Roy A., 2013). During this period, developed regions such as Japan, Western Europe, and North America were both leading producers and consumers of cut flowers. Over time, the industry expanded beyond cut flowers to include a wide variety of plants and flowers sold in multiple forms. As the industry evolved, it expanded beyond cut flowers to include cut cultivated greens, annual bedding/garden plants, potted flowering plants, herbaceous perennial plants, foliage plants for indoor/patio use, and propagative floriculture materials. This diversification led to the involvement of various industry segments such as transportation companies, brokers, and wholesalers who facilitate the shipment of flowers from production locations to global population centers.

Additionally, the industry also encompasses plant breeders, suppliers of seeds, bulbs, and cuttings, and businesses providing greenhouses, pots, potting soil, labels, marketing supplies, fertilizers, pesticides, and machines for plant production. The service segment includes floral designers, florists, garden designers, and interior/exterior landscaping companies, while retail is carried out through garden centers, supermarkets, and hardware stores. Export Development Board, 2016, North Australian Cut Flower Group, 2008, and Gardening (2007-07-13); "Country Roses: A Cut Above". London: Telegraph. Retrieved October 27, 2016.] In 2021, the global cut flower market was estimated at approximately USD 10.8 billion (wholesale), based on trade data from 114 countries (Osum, 2024). The leading importers of cut flowers included the United States (21%), Germany (15%), the Netherlands (12.5%), the United Kingdom (9.4%), Russia (5%), and France (4.6%) (Osum, 2024). By 2022, the overall global floriculture industry was estimated at USD 50,040 million. It is projected to grow to USD 58,030 million by 2028, representing a compound annual growth rate of 2.5% during the forecast period (Floriculture Market Report, 2022).

The U.S. Agricultural Census categorizes flowers into six categories for organizational convenience: Cut Flowers, Cut Cultivated Greens, Annual Bedding/Garden Plants, Potted Flowering Plants, Herbaceous Perennial Plants, Foliage Plants for Indoor/Patio Use, and Propagative Floriculture Materials (USDA, NASS, 2023). These categories facilitate the management of the floral industry's diverse plant varieties, which consumers generally select based on their appearance and enjoyment rather than botanical names.

The Netherlands and the History of the Flower Industry

The tulip, originally a wildflower native to Central Asia, was first cultivated by the Turks as early as 1000 AD. During the 16th century, the Ottoman Empire, Turkey, experienced "Tulip Mania" when the Sultan mandated the cultivation of specific tulip varieties for his pleasure. Tulips gained popularity as garden plants in both Eastern and Western cultures. In Turkish culture, tulips symbolized paradise on earth and were regarded with near divine reverence, while in the Netherlands, they came to represent the fleeting nature of life. Tulip became an important cultural symbol in the Netherlands, reflecting different values compared to its original symbolism in Turkish culture. The Netherlands remains the hub of the European floral market. Since the

mid-1970s, its production and distribution of cut flowers have grown substantially, making the country a major international supplier, with billions of cut flowers shipped annually. The Royal Flora Holland flower auction, the world's largest flower market, plays a pivotal role in this industry. Flowers are auctioned and then immediately transported to buyers around the globe.

2.2.2 New Flower Growing Centers

Experts believe that the production focus in the floral industry has shifted from traditional growers to countries with more favourable climates and lower production and labour costs. This paradigm shift has redefined the global floral industry over recent decades. Historically, the Netherlands was a dominant force in flower production; however, it has since transitioned primarily to flower trading and logistics, while continuing to lead in flower genetics and breeding innovation. New centers of floral production have emerged in developing countries, including Ecuador (the world’s largest producer and exporter of roses), Colombia (the second-largest exporter with a market over 40 years old), as well as Ethiopia, Kenya, and India. Other significant players in the global floriculture industry include Mexico, Israel, South Africa, Australia, Thailand, and Malaysia. Notably, New Zealand, owing to its location in the Southern Hemisphere, serves as an important supplier of seasonal flowers that are typically unavailable in Europe and the United States during certain times of the year. Kenya the largest exporter of flowers to Europe, is represented by the Kenya Flower Council.

North America: In 2019, Mexico dedicated 22,700 hectares or 56,092 acres to ornamental flower production, ranking the third largest globally by land area. However, only 5% of the production is exported, mostly to the United States, Canada, and Europe. High-tech flower production centers like Villa Guerrero—known as the Flower Capital of Mexico - benefit from their proximity to the U.S. and Canada's markets, offering logistical advantages. Additionally, Mexico's underutilized Toluca International Airport provides a competitive airfreight option. The U.S.-Mexico-Canada Agreement could further strengthen Mexico's position as a leading flower exporter. Furthermore, repurposing lands currently used for illegal crops into flower production may help address narcotic-related issues and violence in Mexico.

Colombia: As the world’s leading cut flower producer and exporter, Colombia accounted for 59% of all flowers imported by the United States in 2006. The U.S. imports 82% of its cut flowers, with Colombia as the largest supplier. The free trade agreement between the U.S. and Colombia has lowered the cost of Colombian flowers in the U.S. ((Osum, 2024).

Ecuador: Renowned for its high-quality, large-headed roses cultivated in high-altitude rose farms, Ecuador has emerged as a leading rose producer in South America in recent years. Traditionally, flowering plants were grown from seeds and sold in small pots or packs. Over the past 20 years, both plant and pot sizes have increased significantly, with many cultivars now propagated from cuttings. Similarly, vegetable

transplants are offered in a variety of pot sizes to meet diverse market demands. The production of bedding plants remains predominantly local due to pest quarantine regulations that restrict the shipment of plants in potting soil between countries (Dole, J.M. and Wilkins, H.F., 1999 and Larson, Roy A., 2013). In the U.S., bedding plants represent the top-selling category of flowers, nearly 40% of total sales (approximately USD 2.5 billion wholesale value) in 2022 (USDA, NASS, 2023). Houseplants and foliage plants, though typically regarded as indoor plants, are also widely used in exterior landscaping in tropical and sub-tropical climates. Over the past 300 years, these plants have adapted to various indoor environments, which has contributed to their success within the floral industry (Griffith and L. P., 1998). In the U.S., the wholesale value of houseplants and foliage plants reached nearly USD 1.1 billion in 2022 (USDA, NASS, 2023).

2.2.3 Floral Industry Market

The floral industry has evolved significantly over the years, enhancing human environments with its vibrant and diverse offerings. Central to this industry is the retail segment, which includes local independent garden centers, florists, nurseries, interior landscaping services, and retail greenhouses. These businesses often specialize in plants and provide related professional design and installation services, which require extensive plant knowledge, a critical factor for many consumers. Additionally, flowers and plants are widely accessible through hardware stores, supermarkets, department stores, local farmers' markets, roadside stands, and mail-order companies, ensuring widespread access. Supporting the retail segment is the wholesale segment, which ensures the delivery of flowers and plants in time. Garden centers receive their supplies from large regional greenhouses and nurseries, while hardware stores are stocked by even larger greenhouses that cater to multi-state areas. These plants are typically transported in trucks after being transported from the greenhouse. Contracts for these plants are often negotiated months in advance. Florists source their cut flowers and greens from regional wholesale florists, who condition and re-distribute the flowers imported from around the world. Supermarkets receive their floral supplies from company distribution centers, which produce cut flowers globally and potted plants from regional producers. Allied trade companies play a crucial role in the floral industry. Plant breeders, for instance, continuously develop improved cultivars to replace older varieties that may suffer from mutation in vegetative propagated plants. These breeders supply seeds, bulbs, cuttings, plugs, and tissue culture explants to large greenhouses and nurseries worldwide. Young plants of various species, such as roses, carnations, and chrysanthemums are distributed to major growers in countries including the Netherlands, Colombia, Kenya, China, and India. These plants are then cultivated to produce cut flowers and other crops for consumer markets.

Greenhouse design and construction companies are integral to the floral industry, introducing controlled-environment agriculture technologies to enhance flower production. These companies integrate systems for heating, cooling, lighting, irrigation, and material handling, often incorporating robotic equipment for tasks such

as transplanting and grading. The production and distribution of containers, including cardboard boxes for shipping cut flowers and a variety of pots and trays, are also essential components of the industry. Innovations such as the Procona System, which enables shipping cut flowers in water on pallets, and the development of compostable materials for pots and trays, have significantly improved both efficiency and sustainability within the industry. Companies that produce potting soil components such as peat, bark, coir, and perlite play a vital role in the floral industry by processing and packaging these materials for commercial use. Pest management has also undergone major advancements over the past 20 years. While the industry initially relied heavily on chemical pesticides to maintain the aesthetic quality of flowers, safer pesticides and integrated pest management practices have emerged since the 1970s. The use of predatory insects to control pests has become increasingly common, particularly in long-term crops like roses, reducing the reliance on chemical pesticides. Although biological pest control remains more challenging for short-term crops, ongoing efforts aim to further minimize pesticide use and promote sustainable practices.

2.2.4 Major Exporting Countries

Over the past 20 years, global ornamental plant production and consumption have successfully navigated significant challenges. The EU (European Union) leads the world in cut flower and ornamental pot-plant sales, accounting for 31.0% of the global market value, followed by China and the USA at 18.6% and 12.5% respectively (Eurostat, 2017). Within the EU, the Netherlands led cut flower and ornamental pot-plant sales in 2016, followed by France and Italy in second and third places, respectively (Eurostat, 2017). Between 2006 and 2016, sales in this sector across the EU grew by approximately 7% (around 1.4 billion Euros), reflecting a slow but steady increase that appeared resilient to fluctuations in the global economic climate (Eurostat, 2017). In contrast, the number of cut flower producers in the USA declined significantly between 2007 to 2015. According to the US Department of Agriculture (USDA), the reduction reached 30%, highlighting a shift in global cut flower production toward emerging players such as China. In 2017, China ranked second in global cut flowers and pot-plant sales. The USA, Japan, Brazil, Colombia, Canada, Ecuador, and Kenya rounded out the top 10 production countries that year. Kenya ranked first in pot-plant and cut flower imports to the EU, accounting for 27.5% of the total share. Ethiopia, Ecuador, Colombia, Israel, USA, Costa Rica, China, and Uganda completed the top-10 list of countries exporting floricultural products to the EU (Eurostat, 2017). Nonetheless, the consumption of cut flowers and pot plants remained highest in the EU, USA, and Japan (Xia et al., 2006; Darras, A.I., 2020).

2.2.5 Major Importing Countries

The global floriculture trade now operates through three primary marketing channels that connect production regions with major consumption markets: Europe, Africa, South and North America, and Asia Pacific (Xia et al., 2006). In the Europe Africa channel, imports of floricultural products to Europe from Kenya, Ethiopia, and Uganda

have increased up to 40% (Eurostat, 2017). However, the EU also imports cut flowers from Asia such as Israel and China and from the American continents including the USA, Colombia, Ecuador, and Costa Rica. The South and North America channel functions through production in South America and importation into North America. Although the USA ranks as the world's third-largest cut flower producer, cut flower production in the country has declined over the past 20 years, while imports have increased (Zhao et al., 2016). For example, the number of year-round cut flower producers in the USA decreased by 21% between 2013 to 2014 (Zhao et al., 2016). Conversely, specialty cut flower production in the USA and Canada has grown, driven by a significant rise in consumer demand (Loyola, Dole & Dunning, 2019). This trend has supported increased imports of popular commercial cut flower species such as roses, chrysanthemums, carnations, alstroemeria from South America to North America. The Asia Pacific channel involves production in China, Japan, Thailand, India, and Australia, with imports mainly directed to the Japanese and Chinese markets (Xia et al., 2006). Most of the ornamental production in China and Japan is consumed domestically.

2.2.6 Major Commodities and Trends

For more than 200 years, the Netherlands has been the heart of the global cut flower trade. The Royal Flora Holland auction house in Aalsmeer remains pivotal, importing and then re-exporting around 40% of flowers worldwide. However, newer players in the flower trade are making their presence felt, shifting the dynamics of production. As transport technology develops, producers in regions such as Sub-Saharan Africa are challenging the Netherlands' traditional hold on the industry. Worldwide consumption of floriculture products was estimated to range between US$ 120–160 billion by the end of 2020. Cut flowers account for 60% of global trade, while the remainder includes live plants, cut foliage, dried flowers, and other related products (Janakiram, 2017). A wide variety of flower species are traded throughout the year, with demand peaking during key occasions such as Valentine's Day and Mother's Day, when large volumes must be delivered to destination markets.

Efficient logistics and supply chain processes —from origin to destination — are crucial for ensuring speedy deliveries, maintaining the cold chain to preserve quality during transport, and maximizing vase life. According to the British Florist Association, almost 80% of cut flowers pass through the Netherlands, although a significant proportion is sourced directly from Kenya. The Netherlands is a leading player in the floriculture industry, accounting for 43.8% of international exports, followed by Colombia, Germany, Italy, Ecuador, and Kenya. Globally, 106 countries participate in floriculture imports, with Germany ranking first, followed by the Netherlands, USA, and the UK. According to Future Market Insights, 2018, global revenue from floriculture was projected to reach US$ 43.2 billion, with an annual growth of 7% in 2019. The largest producers of commercial cut flowers include the Netherlands, USA, Colombia, Kenya, Zimbabwe, Japan, and Israel. The Netherlands ranks first in the total world export of cut roses, holding a 42.32% share primarily due to its role in importing and re-exporting while producing only 0.64% of the total cut rose volume. It also leads in cut

rose imports, accounting for 20.72% of the global share. India contributes only 0.20% to the global export of cut roses, despite ranking first in cut rose production worldwide with a 46.54% share. Although exports of Indian cut roses have increased recently, they typically fetch lower prices compared to the global average. India primarily exports to markets with lower price points, such as Singapore and Malaysia, rather than to higher-paying countries like the USA, Jordan, and Saudi Arabia. Other major exporters of cut roses include Kenya, Ethiopia, Ecuador, and Belgium (Bhagat et al., 2019)

2.2.7 Global Floriculture Supply Chain

Over the past 20 years, the global cut flower production and consumption industry has overcome serious challenges, particularly those stemming from global economic recessions. Between 2007 to 2015, the number of cut flower producers in the USA declined significantly, with many exiting the floriculture industry during the 2008–2009 recessionary (Eurostat, 2017). USDA data indicate that cut flower production in the USA decreased by 30% during this period, reflecting a shift in production toward emerging global players such as China, Colombia, and Ecuador (Loyola, Dole & Dunning, 2019). Despite these setbacks, US cut flower production experienced a modest recovery from 2015 to 2018 (Xia et al., 2006; Zhao et al., 2016).

Meanwhile, the EU has maintained a leading position in the global market for cut flowers and ornamental potted plants, accounting for 31.0% of the global value in 2017, followed by China and the USA with 18.6% and 12.5%, respectively (Eurostat, 2017). Within the EU, the Netherlands recorded the highest sales of cut flowers and ornamental plants in 2016, with France and Italy ranking second and third places respectively (Eurostat, 2017). Sales of cut flowers and ornamental plants in the EU increased by 7% (approximately 1.4 billion Euro) between 2006 to 2016, reflecting a slow but steady increase, despite global economic fluctuations (Eurostat, 2017). By 2017, China had emerged as the leading country in sales of cut flowers and became the top exporter of cut flowers to the EU (Darras, A., 2021).

Due to the time and temperature sensitive nature of perishables, a cold-supply chain is typically employed. This process involves rapid harvesting at the optimal stage of the product’s life cycle, transporting relatively small batches often in refrigerated containers and storing them at appropriate consolidation facilities before long-distance shipment to the final customers. The perishable supply chain, aside from capital investments in storage facilities, primarily involves forward integration. From an economic development standpoint, this offers significant benefits, including foreign exchange conservation and domestic job creation. Dettmer et al. (2014), analyzing South Africa's international trade data, found that air transportation holds a comparative advantage for long-distance trunk-haul movements involving lightweight, low-volume, and high-value perishables, especially those with a shelf-life. Often, aviation supply chains are integrated with passengers or other goods transport.

For landlocked countries, or those lacking easy access to major markets, air transportation supply provides considerable advantages for exporting perishables (World Bank, 2009). As the floriculture sector has shifted toward higher value-added products, the quality of the supply chain and its labour have also improved. Kenya, for example, has transitioned from exporting lower value to higher-value stems and onto bouquets (Kuiper and Gemählich, 2017). Since the quality of a supply chain depends on its weakest link, even excellent aviation infrastructure alone does not guarantee successful flower production. In cold chains, large forwarders and agents play a crucial role (Babalola et al., 2011). Delays can lead to product loss, and prolonged storage reduces shelf life, increasing costs. Typically, the trunk-haul aviation link is directly connected to local forwarders who operate refrigerated trucks and warehouses. These local forwarders often work with larger international companies involved in the global supply chain, which helps achieve economies of scale and scope while maintaining quality control. However, the supply chain is expensive; African flower exporters, particularly those in Kenya, estimate that logistics account for 40% to 60% of the cost of production of stems (Button, K., 2020).

CHAPTER THREE

Methodology

3.1 Framework for Methodology

The research was conducted as action research. The first phase involves assessing the current state of Sri Lanka's floriculture sector, identifying key issues, and exploring potential solutions. The second phase focuses on developing a logical framework to address these issues and implementing the action plan as a pilot project in a selected location.

3.1.1 Stakeholder Profile and Analysis

The stakeholder groups relevant to the floriculture industry, either directly or indirectly, are identified here. Stakeholder analysis involves recognizing and defining stakeholders, identifying their interests, expectations, and needs. This would help define the intervention strategies to gain their support in the second phase of the action plan. The stakeholders of the floriculture industry include the following categories.

Table 3.1: Relevant Stakeholder Groups, Source: Compiled by the Authors

No.	Stakeholder Group
1	Floriculture growers operating across all major floriculture-producing areas of the country
2	Collectors
4	Wholesalers
5	Exporters
6	Retailers
7	Consumers
8	Floriculture farmer associations (growers and exporters)
9	Subject experts
10	Government agencies (Eg: Royal Botanical Gardens)
11	Government agencies (Eg: Export Development Board)
12	Government agencies (Eg: HARTI, Ministry of Agriculture)
13	Donors

3.2 Data

3.2.1 Data Collected based on Three Stages

The study will collect both primary and secondary data for all three objectives.

3.2.2 Study Locations

Data was collected from all provinces of the country except for Northern and Eastern Provinces

3.3 Data Collection

3.3.1 Data Collection Techniques

Table 3.2: Data Collection Details

No	Objective	Data Collection Method
1	Objective 1	• Literature review • Questionnaire survey • Key informant interviews (leaders of *Suwahas Mal* Floriculture Growers Associations and selected local floriculture growers) • Focus group discussions (*Suwahal Mal* Floriculture Growers Associations)
2	Objective 2	• Literature review • Key informant interviews (selected export-oriented floriculture growers)
2	Objective 3	• Literature review • Outcomes of objectives 1 and 2

3.3.2 Sample Size for the Questionnaire Survey

Table 3.3: Sample Distribution

No.	District	Number of Sample
1	Gampaha	99
2	Badulla	47
3	Kurunegala	44
4	Colombo	44
5	Kegalle	30
6	Kalutara	24
7	Polonnaruwa	21
8	Nuwara Eliya	18
9	Hambanthota	16
10	Puttalam	14
11	Matale	14
12	Anuradhapura	8
13	Matara	6
14	Kandy	5
15	Galle	5
16	Monaragala	5
17	Rathnapura	1
	Total	401

The total number of floriculture growers was identified using the book published by the Department of National Botanic Gardens on the "*Suswahas Mal*" Floriculture Growers Associations. The authors identified the updated number of members in

Suswahas Mal Floriculture Growers Associations by contacting leaders of relevant floriculture associations. The total population of registered members of floriculture growers was 4,781. Out of this, a representative sample of 401 was drawn. Data were gathered from 17 districts, excluding those in the Northern and Eastern provinces. Due to practical difficulties, the Northern and Eastern provinces were not included. The sample size distribution is shown below in Table 3.3.

3.3.3 Key Informant Discussions

For objective 1, key informant discussions were conducted with the leadership of all the *Suwahas Mal* Floriculture Growers Associations included in the survey.

For objective 3, there were about 60 floricultural companies registered under the Export Development Board. The research team conducted five key informant discussions with leading floriculture exporters in the country.

3.4 Data Analysis

Descriptive data analysis methods were used for the study. A SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis was used to identify the constraints and opportunities associated with the locally oriented floriculture sector. The indicators and variables used for the analysis are shown in Table 3.4.

Table 3.4: Operationalizing Variables

Stage	Objective	Dimension	Indicator	Variable	Data Source
Preliminary	Objectives 1 and 2	Stakeholder mapping	Level of participation from stakeholders	Level of influence, level of interest, level of investment, level of commitment, level of support, need for outcome (5-point Likert Scale)	Literature review, Focus group discussions, Key informant interviews
		SWOT Analysis	Strengths	Internal strengths associated with horticultural industry (5-point Likert Scale)	Key informant interviews with industry people, and subject experts. Literature review
			Weaknesses	Internal weaknesses associated with horticultural industry (5-point Likert Scale)	Key informant interviews with industry people, and subject experts. Literature review
			Opportunities	External opportunities associated with horticultural industry (5-point Likert Scale)	Key informant interviews with industry people, and subject experts. Literature review
			Threats	External threats associated with horticultural industry (5-point Likert Scale)	Key informant interviews with industry people, and subject experts. Literature review
		PESTEL Analysis	Political factors	External political factors influencing the floriculture industry (5-point Likert Scale)	Key informant interviews with industry people, and subject experts, Literature review
			Economic factors	External economic factors influencing the floriculture industry (5-point Likert Scale)	Key informant interviews with industry people, and subject experts. Literature review
			Social factors	External social factors influencing the floriculture industry (5-point Likert Scale)	Key informant interviews with industry people, and subject experts. Literature review
			Technological factors	External technological factors influencing the floriculture industry (5-point Likert Scale)	Key informant interviews with industry people, and subject experts. Literature review
			Ecological factors	External ecological factors influencing the floriculture industry (5-point Likert Scale)	Key informant interviews with industry people, and subject experts. Literature review
			Legal factors	External legal factors influencing the floriculture industry (5-point Likert Scale)	Key informant interviews with industry people, and subject experts. Literature review

CHAPTER FOUR

Results and Discussion: Current Status of Locally Oriented Floriculture Industry

4.1 Demographical Information of the Sample

4.1.1 Geographical Distribution

Table 4.1: Geographical Distribution of the Sample

District	No.	Percentage
Gampaha	99	24.7
Badulla	47	11.7
Kurunegala	44	11.0
Colombo	44	11.0
Kegalle	30	7.5
Kalutara	24	6.0
Polonnaruwa	21	5.2
Nuwara Eliya	18	4.5
Hambantota	16	4.0
Puttalam	14	3.5
Matale	14	3.5
Anuradhapura	8	2.0
Matara	6	1.5
Kandy	5	1.2
Galle	5	1.2
Monaragala	5	1.2
Ratnapura	1	0.2
Total	401	100.0

Source: Authors' Survey Data,2023

Table 4.1 shows the district-wise distribution of sample. Except for Kandy District, where the authors have encountered a practical issue during data collection, the rest is proportionate to the approximate number of floriculture growers in each district. The highest percentage of the sample (25%) was from Gampaha District, while the lowest was from Ratnapura District.

4.1.2 Age of the Sample Growers

Table 4.2: Age Distribution of the Sample

Age Group	Count	Percentage
30 - 40 Years	1	0%
40 - 50 Years	13	3%
50 - 60 Years	20	5%
=> 60 Years	366	92%
Total	400	100%

Source: Authors' Survey Data,2023

Table 4.2 illustrates the age distribution of the sample. The majority of the growers were 60 years old or above (92%). Table 4.3 shows the year the business started their business. By 2010, 33% of the sample had started their business, and by 2016, 70% of the sample had started their business. However, very few joined the business after 2021, likely due to the unfavourable conditions caused by the COVID-19 pandemic and economic crisis. This suggests that a considerable number of growers may have entered the business at a younger age and continued even after 60 years of age**.**

Table 4.3: Year of Business Commencement

Year	Count	%	Year	Count	%
1988	1	0.3	2007	3	0.8
1990	2	0.5	2008	14	3.5
1992	1	0.3	2009	3	0.8
1993	2	0.5	2010	26	6.5
1994	3	0.8	2011	11	2.8
1995	7	1.8	2012	22	5.5
1996	3	0.8	2013	45	11.3
1997	2	0.5	2014	19	4.8
1998	8	2.0	2015	29	7.3
1999	4	1.0	2016	23	5.8
2000	12	3.0	2017	24	6.0
2001	4	1.0	2018	36	9.0
2002	2	0.5	2019	26	6.5
2003	17	4.3	2020	19	4.8
2004	3	0.8	2021	7	1.8
2005	12	3.0	2022	4	1.0
2006	4	1.0	2023	2	0.5

Source: Authors' Survey Data, 2023

4.1.3 Gender Distribution of the Sample Growers

Table 4.4: Gender Distribution of Household Heads

Gender	Count	Percentage
Female	325	81%
Male	75	19%
Total	400	100%

Source: Authors' Survey Data, 2023

Referring to the gender distribution (Table 4.4), more than 80% of the sample were females. The domestic floriculture sector serves as an additional source of income for households, where most often the stay-at-home wife/mother is engaged in the activity.

4.1.4 Educational Level of Sample Farmers

Table 4.5 shows the educational distribution of sample growers. Growers who have either passed or studied up to A/Ls (GCE Advanced Level) make up 51% of the sample. Those who have passed O/L (GCE Ordinary Level) or studied up to O/L account for 39%. Altogether, 89% of the sample fall into the categories of having studied up to O/L or A/L. This implies that, in most cases, women who completed their education up to O/L and A/L, got married and became stay-at-home wives/mothers, are engaged in this business as an additional source of income to support the family. The number of growers with higher educational qualifications equal to or above the diploma level is minimal.

Table 4.5: Educational Level of Sample Farmers

Level of Education	Count	Percentage
Primary (Up to Grade 1-5)	10	3%
Secondary (Up to Grade 6-10)	5	1%
Up to G.C.E (O/L)	110	28%
Passed G.C.E (O/L)	44	11%
Up to G.C.E (A/L)	127	32%
Passed G.C.E (A/L)	74	19%
Diploma	13	3%
Degree	16	4%
Post-Graduate	1	0%
Total	400	100%

Source: Authors' Survey Data, 2023

4.1.5 Scale of Business of Sample Farmers

According to the Food and Agriculture Organization of the United Nations (FAO), the floriculture industry in Sri Lanka can be categorized into three groups: large-scale commercial establishments cultivating under greenhouse conditions, poly tunnels, and netting.

The second group is called medium scale. Table 4.6 shows information on the scale of business of the sample. Out of the total sample, 331 (82%) are small-scale growers, while 22 (5%) are medium-scale growers. 28 (7%) of the sample are retailers. Although floriculture growers in Polonnaruwa (5%) are small-scale, based on the intensity and the business set-up, they are identified as a separate category. This business is well organized and stands apart from small-scale growers in other areas.

Table 4.6: Scale of Business

No.	Scale of Business	Count	Percentage
1	Small-scale growers	331	82
2	Medium-scale growers	22	5
3	Retailers	28	7
4	Polonnaruwa	20	5
	Total	401	100

Source: Authors' Survey Data, 2023

4.1.6 Number of Members in the Sample Household

Table 4.7 shows the number of members in the sample households. Household sizes vary from one to eight members, with the majority (32%) having four members.

Table 4.7: Number of Family Members in the Household

No.	Number of Members	Count	Percentage
1	1	22	5
2	2	66	16
3	3	84	21
4	4	130	32
5	5	75	19
6	6	20	5
7	7	3	1
8	8	1	0
	Total	401	100

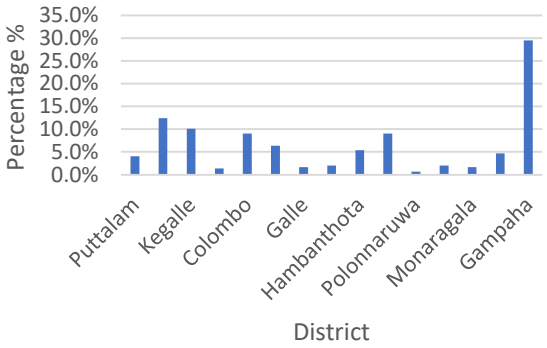
Source: Authors' Survey Data, 2023

4.2 Major Floricultural Commodities Produced and Value Chain Information

4.2.1 District-Wise Cultivation of Floricultural Commodities

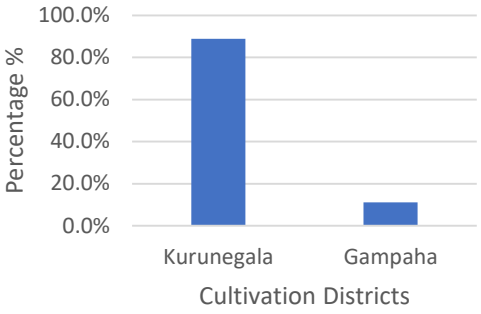
The following figures show the major commodities that growers cultivate and sell in different districts. Generally, the majority of growers cultivate a mix of plants rather than monocultures. However, certain districts tend to grow specific varieties more commonly, depending mainly on customer demand, climatic suitability, and logistical advantages such as proximity to the airport. For example, considering ornamental foliage plants, the highest number is found in the Gampaha District. One reason is that Gampaha has the largest number of small-scale floriculture growers. Another reason is that many floricultural exhibitions take place in Gampaha and Colombo Districts, attracting many customers to buy potted plants. Therefore, many growers in Gampaha District cultivate potted plants due to the high sales opportunities. For cut decorative foliage, Kurunegala and Gampaha are the major cultivation areas, mainly due to their proximity to Katunayaka International Airport. This allows growers to

supply exporters with lower transport costs. As a result, engagement in the cut decorative foliage business is minimal in other areas without this advantage.



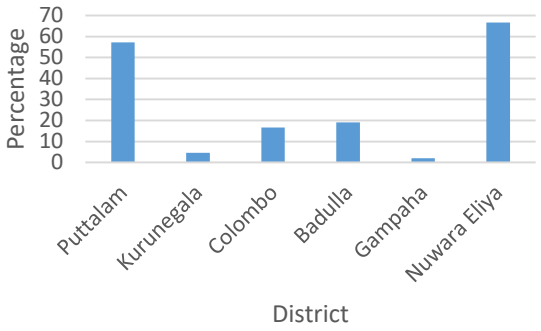
Source: Authors' Survey Data, 2023

Figure 4.1: District wise Percentage of Households Cultivating Ornamental Foliage Plants



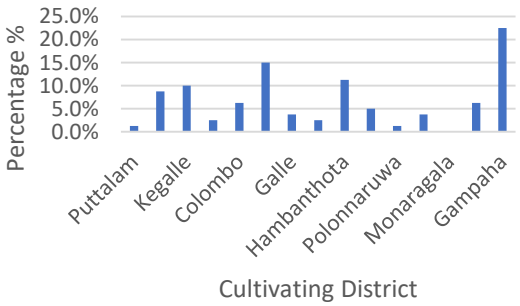
Source: Authors' Survey Data, 2023

Figure 4.2: District wise Percentage of Households Cultivating Cut Decorative Foliage



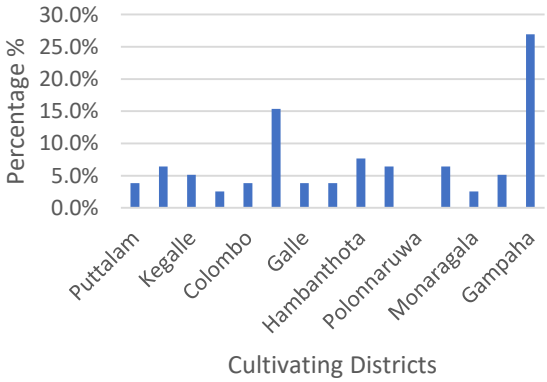
Source: Authors' Survey Data, 2023

Figure 4.3: District wise Percentage of Households Cultivating Cut Flowers



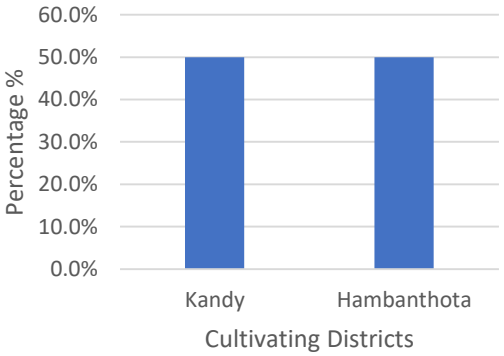
Source: Authors' Survey Data, 2023

Figure 4.4: District wise Percentage of Households Cultivating Aquarium Plants



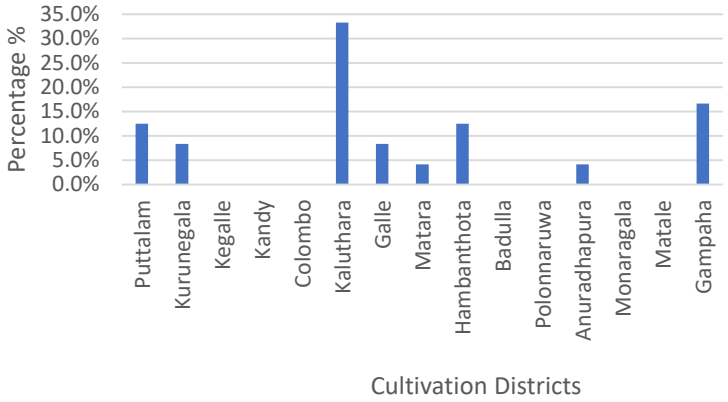
Source: Authors' Survey Data, 2023

Figure 4.5: District wise Percentage of Households Cultivating Landscaping Plants



Source: Authors' Survey Data, 2023

Figure 4.6: District wise Percentage of Households Cultivating Tissue Culture Plants



Source: Authors' Survey Data, 2023

Figure 4.7: District wise Percentage of Households Prepare Potting Media

4.2.2 Type of Business and Value Chain Information

Table 4.8: Distribution of the Sample by the Business Type

Business Type	Count	Percentage
Producer, Collector	4	1%
Producer, Collector, Wholesaler	4	1%
Producer, Collector, Wholesaler, Retailer	26	6%
Producer, Collector, Retailer	25	6%
Producer, Wholesaler	8	2%
Producer, Wholesaler, Retailer	115	29%
Producer, Retailer	215	54%
Retailer	4	1%
Total	401	100%

Source: Authors' Survey Data, 2023

There were eight business types that the sample growers were associated with, based on the value chain of commodities (Table 4.8). The highest number of growers (54%) were engaged in both growing floriculture commodities and retail. The second highest group (29%) grew floriculture commodities and were involved in both retail and wholesale selling. The number of growers involved in other value chain types was below 7% each. This implies that the preferred value chain identified by growers is production combined with either retail or wholesale selling of floriculture commodities.

Several value chains are available for the locally oriented floriculture sector, as shown in Table 4.8. The first is from the producer to the wholesaler. The simplest value chain is from producer to retailer. Producers, especially small-scale growers, generally cultivate in their home gardens. However, medium-scale growers have larger land areas, either owned or leased by them. Collectors can be mere collectors, exporters,

wholesalers, or retailers. In general, some collectors regularly visit floriculture growers and have established business links with them. Once an order is ready, they inform the collector/wholesaler/retailer, who then comes to collect the products. Collectors help transport floricultural items over long distances from rural areas, where many small-scale growers reside (Example: Polonnaruwa and Welimada), to urban areas where most customers are located (Example: Colombo and Negombo). Retail sales occur in various places such as producers' homes, retail shops, weekly fairs, or events such as weekly, monthly, and quarterly exhibitions. Besides collectors, retailers, wholesalers, and producers also sell their products to exporters. This was mainly observed in Colombo, Gampaha, and Kurunegala Districts, which are close to the Bandaranayake International Airport. The main export commodity was cut foliage.

CHAPTER FIVE

Results and Discussion: Present Status of Export-oriented Floriculture Industry

5.1 Background of Floriculture Export Business

According to Export Development Board data, there are 60 registered floriculture exporting companies in Sri Lanka. The export-oriented floriculture industry can be divided into two groups: direct exporters, where the parent company is in Sri Lanka, and exporters whose parent companies are based in foreign countries. Cut foliage, floriculture seeds, rooted cuttings, and pot plants are the major exported floriculture items. The location of the companies mainly depends on factors such as the climatic requirements of the crop, land availability, and proximity to the airport. The floriculture export industry started around the 1970s and quickly flourished into a source of foreign income. Though Sri Lanka performed well in the early stages, its world ranking as a floriculture exporter has gradually declined, while many low-performing countries such as Kenya and Ethiopia have emerged as leading exporters. Although Sri Lanka initially exported cut flowers, it now exports very few, with the cut foliage business dominating the floriculture export market. Major stakeholders associated with the floriculture export business include the Department of Plant Quarantine, Sri Lanka Customs, Forest Department, Chamber of Commerce, Department of Inland Revenue, Department of National Botanic Gardens, and Export Development Board.

5.2 Current Situation of the Floriculture Export Business

Export-oriented floriculture businesses have been severely affected by recent macro-economic shocks. Their response and ability to survive these shocks vary depending on factors such as business scale, level of establishment, institutional support, and type of management. During key informant discussions with major floriculture exporting companies, the research team identified the following three types of business.

1. Small-scale floriculture exporting companies with a parent company based in Sri Lanka.
2. Medium-scale floriculture export companies with a parent company based in Sri Lanka.
3. Medium-scale floriculture export companies with foreign parent companies.

How the business was performed for each case is explained in the following case study examples.

Case Study 1: Small-scale Floriculture Export Companies with Parent Company Based in Sri Lanka

This floriculture export business started in the 1990s to export cut foliage. The owner had owned land, leased land, and also bought cut foliage from local small-scale suppliers. Being close to the airport was an advantage and one of the reasons for starting the business. The owner previously worked in a leading floriculture exporting company. After gaining experience and knowledge of the industry's potential, he started his own export business. When the business was performing well, it earned around 300,000 Euros per year. Buyers were identified through connections made while working in the industry, participation in trade fairs (Example: Hort Fair in the Netherlands), and the internet. Major export destinations included the Netherlands, England, Japan, South Korea, and Kuwait. According to the owner, European buyers were the best as prices were better and quality compliance was less strict. Major stakeholder institutes involved were the Department of Plant Quarantine, Sri Lanka Customs, the Forest Department, the Chamber of Commerce, the Department of Inland Revenue, and Export Development Board. The owner was neutral about the service he received from these institutions and did not receive any special training programmes from them. Although the business was performing well initially, the economic crisis in the country led to a surge in freight charges, which severely impacted operations. Since profits were already low, this increase in freight costs significantly reduced profitability. As a result, the business eventually shut down, and the cultivated lands were abandoned. According to the owner, logistics within the country and during airfreight are not major concerns for the cut foliage export business. He added that even a charter flight without air conditioning would be sufficient, as shipments take a maximum of 6 hours to transport. However, he emphasized that the overall instability of the country also poses a serious threat to the industry.

Judgment: This case study suggests that although the floriculture export business was initially profitable, small-scale exporters have minimal capacity to withstand macro-economic shocks.

Case Study 2: Medium Scale Floriculture Export Companies with their Parent Company based in Sri Lanka

This company, a registered private limited company in Sri Lanka, started in 1980 in Kandy. Along with another farm started later, it now has four farms located in Kurunegala and Attanagalla. The farms are either owned or leased. The main export commodities are cut foliage and pot plants. But, the demand for pot plants has decreased now. The second farm started in 1985 in Kurunegala, and the main shareholders, Chairman and Board of Directors, live in Switzerland. Export destinations include the Netherlands, Japan, Switzerland, England, and the Middle East. Although they previously exported to Australia, this has stopped due to strict quarantine requirements. For example, Australia required Glyphosate treatment, but Glyphosate was banned in Sri Lanka during that time. Additionally, Sri Lanka requires treatment of floriculture commodities with Methyl Bromide, but the National Plant Quarantine Service's procedures may negatively affect the quality of the plant. One concern is the slow response time to meet requirements, causing the company to lose buyers who find suppliers in countries such as Malaysia, Thailand, the Philippines, and Vietnam offering lower prices and better quality. The company stated that macro-economic shocks such as the Easter attack, the COVID-19 pandemic, and Sri Lankan economic crisis did not have a long-term impact. While there was a temporary shock due to the COVID-19 pandemic and economic crisis, recovery was quick. Because the company had stocks of inputs, shortages and price hikes did not affect them much. However, the biggest sales drop occurred due to the Russian and Ukrainian war, as most buyers were from Europe and Russia. As suggested by the management, in order to further develop the industry and reach larger international markets, it is essential to attract bigger investors. However, investors are reluctant to invest in the Sri Lankan floriculture sector due to the lack of essential facilities such as advanced technologies, improved flower varieties, and adequate institutional support. Additionally, high freight charges have had a negative impact, and the increased production costs resulting from the economic crisis have made the business less competitive in the market.

Judgment: Compared to locally oriented businesses, companies with foreign parent companies are less vulnerable to domestic macro-economic shocks, as the parent company, especially if it is a market giant can help cushion the impact. However, if the target export market is affected, these companies should adopt alternative strategies such as market diversification to sustain their operations.

Case Study 3: Medium-scale Floriculture Export Companies with Parent Companies Based in Sri Lanka

This company started in Sri Lanka mainly to export rooted cuttings and flower seeds. The floriculture business is part of a group of companies based in Sri Lanka, with the parent company of Sri Lankan origin. The main farm is located in the Kappetipola area, and mother plants for flower seed production are imported from the respective foreign buyers. Apart from the export business, they also produce pot plants for the local market. Similar to other export businesses, they were affected by the country's macro-economic crisis, especially the economic crisis. However, having stocks of the inputs helped them manage the high costs and limited availability to some extent. One major coping strategy was shifting focus toward local market production, diversifying products and markets. Their ability to produce on a mass scale gave them a competitive edge locally, which posed a threat to small-scale producers. Additionally, the parent company supported the business financially during hard times, as it earned income from other ventures.

Judgment: It is comparatively easier for a business to withstand shocks when it has strong financial backing, as this acts as a cushion during a crisis. Additionally, timely product and market diversification is an effective strategy to cope with crises.

CHAPTER SIX

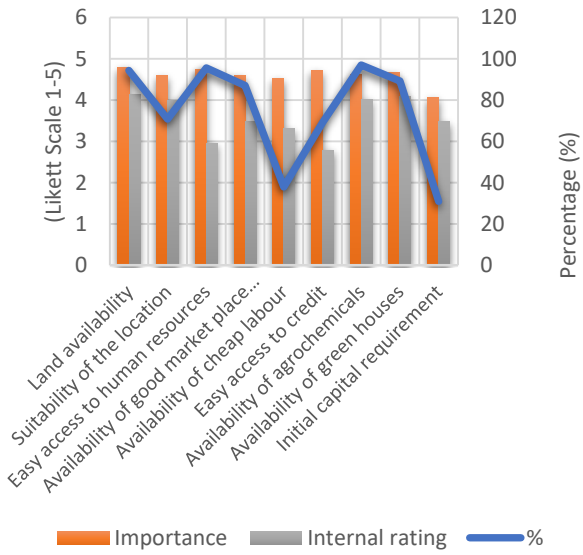
Potentials and Constraints to Develop the Floriculture Industry in Sri Lanka

6.1 Local Market-oriented Floriculture Production

6.1.1 SWOT Analysis

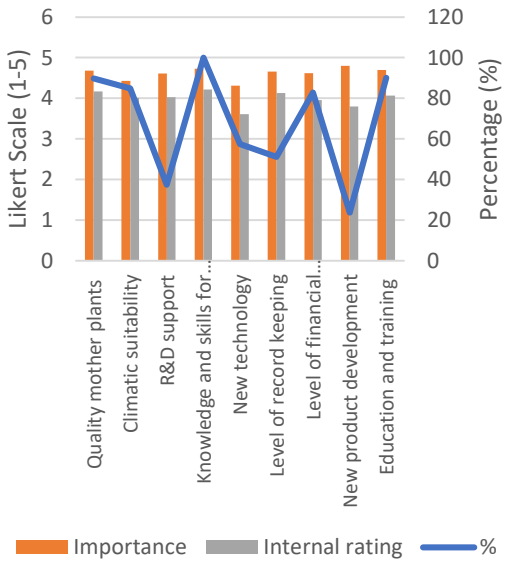
The SWOT analysis results of the local market-oriented floriculture sector are shown below. Strengths are grouped into four categories 1) Resources; 2) Technology, knowledge, and climate; 3) Institutions markets, and social factors; 4) Infrastructure facilities. In the case of strengths and weaknesses, first the percentage of respondents identifying each factor as a strength or weakness was calculated. Then, the importance of that factor for the total sector and the internal rating given by the respondents - showing its importance to their own business— are presented on a 5-point Likert Scale. It is observable that in some cases, although respondents consider certain factors important for the overall industry, the internal rating is lower because those factors do not play a significant role at the individual business level.

Figures 6.1 to 6.4 illustrate the strengths under the four categories mentioned above. However, later in this chapter, some of the strengths will also be identified as issues in the sector. This is because, although they are strengths overall, some respondents do not possess them. Figure 6.5 shows the weaknesses of the locally oriented floriculture sector.



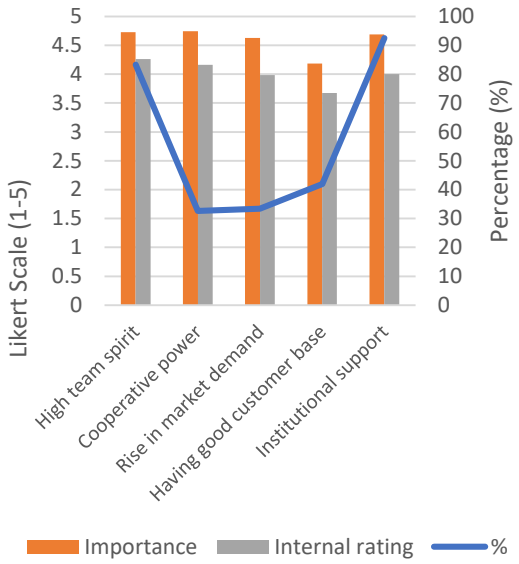
Source: Authors' Survey Data, 2023

Figure 6.1: SWOT Analysis: Strengths (Resources)



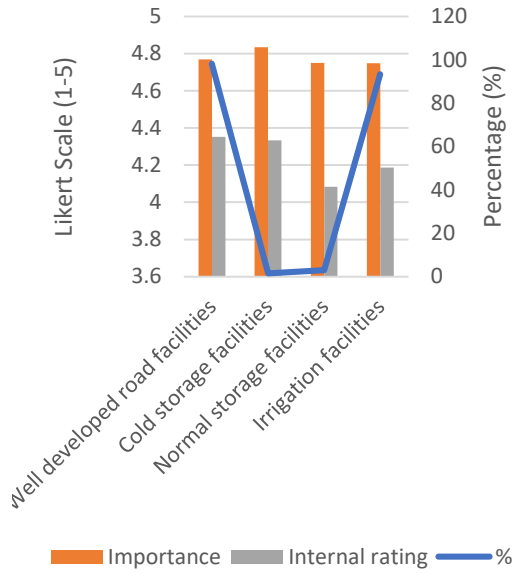
Source: Authors' Survey Data, 2023

Figure 6.2: SWOT Analysis: Strengths (Technology, Knowledge and Climate)



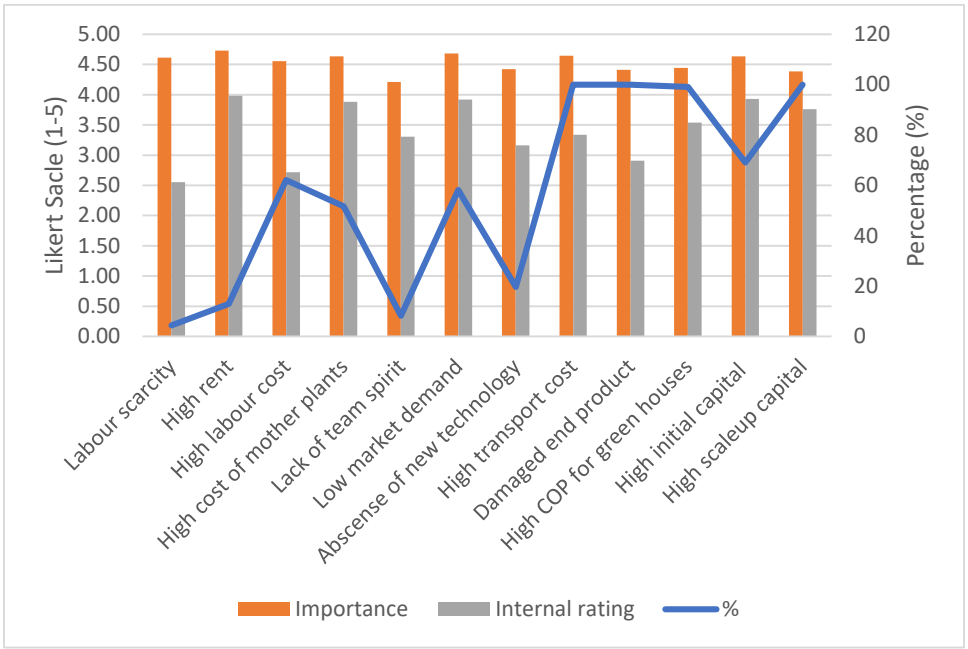
Source: Authors' Survey Data, 2023

Figure 6.3: SWOT Analysis: Strengths (Institutions, Markets and Social Factors)



Source: Authors' Survey Data, 2023

Figure 6.4: SWOT Analysis: Strengths (Infrastructure Facilities)

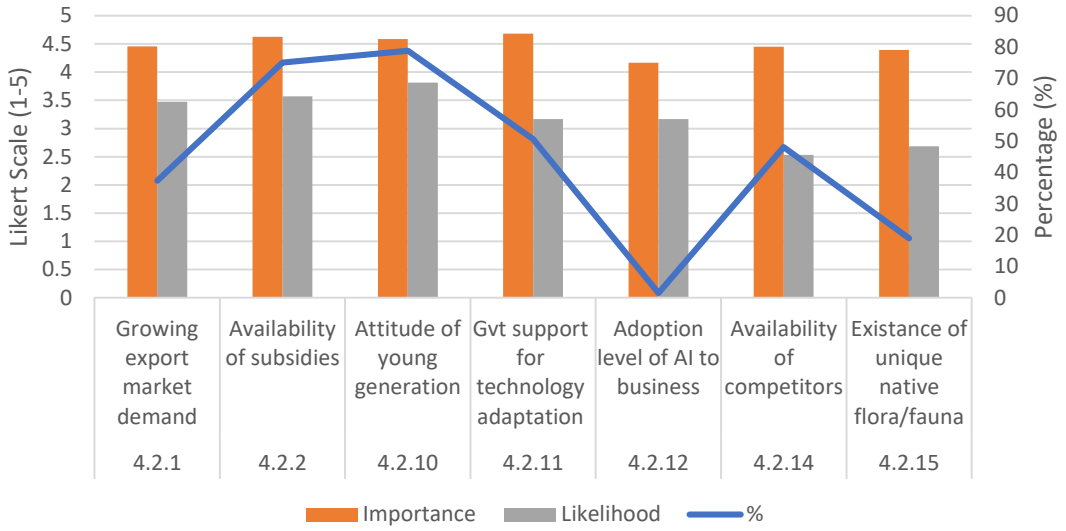


Source: Authors' Survey Data, 2023

Figure 6.5: SWOT Analysis: Weaknesses

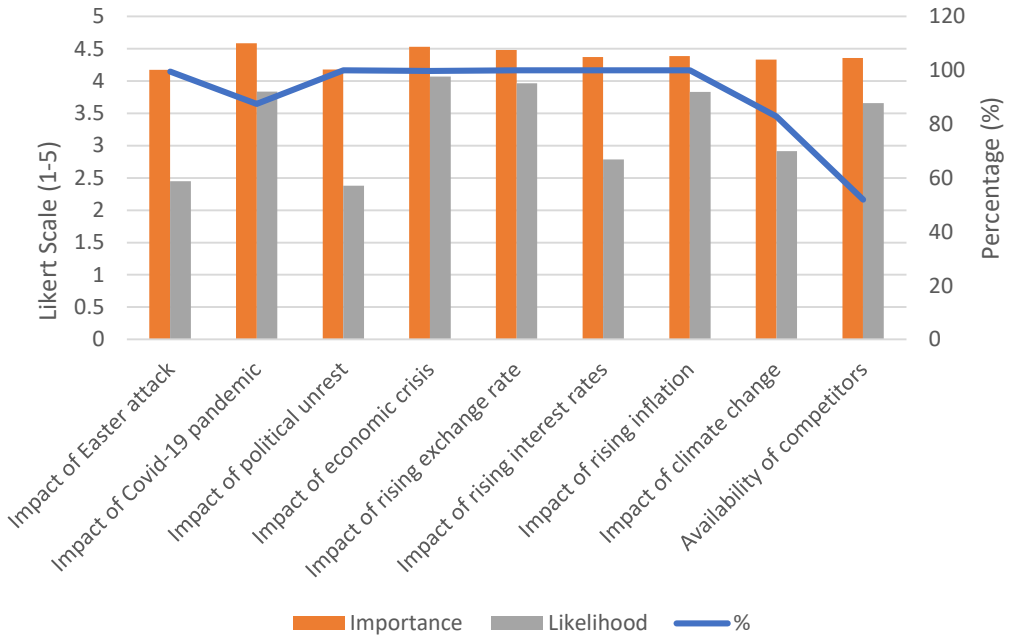
The following section discusses the opportunities and threats mentioned by the respondents. As noted earlier, although these are opportunities, the level of exploitation by respondents varies and is generally quite low. Figure 6.6 illustrates the opportunities for the locally oriented floriculture industry, while Figure 6.7 shows the threats. An interesting point is that the availability of competitors has been identified

both as an opportunity and a threat. This is because, while competitors are generally seen as a threat, some respondents view them as an opportunity to improve and grow both individually and for the sector, as competition drives better performance.



Source: Authors' Survey Data, 2023

Figure 6.6: SWOT Analysis: Opportunities



Source: Authors' Survey Data, 2023

Figure 6.7: SWOT Analysis: Threats

6.1.2 Issues Faced by Locally Oriented Floriculture Growers

This section illustrates the issues faced by locally oriented floriculture growers. As discussed in Section 6.1.1, certain factors identified as favourable factors for the business (such as certain strengths and opportunities) are not available to all respondents. For example, although good mother plants were identified as a strength in section 6.1.1, growers often face problems finding them due to unavailability or high cost. Therefore, these factors are presented as issues in this section.

Table 6.1: Major Issues Faced by Locally Oriented Floriculture Growers

Issues Faced by Floriculture Growers	Total	Percentage
High input prices	152	18%
Demand/Price drops	129	16%
Market barriers (Foreign and local markets)	90	11%
Lack of inputs	80	10%
Plant disease/animal or pest attacks	79	10%
Financial issues	63	8%
Lack of government support	52	6%
Lack of technology	51	6%
Lack of new plant varieties	43	5%
Lack of technical knowledge in the sector	28	3%
Climate issues	12	1%
Supply fails to meet demand	7	1%
Land scarcity	7	1%
Lack of mother plants	7	1%
Lack of effective promotion strategies (Diyatha park)	5	1%
High cost of transportation	5	1%
Ethical issues	4	0%
The location of the nursery/outlet is not suitable for the business	3	0%
Lack of proper storage facilities	2	0%
High business risk	2	0%
Low-quality mother plants	2	0%
Reduced demand for local products due to the importation of cut flowers	2	0%
Lack of parking space for business	1	0%
Over supply	1	0%
Lack of awareness in the floriculture sector	1	0%
The cut flower sector has become a monopolized market	1	0%
Total	829	100%

Source: Authors' Survey Data, 2023

As shown in Table 6.1, the major issue mentioned by most locally oriented floriculture growers was high input prices. Along with this, drops in demand and prices have also had detrimental impacts on the business, causing some to shut down. Market barriers

were another issue noted, especially limiting business expansion. For example, to enter the export market, locally oriented floriculture growers face barriers such as financial constraints, limited land, and a lack of knowledge and skills. In addition to high input prices, a shortage of inputs was another barrier caused by the country's economic crisis. This shortage was especially severe for fertilizers and pesticides but has now subsided. Other issues related to the local floriculture business include pest and disease problems, lack of financial resources, insufficient institutional support, limited access to advanced technologies, lack of exposure to such technologies, lack of high-quality locally produced planting materials and mother plants, mainly due to poor research and development.

As the table depicts, the percentages of the respondents represent the proportion who identified each issue, providing insight into the relative significance of these challenges within the floriculture industry.

6.1.3 Major Solutions Suggested by Locally Oriented Floriculture Growers

To address the prevailing issues, growers and sellers made several key suggestions. The majority proposed providing financial assistance along with training programmes to equip them with the necessary skills and knowledge, particularly in advanced technologies. Many growers expressed interest in learning tissue culture techniques, as the unavailability of quality planting material is a significant concern. Mastering tissue culture could reduce reliance on imported plants and help conserve foreign exchange. To overcome input shortages, they recommended increasing availability. In addition, small-scale growers also showed willingness to expand into export markets and requested institutional support to facilitate this. Furthermore, they emphasized the need to strengthen the network of stakeholders.

Major stakeholders of the small-scale floriculture growers include fellow growers and sellers, the National Botanic Gardens, respective Divisional Secretariats, and the Department of Agrarian Development (even though the floriculture industry does not fall under the Ministry of Agriculture). Although there are existing associations, such as the "Suwahal Flower Associations," not all small-scale growers are members. Enhancing collaboration among growers would increase their bargaining power and collective action, while stronger links with other stakeholders would promote business development and problem-solving. Additional suggestions included controlling the limitless but informal importation of Bangkok varieties, which often occurs illegally. Providing local producers with knowledge and skills in new production technologies could help address this issue. Other major recommendations included increasing government support, providing training on e-marketing, introducing new cultivars with high market demand, and leasing government-owned lands to growers.

Table 6.2: Major Solutions Suggested by Locally Oriented Floriculture Growers

Suggestions to Overcome Issues	Count	Percentage
Provide financial assistance	159	21%
Provide training where necessary	116	15%
Improve access to agricultural inputs	98	13%
Provide technical assistance	87	12%
Increase the market value of products	79	11%
Facilitate SMEs' access to export markets	67	9%
Strengthen the network among stakeholders	44	6%
Control unlimited importation of plants from other countries (Eg: Thailand)	23	3%
Increase government support	16	2%
Provide training on digital marketing/E-marketing	11	1%
Introducing new plant varieties	10	1%
The government should lease underutilized lands at low rent	10	1%
Implement promotional strategies	5	1%
Encourage co-operative actions	5	1%
Produce mother plants using tissue culture technology and supply them to growers	4	1%
Government officers should conduct inspections	2	0%
Conduct awareness and training programmes at the school level	2	0%
Banks should provide flexible repayment options during difficult times	2	0%
Provide high-quality mother plants that are resistant to pests and diseases	2	0%
Fertilizer subsidies should be provided	2	0%
E- marketing training	1	0%
Provide adequate parking facilities	1	0%
A separate institute is needed to regulate the sector	1	0%
Promote plant varieties suited to geographic and climate conditions	1	0%
Establish a quality control process in the market	1	0%
Implement a price control mechanism at flower markets	1	0%
Total	750	100%

Source: Authors' Survey Data, 2023

6.1.4 Major Future Development Potentials Suggested by Locally Oriented Floriculture Growers

Notably, the majority of small-scale, locally oriented growers and retailers had a limited understanding of the future development potential of the floriculture industry. This knowledge gap represents a significant challenge that could hinder the sector's growth. Among the opportunities identified, the growing global demand for

floriculture products was seen as the most promising, especially if small-scale growers manage to enter export markets.

Table 6.3: Major Future Development Potentials for Locally Oriented Floriculture Growers

Future Development Potentials	Count	Percentage
Knowledge alone is not sufficient to make informed comments	188	36%
Increasing global and local demand for floriculture products	102	19%
Create employment opportunities	90	17%
Encourages research, development, and innovation in the floriculture sector	47	9%
Favourable climate suitability	40	8%
Availability of arable lands	22	4%
Low-cost availability of agricultural inputs (e.g., coconut husk, sand, rice husk)	13	2%
Potential for floriculture-based integrated farming systems	13	2%
High global demand for plants that have low market value locally	5	1%
Higher income potential per unit of land area/per square meter	2	0%
Strong export market demand for plants that are undervalued in Sri Lanka	1	0%
Greater profitability compared to other industries	1	0%
High demand for cut flowers	1	0%
Total	526	100%

Source: Authors' Survey Data, 2023

Additionally, the industry is expected to generate employment opportunities, especially for women and youth. The promotion of research and development within the floriculture sector was also recognized as a key opportunity. Enhanced research and development could enable Sri Lanka to develop new, locally adapted plant varieties that meet both local and foreign demand, providing a competitive edge.

Sri Lanka's diverse climatic conditions - from semi-arid, dry, wet to temperate zones are another valuable asset. The absence of a winter season allows for year-round cultivation, provided appropriate infrastructure is in place, offering a distinct advantage for continuous production. This is an opportunity for Sri Lanka. Land shortage remains a prevailing issue in the country, contributing to the higher presence of small-scale growers. However, the availability of arable government-owned lands for lease or rent represents an opportunity to expand export-oriented production. Finally, the availability of affordable inputs for growth media is a strength for Sri Lanka. The country's coco peat is already internationally recognized as a quality potting medium, which, with further research and development, can be enhanced and leveraged to boost the floriculture industry.

CHARTER SEVEN

Findings and Recommendations

7.1 Findings

Export-Oriented Floriculture Industry

The export-oriented floriculture industry can be divided into two groups: direct exporters, whose parent companies are in Sri Lanka, and exporters whose parent companies are situated in foreign countries. Major floriculture export items include cut foliage, floriculture seeds, rooted cuttings, and pot plants. The study collected information from both types of companies and revealed that direct exporters are comparatively more vulnerable to external environmental shocks than those affiliated with parent companies, as the latter benefit from a certain level of safety and support networks.

The issues affecting the floriculture export business are:

Institutional Level

- Complicated institutional requirements make the export procedure costly, complex, and time-consuming.
- Lack of institutional support and interventions to address challenges faced by the industry
- Lack of coordination between stakeholder institutions
- Absence of a central umbrella institution to oversee all the stakeholder institutions and intervene when necessary.

Supply Chain-Level

- High cost of production, including agro-chemicals (fertilizers and pesticides, labour, electricity, and transport).
- Lack of suitable transport facilities, such as cold chain systems and cold storage at the airport.
- Lack of market-oriented, export-quality locally developed varieties, along with a mechanism for continuous product development.

Local Market-oriented Floriculture Industry

The local market-oriented floriculture industry is present in almost all districts of the country. A sample survey was conducted across 17 districts-Puttalam, Kurunegala, Kegalle, Kandy, Colombo, Kalutara, Galle, Matara, Hambantota, Badulla, Polonnaruwa, Anuradhapura, Monaragala, Matale, Gampaha, Ratnapura, and Nuwara Eliya, where floriculture is a flourishing business. The local floriculture value chain includes producers, wholesalers, transporters, and retailers. There is also a growing trend of producers directly acting as retailers.

Major Issues and Constraints Faced by the Local Market-oriented Floriculture Industry

- High cost of production (fertilizer, pesticides, fuel, transport, and mother plants).
- Limited availability of necessary inputs.
- Poor adoption of advanced technologies.
- Decreased local demand for floricultural products.
- Absence of high-quality planting material and mother plants.
- Lack of resources, such as land and capital, to expand the business.
- Insufficient technical knowledge of cultivation methods.

7.2 Recommendations

The development of the floriculture sector involves addressing issues related to two market types. The first focus should be on the local market. Achieving self-sufficiency in meeting local market demand and strengthening the business of local market-oriented producers should be the top priority. This process involves several key recommendations.

1. It is recommended to strengthen local research and development to produce new varieties, high-quality tissue culture plants, and mother plants, as well as to enhance training and technology transfer to meet the needs of growers.
2. It is recommended to establish a separate regulatory body to oversee the floriculture sector and coordinate with stakeholder institutions.
3. It is recommended to introduce a subsidy scheme to provide growers with essential input materials such as fertilizers and raw materials for greenhouses at reduced prices.
4. It is recommended to provide designated marketplaces, similar to economic centers, in each province/major producing area, at affordable rates, enabling growers to attract more customers and sell their produce without difficulty.

Recommendations to Develop the Export-oriented Floriculture Sector:

1. Establish an umbrella body to oversee the entire industry, ensuring a level playing field for all stakeholder institutions.
2. Government intervention is essential to regulate and support research and development for new product innovation. This includes providing advanced technologies, facilities, and training for floriculture research and development institutions to stay aligned with evolving consumer demands and trends.
3. Formalize the institutional setup to facilitate floriculture trade (Eg: support for input pricing, availability, and dispute resolution) to attract and retain exporters.
4. Resolve institutional issues related to floriculture exportation to create a more enabling environment for exporters.

5. Government support is required to improve logistics infrastructure, particularly the development of cold chain facilities and cold storage at key locations such as airports.
6. Promote the establishment of farming companies and provide cultivable land on lease to enable large-scale cultivation with uniform quality, which is essential for export-oriented production.
7. Provide the necessary institutional support, training, and skills development for cultivation using modern technologies.

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