

## Analyse the Coir Substrate Industry in Sri Lanka through a SWOT Exploration

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### ABSTRACT

Sri Lankan coir substrate industry is a significant source of foreign exchange earnings and employment. There is a significant gap between demand and supply for these products in the global market. This SWOT study was conducted to identify barriers to improving production and develop and prioritize strategies to overcome them. To develop a questionnaire, a list of strengths, weaknesses, opportunities, and threats were identified through library studies and personal interviews with industry familiars. The reliability of the Likert scale questionnaire was tested through the Cronbach alpha reliability test. Data were collected through a questionnaire by holding in-depth telephone call interviews with managers and owners of 30 registered companies under the Coconut Development Authority. The main three phases included in the research framework were the input phase, the comparison and correspondence phase, and the decision-making phase. Descriptive analysis evaluated sociodemographic factors, industry-related factors, company future trends, and reasons for the lower availability of raw materials. Ultimately, required strategies were determined based on the Internal Factor Evaluation Matrix (IFEM)-External Factor Evaluation Matrix(EFEM), and developed strategies were prioritized using the Quantitative Strategic Planning Matrix(QSPM). Less coconut production and inefficient husk collection mechanisms were identified as the major reasons for the scarcity of raw materials. Mostly prioritized strength was large market share for Sri Lankan coir substrate products in world market and the labor-intensive industry was identified as the major weakness. The prioritized opportunity was the growing world demand for washed and buffered products. Because of this major threat was few low-quality products damage the well reputation of all the other high-quality products produced and export from Sri Lanka. According to the result of the IFE - EFE matrix, Sri Lankan coir substrate industry belongs to the quadrant that requires more competitive strategies to achieve and maintain success of the industry.

**Keywords: Coir Substrate, Matrix, QSPM, Strategies, SWOT**

### INTRODUCTION

The usage of coconut coir dust as an organic component of soilless substrate mixtures has significantly increased over the past decade (Munroe *et al.*, 2018). Sri Lanka is one of the leading coir substrate product producers and exporters to the world market. Exports of coconut

and coconut-based products have earned foreign exchange US\$664.58 million to Sri Lanka in 2020 (Exporters Association of Coir-Based Substrates, 2022). Sri Lanka has a competitive advantage in this field because of its history, geographic position, and native processing techniques.

The coir substrate industry was able to report export revenue of 135 million USD in 2019, which was 22% of the total export revenue of coconut-based industries (Exporters Association of Coir-Based Substrates, 2022). Sri Lanka holds a leading position in world market because of the demand for Sri Lankan coir substrate products (Rosairo *et al.*, 2004). However, substrate manufacturers are still unable to produce enough to meet that demand (Industrial Development Board of Sri Lanka and Industrial Services Bureau, 2007).

SWOT analysis is a popular tool used to evaluate the strengths, weaknesses, opportunities, and threats of a company or industry. Through a SWOT study we can address the major problem and suggests strategies to overcome them. Rather than other qualitative studies, SWOT study is the most suitable method to address the problem of this research as a qualitative study.

**Research Problem:** The fortuitous revelation of coco peat's potential as a growth medium a few decades ago (Cosmic coir, 2022) has fundamentally reshaped the landscape of the coconut industry. What was once regarded as a hazardous industrial byproduct in the 1980s has evolved into the primary source of export revenue for the coconut sector. The coir substrate industry exhibits a discernible upward trajectory in exportation. However, the escalating rates have demonstrated fluctuations in recent years. Despite a twofold increase in the volume of exported substrates since 2009, the percentage growth between 2015 and 2019 stands at a modest 20%, with a mere 1% increment observed between 2018 and 2019 (Exporters Association of Coir-Based Substrates, 2022). The diminishing percentage growth in exports poses a critical issue as it contributes less to the overall revenue percentage of the country. Motivated by this concern, this study is designed to address the research gap by identifying challenges and opportunities encountered by manufacturers in expanding production capacities. The objective is to formulate and prioritize strategic interventions that can effectively mitigate weaknesses and threats faced by the coir substrate industry. The successful achievement of this goal hinges on the development of sustainable, long-term solutions to the prevailing challenges confronting the industry (Exporters Association of Coir-Based Substrates, 2022).

**Objectives:** The primary objective of this study is to conduct a rigorous SWOT analysis of the Sri Lankan coir substrate industry. Specifically, the research aims to identify and assess major challenges and opportunities within the coir substrate sector, with a particular emphasis on augmenting manufacturing volumes. Furthermore, the study endeavors to develop and prioritize strategic initiatives through the application of the Quantitative Strategic Planning Matrix (QSPM). By pursuing these objectives, this research aspires to contribute valuable insights to the scholarly discourse on the coir substrate industry, offering evidence-based recommendations for fostering sustainable growth and resilience in the face of evolving market dynamics and challenges.

**Justification:** There is a significant and rather unprecedented growth seen in the export of coir pith widely used in horticultural applications, which has turned out to be an eco-friendly foreign exchange earner. Therefore, Sri Lanka is in a unique position to take advantage of this situation (Rosairo *et al.*, 2004). However, there is no research has conducted to identify the potential of the coir substrate industry in Sri Lanka. This study will fill the research gap which is a need of this industry. It is essential to identify the problems and challenges manufacturers face in the industry (Exporters Association of Coir-Based Substrates, 2022).

Accordingly, this will be useful in creating proper strategies to rectify problems and compete with national and international brands.

## LITERATURE REVIEW

Horticultural substrates, encompassing the well-established category of 'horticultural soils' predominantly composed of natural organic matter, serve as the foundation for plant growth. While soil remains the universal substrate, contemporary horticultural practices increasingly seek specialized mediums tailored to specific plant needs. Currently favored substrates in horticulture include sphagnum peat moss, bark, coir, perlite, vermiculite, and mineral wools (Olle *et al.*, 2012). The surge in the use of coir substrates is attributed to factors such as ready availability, reduced environmental concerns in disposal, competitive pricing, and ease of installation (Prabhu and Thomas, 2002).

In the Sri Lankan context, the coir and substrate industries have encountered challenges in recent years. A study by Sathana (2018) in the Jaffna area highlighted the significant hurdles faced by coconut producers in value addition. Another investigation by Rosairo *et al.* (2004) sought to unravel the causes behind the collapse of the Sri Lankan coir fiber industry,

identifying multifaceted issues ranging from environmental concerns to trade barriers and inadequate research and development. Turnaround strategies were proposed in response to these challenges. In the Northwestern Province, a key region for coir production, Small and Medium Enterprises (SMEs) have been observed to lack innovation, focusing on producing coir fiber as raw material (Industrial Development Board of Sri Lanka and Industrial Services Bureau, 2007; Wedathanthrige, 2014).

The coir industry in Sri Lanka has attracted academic attention, with studies like "The Coir Industry in the Southern Province of Sri Lanka" (Nanayakkara et al., 2006) offering strategies to ensure equitable benefits for workers as the industry expands globally. Drawing inspiration from an Indian context, a SWOT analysis of the coir industry in India (Sitrasasu, 2020) provides valuable insights applicable to enhancing production capacities in Sri Lanka.

The SWOT analysis is employed as a strategic tool to leverage insights into internal and external factors influencing the industry, guiding strategic formulation (Lupu et al., 2016). Recognizing and emphasizing pertinent attributes, both internal and external, the SWOT analysis aims to align industry goals with favorable attributes. Furthermore, the Quantitative Strategic Planning Matrix (QSPM), situated in the final stage of strategy formulation, facilitates decision-making by evaluating and ranking alternative strategies based on identified indicators derived from internal and external factors (Leliga et al., 2019; Ommani, 2010). Integrating these analytical frameworks, this study aims to contribute scientifically rigorous insights to the challenges and opportunities faced by the Sri Lankan coir substrate industry, offering a strategic roadmap for sustainable growth and development."

## **METHODOLOGY**

This research employed a combination of primary and secondary data sources to conduct a thorough investigation. Specifically, primary data, about the SWOT analysis, was gathered from a targeted selection of manufacturing companies engaged in the production of Coir substrate products within Sri Lanka. A sample size of 30 companies was strategically chosen from the 138 manufacturing entities registered with the Coconut Development Authority (CDA), employing purposive sampling methods to ensure representative data collection (Boddy, 2015; Creswell, 1998; Onwuegbuzie and Leech, 2005). The data collection process involved a mix of personal interviews and telephone call interviews, chosen for their efficacy in acquiring insightful and comprehensive information.

**Method:** Firstly, the SWOT factors were identified by using library studies and personal interviews with those who are familiarized with the coir substrate industry.

Table 1 and 2 shows the identified internal factors (strengths and weaknesses) and external factors (opportunities and threats).

**Table 01: Internal factors**

<b>Internal Factors</b>
<b>Strengths</b>
S1: Coir substrate industry produces value-added products using husks and byproducts of fiber-based industries
S2: It has a large market share for Sri Lankan coir and coir substrate products in the world market
S3: It manufactures products according to different requirements of customer
S4: Produce diversified products in vast range
S5: Export-oriented development of coir substrate industry
S6: Adaptations to minimize wastage in production factories
S7: Adherence to GMP and other internationally accepted quality requirements
S8. Sri Lankan manufacturers have made a good reputation as a suppliers of quality coir substrate products to the international market
S9: Skilled labor force
S10: Utilization of natural resources for drying purposes
S11: Industry experience in coir substrate products manufacturing
S12: It only utilizes locally available materials for productions
<b>Weaknesses:</b>
W1: Difficulties of achieving green environmental goals with buffering and washing
W2: Less availability of own laboratory facilities
W3: Poor market intelligence about world market trends
W4: Insufficient drying facilities
W5: Less orientation towards own energy-supplying sources
Ex: Solar systems
W6: Insufficient promotional efforts in international markets
W7: Labor intensive industry

**Table 02: External factors**

<b>External Factors</b>
<b>Opportunities</b>
<p>O1: Growing world demand for washed and buffered products</p> <p>O2: Growing consumer trends towards eco-friendly natural hydroponic systems</p> <p>O3: Increasing exchange rate</p> <p>O4: Government scope of minimizing husk wastage through “Kapruka” Programme</p> <p>O5: Government guidance for quality maintenance of coir substrate products</p> <p>O6: Government guidance to find international market opportunities</p> <p>O7: Support from Associations related to industry</p> <p>O8: Potential for produce more value-added products from the products which are currently exported in raw form</p> <p>O9. Potential to expand Sri Lankan coir substrate products for new world markets</p>
<b>Threats</b>
<p>T1: Quality raw materials reduction due to sand addition and contamination with animal manure</p> <p>T2: Availability of cheap alternative products/ Substitutes</p> <p>T3: Increasing competition from other coir-based substrate-producing countries in world market</p> <p>T4: Limitations of raw materials availability for production because of; less coconut production</p> <p>T5: Limitations of raw materials availability for production because of; husk damages due to pest issues</p> <p>T6: Limitations of raw materials availability for production because of; inefficient husk collection mechanism</p> <p>T7: Limitations of raw materials availability for production because of; fresh nut exportation</p> <p>T8: Increasing cost of production</p> <p>T9: Few low-quality products damage the well reputation of all the other high-quality Sri Lankan products</p>

Identified AWOT factors were evaluated by five-point Likert scale. Five-point evaluation (Likert-scale) questionnaire was developed to convert the qualitative data into a quantitative

data format. A pilot test was conducted using five companies that manufacture coir substrate products to determine the reliability of the questionnaire. Cronbach's alpha reliability test was used to determine the questionnaire reliability.

The data were then gathered from selected company owners and production managers. Data analysis was conducted under two categories as; descriptive and matrix analysis. Socio demographic factors, industry related factors, company future trends and factors affecting on less availability of raw materials were evaluated under descriptive analysis.

In order to evaluate how companies, likeliness to increase their spending for predetermined factors regarding manufacturing volume increments, six-point evaluation (Likert scale) questions were used. Most possible reasons for less availability of raw materials for production was evaluated according to manufactures' opinions for Likert scale questions for predetermined factors.

Under matrix analysis in this study, four matrices were used under three phases, as the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) matrixes (the input phase), the SWOT matrix (the comparison and correspondence phase), and the QSPM matrixes (the decision-making phase). The final decision was made using QSPM. Lately, an action plan was developed based on prioritized strategies.

**IFE matrix analysis:** The weight, rank, and final scores of all internal factors (strengths and weaknesses) were calculated using this matrix. Experience of experts' knowledge used to evaluations. The weights and ratings of the relevant qualitative variables have been allocated to prevent bias, and the importance of each aspect has been discussed so that an unbiased quantification based on their knowledge and experience of the corrugation business can be performed. The following formula was used to calculate the weight for each factor in the IFE matrix (Wardhani and Dini, 2020).

$$a_i = \frac{X_i}{\sum_{(i)}^n X_i}$$

*a<sub>i</sub>* - Weight of *i<sup>th</sup>* variable

*X<sub>i</sub>* - *i<sup>th</sup>* variable value

*i* - 1, 2, 3, ..., *n*    *n* - Number of variables

Finally, the total weight become 1 (100%).

Rating each factor is the most challenging step because it involves subjectivity. For allocating rank, the opinions of three experts in the industry were considered. The average of the responses was allocated as the final rank (Zhang and Zhang, 2014).

The rating is between 1 and 4 for each internal factor, which shows how effectively the industry's current strategy responds to these factors. According to their importance, ranks of 4 and 3 are allocated to strength, while ranks of 2 and 1 are for weakness (Leliga *et.al.*, 2019).

If the calculated strength is high, this factor will gain rank 4; otherwise, when an organization gains weak strength, the average rank of the factor is 3. If an organization is challenged with a common weakness, the corresponding factor gains 2. However, fatal weakness gained a rank of 1. Therefore, in order to calculate the score of each factor, the weight of each row of internal factors was multiplied by the rank and inserted in the score column.

$$Score = Weight \times Rank$$

So, the total of scores were calculated. The minimum of this total could be 1 and maximum of it could be 4.

**EFE matrix analysis:** The current status of each factor is determined by ranks from 1 to 4, according to their importance. Ranks of 4 and 3 were allocated to opportunities while ranks of 2 and 1 for threats. If calculated opportunity is excellent, this factor gains a rank of 4. Otherwise, when an organization gains limited opportunity, the average rank of the factor is 3. If an organization is challenged with ideal threats corresponding factor gains 2. However terrible threat gain rank 1 (Leliga *et.al.*, 2019). Therefore, in order to calculate the score of each factor, the weight of each row of external factors were multiplied by the rank and inserted into the score column. Weight for each factor in EFE matrix were determined according to the same formula used in internal factor analysis. So, the total scores were calculated. The minimum of this total could be 1, and the maximum could be 4.

Then the Probability of Strategy Success (PSS) was tested. IFE- EFE matrixes were applied for below formulas to calculate Probability of Strategy Success (PSS).

$$PSS = \frac{(SP + AS)}{2}$$

$$SP = \frac{\sum s}{\sum (s + w)}$$



$$AS = \frac{\sum O}{\sum(O + T)}$$

*PSS* – coefficient of the probability of a strategic success

*SP* – coir Substrate industry internal strength

*AS* – the attractiveness of the environment

**SWOT matrix analysis:** Using IFE- EFE matrix, Sri Lankan Coir Substrate industry belonging strategy quadrant was determined. In the comparison and correspondent phase, different strategies were developed considering current strengths, weaknesses, opportunities, and threats in the industry as a SWOT matrix the organization's strengths and weaknesses were represented on one side of this matrix, and opportunities and threats were located on the other side, where they meet to form four quadrants.

**QSPM analysis:** Through QSPM analysis strategies developed in the above phase could be prioritized. Strategic factor, weight, attractiveness score, and total score were the QSPM components in this analysis. A numerical value showing the relative appeal of each approach in a group of developed strategies is known as the attractiveness score.

In QSPM the determination of Total Attractiveness Scores (TAS) is also carried out with the following conditions.

(1) Value 1 = not attractive

(2) Value 2 = rather interesting

(3) Value 3 = quite interesting

(4) Value 4 = very interesting TAS is obtained by multiplying weights by attractiveness (Sumiarsih *et al.*, 2018).

$$TAS = Weight \times AS$$

Here also average of three experts' opinions (Sumiarsih *et al.*, 2018; Banka *et al.*, 2022) were considered in allocating attractive score. The strategies that have been obtained by SWOT analysis were prioritized using QSPM Analysis.

**Data Analysis:** To analyze data, Matrix, Stata 16 and MS. Excel software were used.

## RESULTS AND DISCUSSION

Under the descriptive analysis, socio-demographic factors and industry-related factors have been described. The socio-demographic factors, respondents' education level, and respondents' experience in the coir substrate manufacturing industry have all been explained. Experience of the company in the coir substrate manufacturing industry, the scale of the company, manufacturing product types, products exporting countries, international trade fair participation, membership of related industry associations, achieved quality certifications for products, and buffering and washing of products have been described under industry-related factors. In addition, future trends of companies were also evaluated through descriptive analysis.

### Summary of socio-demographic factors

Education level of respondents: It was revealed that most of the respondents hold a diploma-level of education, representing a percentage of around 43.33%. This was followed by education up to the degree holder (30%), passed A/L level (23.3%), and postgraduate (3.33%) level of education. The findings indicate that most of the respondents have a relatively high educational level and all of the respondents have learned up to A/L or higher education.

Experience of the respondent: Considering the experience of the responders, 53.33%, the highest percentage of manufacturers have experience between 10 and 20 years of experience, and a 10% minor percentage have experience in the industry less than 10 years. 36.67% of manufacturers have experience in the industry for more than 20 years.

### Summary of industry-related factors

Industry Scale: The national policy framework for Small and Medium Enterprise Development (SME) under the Ministry of Industry and Commerce classifies scales of the industries based on the number of employees of the institute. According to their categorization method, current coir substrate industries can be classified into four categories micro, small, medium, and large scale (Ministry of Industry and Commerce, 2015).

In the selected sample, small-scale companies account for 50% of the majority. The lowest 6.67% represented micro-scale companies 33.33% of manufacturing companies belong to medium-sized companies, while the third highest number of companies represents large-scale companies by 10%.

Experience of the company: According to the respondents' data, most manufacturing companies have experience of between 10 and 20 years. As a percentage value, it is around 46.47%. 20% of companies have experience in the field for more than 20 years, and 33.33% of manufacturers have less than 10 years of experience in the coir substrate field.

Types of manufacturing products: Among different product types manufactured by companies, more than 93% of companies out of 30 produce grow bags. The second highest production type is 5kg blocks (66.67%) and the third place is taken by two products, coco disks and coco bricks. Loose husk chips and 25 kg blocks also show the same percentage share as 20%. Grow cubes and husk chip blocks also show the same percentages of 6.67%, and loose coco peat and coir pots revealed 16.67% equal percentages. Propagation cubes are the least produced products by the manufacturing companies, which are represented by 3.33% in the above table. In the other products category (43%), products that are manufactured by companies which are not included in the substrate category have been included (Ex: coco poles, geo textiles, coco lawns, fiber bales, mulch mats, etc.)

Products exporting regions: According to the products exporting regions, the highest percentage (90%) of manufacturing products are exported to Asian countries like Japan and China. The second highest tendency for exporting substrate products is for European countries, particularly the United Kingdom and the Netherlands. Africa is shown as the lowest importing region, with only a 20% export rate. As explained by the manufacturers, it is somewhat difficult to export Sri Lankan products to Oceanic countries like Australia and New Zealand due to sanitary and phytosanitary quality certification issues because these island regions have been subject to strict regulations on importing horticultural products. So, the second lowest exporting region is Oceanic countries (30%). Among all the manufacturers in the sample, only one manufacturer produces for the local market and the overall percentage for that is 3.33%. Around 43% of the manufacturers of the sample export their substrate products to American countries and for the Middle East it is around 56.67%.

Participation in international trade fairs: Considering the factor of international trade fair participation, the highest percentage, represented as 63.33%, in the above table of manufacturers who have not participated in international level trade fairs. Only a minor percentage (36.67%) of the population have participated in international trade fairs.

Membership of related industry association: In the coir substrate industry, only one association (The Exporters Association of Coir Based Substrate) is currently active in supporting

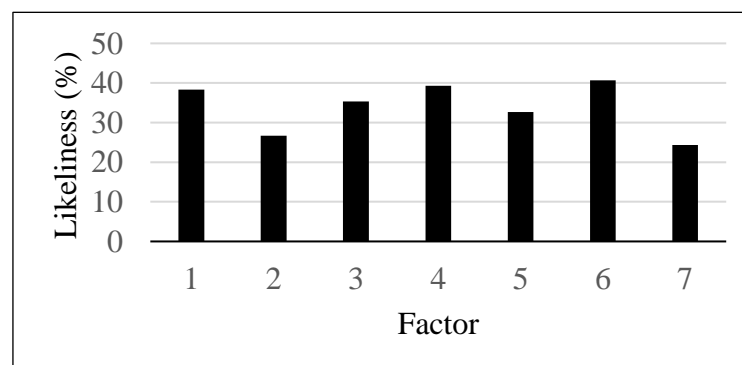
manufacturers and exporters of the industry. A relatively higher percentage (73.33%) have taken membership in a related industry association. The 26.67% minority of manufacturers in the sample have not taken membership of this association or any other related industry association.

**Achieved certifications by companies for productions:** Considering the achieved certifications by the coir substrate manufacturing companies, it explains that 100% of manufacturers have achieved Good Manufacturing Practices (GMP) certification for their products. The second highest achieved certification is ISO 9001(16.67%). The lowest percentage of achieved certifications are ISO 140001, ISO 2015, Leaf, and Ecocert certifications, with an equal percentage of around 3.33%. OMRI and SLS certifications have been achieved by an equal percentage of around 10%, and RHP certification (European countries highly approve RHP-certified products) has been obtained by 6.67% among manufacturing companies for their products.

**Buffering and Washing:** 60% of the majority of companies produce coir substrate products, which are manufactured and exported as unwashed products. 20% second highest represents the companies that do both buffering and washing for their products. Equally minor percentages (10%) of manufacturing companies produce both washed and unwashed products or only washed products.

**Future Trends of companies (% Likelihood):**

**Figure 01: Future trends of companies (% Likelihood)**



Factor 1- Increase spending for new innovations and value-added productions

Factor 2- Increase spending on product promotion

Factor 3- Increase spending on establishing own energy sources

Factor 4- Increase spending on waste treatment

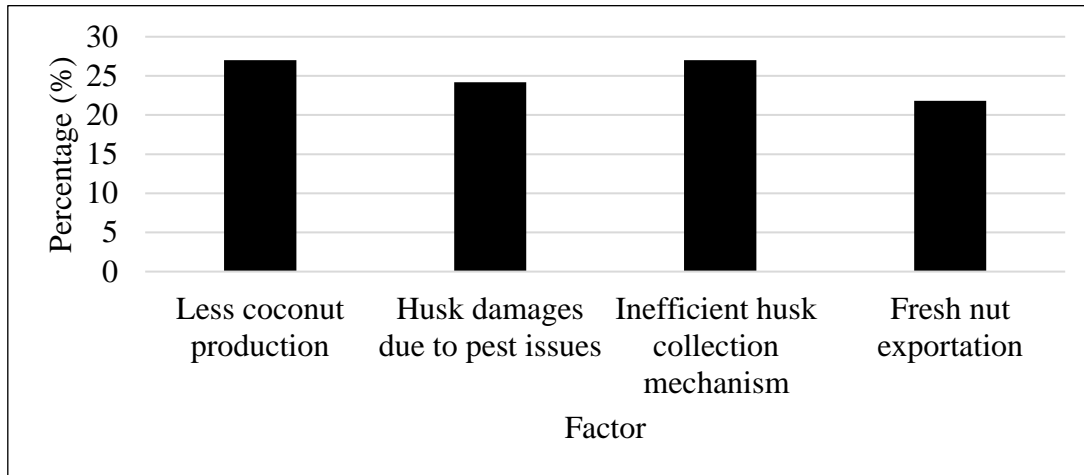
Factor 5-Increase spending on drying yards

Factor 6- Increasing spending for new machineries and technologies

Factor 7- Increase spending for new market researches

As the survey results revealed that, exporters are more likely to increase their spending for production of new machines and technologies. In addition, they are also willing to spend more on waste treatment and new innovations and to produce value-added products.

**Figure 02: Factors effect on less availability of raw materials**



According to the primary survey data; four basic factors are affecting the scarcity of raw materials for production. They are, less coconut production, coconut husk damage due to pest issues (mite damage), inefficient husk collection mechanism, and fresh nut exportation.

According to the graphical illustration of manufacturers' opinions, less coconut production and inefficient husk collection mechanisms were the major reasons for the scarcity of raw materials. According to respondents' opinions, fresh nut exportation shows lower impact while mite damage to husk shows more impact than fresh nut exportation.

Matrix analysis: This article offers guidelines to demonstrate how various strategic management tools aid in decision-making.

After conducting a pilot test to determine the reliability of the questionnaire, the received results of were Strengths- 0.8240, Weaknesses- 0.7073, Opportunities- 0.7818 and Threats- 0.7270 which were all four variable categories exceeded the acceptable level (0.7) in the Cronbach's alpha value scale. So, the questionnaire was reliable.

After considering all the collected data of the sample, the final matrix analysis was done as below.

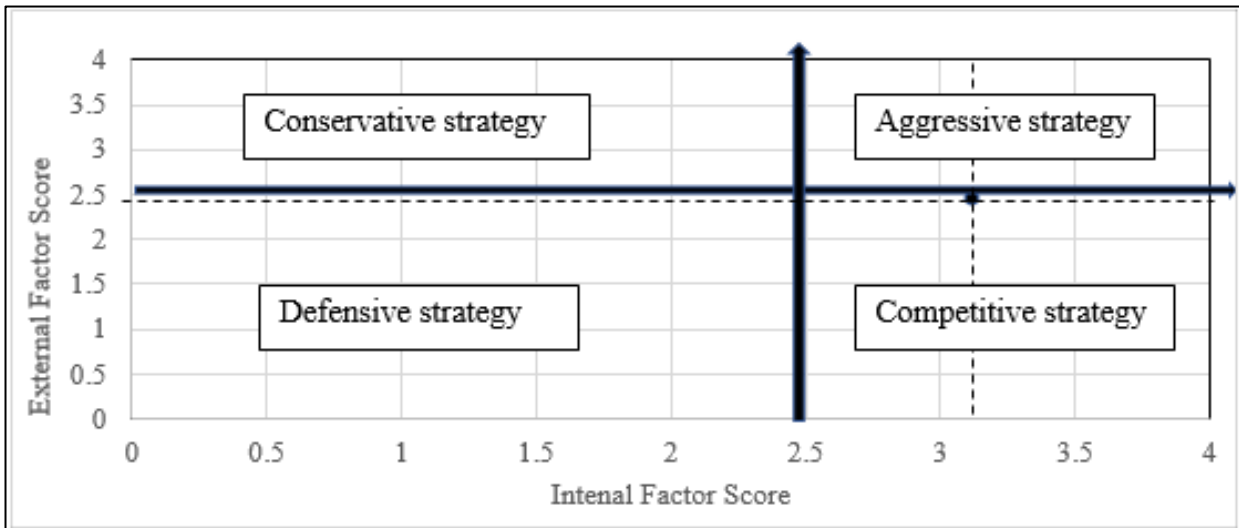
i. Input phase:

<b>Table 03: Internal Factor Evaluation Matrix (IFE)</b>				<b>Table 04: External Factor Evaluation Matrix (EFE)</b>			
Strengths	Weight	Rank	Score	Opportunities	Weight	Rank	Score
1	0.054	4	0.216	1	0.068	4	0.272
2	0.058	4	0.232	2	0.059	4	0.236
3	0.055	4	0.22	3	0.044	3	0.132
4	0.053	4	0.212	4	0.04	4	0.16
5	0.058	4	0.232	5	0.044	3	0.132
6	0.051	4	0.204	6	0.045	4	0.18
7	0.057	3	0.171	7	0.049	4	0.196
8	0.057	4	0.228	8	0.067	4	0.268
9	0.045	3	0.135	9	0.066	4	0.264
10	0.056	4	0.224	<b>Threats</b>			
11	0.057	4	0.228	1	0.064	1	0.064
12	0.058	4	0.232	2	0.056	1	0.056
<b>Weaknesses</b>				3	0.058	1	0.058
1	0.039	2	0.078	4	0.056	1	0.056
2	0.049	1	0.049	5	0.05	1	0.05
3	0.047	2	0.094	6	0.056	1	0.056
4	0.053	1	0.053	7	0.045	2	0.09
5	0.051	2	0.102	8	0.066	1	0.066
6	0.047	2	0.094	9	0.064	2	0.128
7	0.054	2	0.108	<b>Total</b>			
<b>Total</b>			3.112	<b>Total</b>			2.464

Table 3, shows the summary of the internal factor evaluation. According to the matrix, obtained total score for IFE matrix was 3.112 which exceeds the average 2.5 level (David, 2011). The assumption behind choosing 2.5 as the average score is that it serves as a baseline or neutral value (David, 2011). Table 4, shows the summary of the external factors. From this

matrix all the external factors (opportunities and threats) weights, rank and final scores were summarized. According to the matrix, obtained total score for EFE Matrix was 2.464.

**Figure 03: IFE- EFE matrix**



This matrix shows that Sri Lankan coir substrate industry belongs to the competitive strategy quadrant. For determine the position IFE and EFE matrix values were used. It means that internal strengths are more than weaknesses and external threats are more major than opportunities.

This analytical tool utilizes internal and external factors to generate strategies. It comprises of following 4 strategic groups;

1. How strengths are utilized to exploit opportunities.
2. How weaknesses can be reduced by using opportunities.
3. How strengths are utilized to minimize the impact of threats.
4. How weaknesses can be handled that will make these threats a reality.

Assessment of the probability of strategic success (PSS): Observed results of IFE- EFE matrixes were applied for the formulas to calculate PSS. According to the results in IFE and EFE Matrixes,  $\sum S$  is 2.53,  $\sum$ the (S+W) value is 3.11, and the calculated SP value is 0.81.

$\sum O$  is 1.84,  $\sum (O+T)$  is 2.46 hence calculated AS value is 0.75 according to the probability of strategic success formula; The final PSS value is 0.78. According to the decision rule (for strategic success,  $PSS > 0.5$ ), the calculated PSS value is greater than 0.5. In this research, the strategy's success probability is acceptable (Bhatta *et.al.*, 2020). If the coefficient exceeds 0.5, then the industry is successful.

**Table 05: SWOT matrix aggressive and competitive strategies**

	<b>Opportunities</b>	<b>Threats</b>
	O1, O2, O3, O4, O5, O6, O7, O8, O9	T1, T2, T3, T4, T5, T6, T7, T8, T9
<b>Strengths</b> S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12	<b>S-O Strategy</b> <b>(Aggressive Strategies)</b> 01. Introducing standard logo for international reorganization as a branded product from Sri Lanka 02. Conducting research to estimate utilizable coconut husks in domestically 03. Focus on product and market diversification	<b>S-T Strategy</b> <b>(Competitive Strategies)</b> 04. Develop a domestic awareness campaign to promote awareness of the local community regarding “Kapruka Programme” and the importance of coconut husk for manufacturing industries 05. Promoting manufacturers to produce more value-added products which are currently exported in raw form without any value addition 06. Extension about the importance of gaining internationally accepted quality standards/Guidelines with a certificate for Sri Lankan products 07. Maximizing the productivity of existing coconut plantations 08. Establishing a processing zone out of the coconut triangle 09. Sustainable land development and management

ii. Comparisons and correspondence phase: Developed Aggressive (SO Strategies), Competitive (ST Strategies), Conservative (WO Strategies) and Defensive strategies (WT Strategies) considering current strengths, weaknesses, opportunities and threats in the industry are as below.

Aggressive strategies are referring to an organization in which the internal strengths are dominant and opportunities are dominating in external environment and Competitive strategies exist in an industry when it is confronted with negative external conditions



despite having significant internal potential. Threats must be overcome by utilizing strong sides.

**Table 06: SWOT matrix conservative and defensive strategies**

	Opportunities O1, O2, O3, O4, O5, O6, O7, O8, O9	Threats T1, T2, T3, T4, T5, T6, T7, T8, T9
Weaknesses W1, W2, W3, W4, W5, W6, W7	<p><b>W-O Strategy (Conservative Strategies)</b></p> <p>10. Introducing environmentally friendly level of chemicals use for buffering</p> <p>11. Organization of international level trade fairs within country</p> <p>12. Establishing e- Platform to access world market information</p> <p>13. Establishment of promotional stores at all Sri Lankan Airports and ports</p>	<p><b>W-T Strategy (Defensive Strategies)</b></p> <p>14. Introducing low cost machineries</p> <p>15. Introducing low interest loan schemes for solar systems</p> <p>16. Understand the gaps in Sri Lankan coir substrate industry and develop strategic plan with collaboration of CDA and Related Industry Association</p> <p>17. Establish a center to maintain required laboratory testing for quality maintenance</p>

Conservative strategies are referring to an organization which is dominated by weaknesses, but operates in a favorable environment. It should focus on taking advantage of its opportunities. Defensive strategies are internally major in weaknesses and externally major in threats.

iii. Decision making phase: In this phase each developed strategy has been evaluated according to QSPM analysis. Then considering external and internal factors separately, overall Total Attractive Score values were calculated.

Through QSPM Analysis strategies developed in above phase could be prioritized. In QSPM the determination of Total Attractiveness Scores (TAS) is also carried out with the following conditions.

- (1) Value 1 = not attractive  
 (2) Value 2 = rather interesting  
 (3) Value 3 = quite interesting  
 (4) Value 4 = very interesting  
 TAS is obtained by multiplying weights by attractiveness (Sumiarsih *et al.*, 2018).

Here also average of three experts opinions (Sumiarsih *et al.*, 2018; Banka *et al.*, 2022) were considered in allocating attractive score. The strategies that have been obtained by SWOT analysis were prioritized using QSPM Analysis. The Total Attractive Score (TAS) is obtained by multiplying AS and weight (Sumiarsih *et al.*, 2018). After gathering the information from the Quantitative strategic planning matrix (external factors - internal factors).

**Table 07: Quantitative Strategic Planning Matrix (Internal Factors)**

Internal factors		Strategy 1		Strategy 2		Strategy 3	
Strengths	Weight	AS	TAS	AS	TAS	AS	TAS
S1	0.054	1	0.054	4	0.216	4	0.216
S2	0.058	4	0.232	1	0.058	2	0.116
S3	0.055	1	0.055	1	0.055	2	0.11
S4	0.053	3	0.159	2	0.106	4	0.212
S5	0.058	4	0.232	1	0.058	1	0.058
S6	0.051	1	0.051	1	0.051	1	0.051
S7	0.057	2	0.114	1	0.057	1	0.057
S8	0.057	4	0.228	1	0.057	1	0.057
S9	0.045	1	0.045	1	0.045	1	0.045
S10	0.056	1	0.056	1	0.056	1	0.056
S11	0.057	3	0.171	1	0.057	2	0.114
S12	0.058	1	0.058	4	0.232	1	0.058
Weaknesses							
W1	0.039	1	0.039	1	0.039	1	0.039
W2	0.049	1	0.049	1	0.049	1	0.049
W3	0.047	1	0.047	1	0.047	2	0.094
W4	0.053	1	0.053	1	0.053	4	0.212
5W5	0.051	1	0.051	1	0.051	1	0.051

W6	0.047	4	0.188	1	0.047	1	0.047
W7	0.054	1	0.054	1	0.054	3	0.162
Total	1		1.936		1.388		1.804

**Table 08: Quantitative Strategic Planning Matrix (Internal Factors)**

Internal factors		Strategy 4		Strategy 5		Strategy 6	
Strengths	Weight	AS	TAS	AS	TAS	AS	TAS
<b>S1</b>	0.054	4	0.216	4	0.216	1	0.054
<b>S2</b>	0.058	2	0.116	3	0.174	1	0.058
<b>S3</b>	0.055	1	0.055	3	0.165	2	0.11
<b>S4</b>	0.053	1	0.053	3	0.159	1	0.053
<b>S5</b>	0.058	1	0.058	3	0.174	4	0.232
<b>S6</b>	0.051	1	0.051	2	0.102	1	0.051
<b>S7</b>	0.057	1	0.057	1	0.057	4	0.228
<b>S8</b>	0.057	1	0.057	1	0.057	4	0.228
<b>S9</b>	0.045	1	0.045	1	0.045	1	0.045
<b>S10</b>	0.056	1	0.056	1	0.056	1	0.056
<b>S11</b>	0.057	1	0.057	1	0.057	1	0.057
<b>S12</b>	0.058	4	0.232	2	0.116	1	0.058
<b>Weaknesses</b>							
<b>W1</b>	0.039	1	0.039	2	0.078	1	0.039
<b>W2</b>	0.049	1	0.049	1	0.049	2	0.098
<b>W3</b>	0.047	1	0.047	3	0.141	2	0.094
<b>W4</b>	0.053	1	0.053	1	0.053	2	0.106
<b>W5</b>	0.051	1	0.051	1	0.051	1	0.051
<b>W6</b>	0.047	1	0.047	1	0.047	1	0.047
<b>W7</b>	0.054	1	0.054	1	0.054	1	0.054
<b>Total</b>	<b>1</b>		<b>1.393</b>		<b>1.851</b>		<b>1.719</b>

**Table 09: Quantitative Strategic Planning Matrix (Internal Factors)**

Internal factors		Strategy 7		Strategy 8		Strategy 9	
Strengths	Weight	AS	TAS	AS	TAS	AS	TAS
<b>S1</b>	0.054	3	0.162	2	0.108	1	0.054
<b>S2</b>	0.058	1	0.058	1	0.058	1	0.058
<b>S3</b>	0.055	1	0.055	1	0.055	1	0.055
<b>S4</b>	0.053	1	0.053	1	0.053	1	0.053
<b>S5</b>	0.058	1	0.058	3	0.174	1	0.058
<b>S6</b>	0.051	1	0.051	4	0.204	1	0.051
<b>S7</b>	0.057	1	0.057	2	0.114	1	0.057
<b>S8</b>	0.057	1	0.057	1	0.057	1	0.057
<b>S9</b>	0.045	1	0.045	1	0.045	1	0.045
<b>S10</b>	0.056	1	0.056	1	0.056	1	0.056
<b>S11</b>	0.057	1	0.057	3	0.171	1	0.057
<b>S12</b>	0.058	4	0.232	4	0.232	2	0.116
<b>Weaknesses</b>							
<b>W1</b>	0.039	1	0.039	4	0.156	1	0.039
<b>W2</b>	0.049	1	0.049	3	0.147	1	0.049
<b>W3</b>	0.047	1	0.047	1	0.047	1	0.047
<b>W4</b>	0.053	1	0.053	2	0.106	1	0.053
<b>W5</b>	0.051	1	0.051	2	0.102	1	0.051
<b>W6</b>	0.047	1	0.047	1	0.047	1	0.047
<b>W7</b>	0.054	1	0.054	1	0.054	1	0.054
<b>Total</b>	<b>1</b>		<b>1.281</b>		<b>1.986</b>		<b>1.057</b>

**Table 10: Quantitative Strategic Planning Matrix (Internal Factors)**

Internal factors		Strategy 10		Strategy 11		Strategy 12	
Strengths	Weight	AS	TAS	AS	TAS	AS	TAS
<b>S1</b>	0.054	1	0.054	2	0.108	1	0.054

<b>S2</b>	0.058	2	0.116	3	0.174	2	0.116
<b>S3</b>	0.055	4	0.22	2	0.11	3	0.165
<b>S4</b>	0.053	3	0.159	4	0.212	2	0.106
<b>S5</b>	0.058	1	0.058	3	0.174	4	0.232
<b>S6</b>	0.051	1	0.051	1	0.051	1	0.051
<b>S7</b>	0.057	1	0.057	2	0.114	3	0.171
<b>S8</b>	0.057	1	0.057	2	0.114	1	0.057
<b>S9</b>	0.045	1	0.045	1	0.045	1	0.045
<b>S10</b>	0.056	1	0.056	1	0.056	1	0.056
<b>S11</b>	0.057	1	0.057	3	0.171	1	0.057
<b>S12</b>	0.058	1	0.058	1	0.058	1	0.058
<b>Weaknesses</b>							
<b>W1</b>	0.039	4	0.156	1	0.039	1	0.039
<b>W2</b>	0.049	1	0.049	1	0.049	1	0.049
<b>W3</b>	0.047	1	0.047	4	0.188	4	0.188
<b>W4</b>	0.053	1	0.053	1	0.053	1	0.053
<b>W5</b>	0.051	1	0.051	1	0.051	1	0.051
<b>W6</b>	0.047	1	0.047	4	0.188	3	0.141
<b>W7</b>	0.054	1	0.054	1	0.054	1	0.054
<b>Total</b>	<b>1</b>		<b>1.445</b>		<b>2.009</b>		<b>1.743</b>

Table 11: Quantitative Strategic Planning Matrix (Internal Factors)

Internal factors		Strategy 13		Strategy 14		Strategy 15	
Strengths	Weight	AS	TAS	AS	TAS	AS	TAS
<b>S1</b>	0.054	1	0.054	1	0.054	1	0.054
<b>S2</b>	0.058	1	0.058	1	0.058	1	0.058
<b>S3</b>	0.055	2	0.11	1	0.055	1	0.055
<b>S4</b>	0.053	3	0.159	2	0.106	1	0.053
<b>S5</b>	0.058	2	0.116	1	0.058	1	0.058
<b>S6</b>	0.051	1	0.051	2	0.102	1	0.051
<b>S7</b>	0.057	1	0.057	1	0.057	1	0.057
<b>S8</b>	0.057	3	0.171	1	0.057	1	0.057

<b>S9</b>	0.045	1	0.045	3	0.135	1	0.045
<b>S10</b>	0.056	1	0.056	2	0.112	2	0.112
<b>S11</b>	0.057	1	0.057	2	0.114	1	0.057
<b>S12</b>	0.058	1	0.058	1	0.058	3	0.174
<b>Weaknesses</b>							
<b>W1</b>	0.039	1	0.039	1	0.039	1	0.039
<b>W2</b>	0.049	1	0.049	1	0.049	1	0.049
<b>W3</b>	0.047	1	0.047	1	0.047	1	0.047
<b>W4</b>	0.053	1	0.053	4	0.212	2	0.106
<b>W5</b>	0.051	1	0.051	1	0.051	4	0.204
<b>W6</b>	0.047	4	0.188	1	0.047	1	0.047
<b>W7</b>	0.054	1	0.054	4	0.216	1	0.054
	<b>1</b>		<b>1.627</b>		<b>1.627</b>		<b>1.377</b>

Table 12: Quantitative Strategic Planning Matrix (Internal Factors)

Internal factors		Strategy 16		Strategy 17	
Strengths	Weight	AS	TAS	AS	TAS
<b>S1</b>	0.054	1	0.054	1	0.054
<b>S2</b>	0.058	2	0.116	1	0.058
<b>S3</b>	0.055	1	0.055	2	0.11
<b>S4</b>	0.053	1	0.053	1	0.053
<b>S5</b>	0.058	2	0.116	1	0.058
<b>S6</b>	0.051	1	0.051	1	0.051
<b>S7</b>	0.057	2	0.114	4	0.228
<b>S8</b>	0.057	1	0.057	4	0.228
<b>S9</b>	0.045	1	0.045	1	0.045
<b>S10</b>	0.056	1	0.056	1	0.056
<b>S11</b>	0.057	1	0.057	1	0.057
<b>S12</b>	0.058	1	0.058	1	0.058
<b>Weaknesses</b>					
<b>W1</b>	0.039	4	0.156	3	0.117

<b>W2</b>	0.049	3	0.147	4	0.196
<b>W3</b>	0.047	3	0.141	1	0.047
<b>W4</b>	0.053	3	0.159	1	0.053
<b>W5</b>	0.051	4	0.204	1	0.051
<b>W6</b>	0.047	3	0.141	1	0.047
<b>W7</b>	0.054	3	0.162	1	0.054
	<b>1</b>		<b>1.942</b>		<b>1.621</b>

Table 13: Quantitative Strategic Planning Matrix (External Factors)

External factors		Strategy 1		Strategy 2		Strategy 3	
	Weight	AS	TAS	AS	TAS	AS	TAS
<b>Opportunities</b>							
<b>O1</b>	0.068	3	0.204	1	0.068	4	0.272
<b>O2</b>	0.059	3	0.177	1	0.059	4	0.236
<b>O3</b>	0.044	1	0.044	1	0.044	2	0.088
<b>O4</b>	0.04	1	0.04	4	0.16	1	0.04
<b>O5</b>	0.044	4	0.176	1	0.044	1	0.044
<b>O6</b>	0.045	3	0.135	1	0.045	2	0.09
<b>O7</b>	0.049	1	0.049	2	0.098	2	0.098
<b>O8</b>	0.067	3	0.201	2	0.134	4	0.268
<b>O9</b>	0.066	4	0.264	2	0.132	3	0.198
<b>Threats</b>							
<b>T1</b>	0.064	1	0.064	1	0.064	1	0.064
<b>T2</b>	0.056	3	0.168	1	0.056	1	0.056
<b>T3</b>	0.058	3	0.174	1	0.058	3	0.174
<b>T4</b>	0.056	1	0.056	4	0.224	1	0.056
<b>T5</b>	0.05	1	0.05	2	0.1	1	0.05
<b>T6</b>	0.056	1	0.056	4	0.224	1	0.056
<b>T7</b>	0.045	1	0.045	3	0.135	1	0.045
<b>T8</b>	0.066	1	0.066	1	0.066	2	0.132
<b>T9</b>	0.064	4	0.256	1	0.064	1	0.064
<b>Total</b>	<b>1</b>		<b>2.225</b>		<b>1.775</b>		<b>2.031</b>

**Table 14: Quantitative Strategic Planning Matrix (External Factors)**

External factors		Strategy 4		Strategy 5		Strategy 6	
Opportunities	Weight	AS	TAS	AS	TAS	AS	TAS
<b>O1</b>	0.068	1	0.068	3	0.204	3	0.204
<b>O2</b>	0.059	2	0.118	3	0.177	2	0.118
<b>O3</b>	0.044	1	0.044	3	0.132	1	0.044
<b>O4</b>	0.04	4	0.16	1	0.04	1	0.04
<b>O5</b>	0.044	1	0.044	2	0.088	4	0.176
<b>O6</b>	0.045	1	0.045	1	0.045	1	0.045
<b>O7</b>	0.049	2	0.098	3	0.147	2	0.098
<b>O8</b>	0.067	3	0.201	4	0.268	1	0.067
<b>O9</b>	0.066	1	0.066	2	0.132	3	0.198
Threats							
<b>T1</b>	0.064	1	0.064	1	0.064	4	0.256
<b>T2</b>	0.056	2	0.112	2	0.112	1	0.056
<b>T3</b>	0.058	1	0.058	4	0.232	4	0.232
<b>T4</b>	0.056	4	0.224	1	0.056	1	0.056
<b>T5</b>	0.05	2	0.1	1	0.05	1	0.05
<b>T6</b>	0.056	4	0.224	1	0.056	1	0.056
<b>T7</b>	0.045	1	0.045	4	0.18	1	0.045
<b>T8</b>	0.066	1	0.066	4	0.264	1	0.066
<b>T9</b>	0.064	1	0.064	1	0.064	4	0.256
<b>Total</b>	<b>1</b>		<b>1.801</b>		<b>2.311</b>		<b>2.063</b>

**Table 15: Quantitative Strategic Planning Matrix (External Factors)**

External factors		Strategy 7		Strategy 8		Strategy 9	
Opportunities	Weight	AS	TAS	AS	TAS	AS	TAS
<b>O1</b>	0.068	1	0.068	1	0.068	1	0.068



<b>O2</b>	0.059	1	0.059	1	0.059	1	0.059
<b>O3</b>	0.044	1	0.044	2	0.088	1	0.044
<b>O4</b>	0.04	1	0.04	2	0.08	1	0.04
<b>O5</b>	0.044	1	0.044	3	0.132	1	0.044
<b>O6</b>	0.045	1	0.045	1	0.045	1	0.045
<b>O7</b>	0.049	4	0.196	2	0.098	3	0.147
<b>O8</b>	0.067	1	0.067	1	0.067	1	0.067
<b>O9</b>	0.066	1	0.066	1	0.066	1	0.066
<b>Threats</b>							
<b>T1</b>	0.064	1	0.064	3	0.192	1	0.064
<b>T2</b>	0.056	1	0.056	1	0.056	1	0.056
<b>T3</b>	0.058	2	0.116	3	0.174	3	0.174
<b>T4</b>	0.056	4	0.224	1	0.056	4	0.224
<b>T5</b>	0.05	4	0.2	1	0.05	2	0.1
<b>T6</b>	0.056	1	0.056	3	0.168	1	0.056
<b>T7</b>	0.045	1	0.045	1	0.045	1	0.045
<b>T8</b>	0.066	1	0.066	4	0.264	1	0.066
<b>T9</b>	0.064	1	0.064	2	0.128	1	0.064
<b>Total</b>	<b>1</b>		<b>1.52</b>		<b>1.836</b>		<b>1.429</b>

Table16: Quantitative Strategic Planning Matrix (External Factors)

External factors		Strategy 10		Strategy 11		Strategy 12	
	Weight	AS	TAS	AS	TAS	AS	TAS
<b>O1</b>	0.068	3	0.204	4	0.272	3	0.204
<b>O2</b>	0.059	2	0.118	4	0.236	2	0.118
<b>O3</b>	0.044	1	0.044	2	0.088	1	0.044
<b>O4</b>	0.04	1	0.04	1	0.04	1	0.04
<b>O5</b>	0.044	2	0.088	1	0.044	1	0.044
<b>O6</b>	0.045	1	0.045	4	0.18	4	0.18
<b>O7</b>	0.049	1	0.049	4	0.196	3	0.147
<b>O8</b>	0.067	3	0.201	3	0.201	1	0.067
<b>O9</b>	0.066	1	0.066	4	0.264	4	0.264

<b>Threats</b>							
<b>T1</b>	0.064	1	0.064	1	0.064	1	0.064
<b>T2</b>	0.056	1	0.056	2	0.112	1	0.056
<b>T3</b>	0.058	2	0.116	4	0.232	3	0.174
<b>T4</b>	0.056	1	0.056	1	0.056	1	0.056
<b>T5</b>	0.05	1	0.05	1	0.05	1	0.05
<b>T6</b>	0.056	1	0.056	1	0.056	1	0.056
<b>T7</b>	0.045	1	0.045	1	0.045	1	0.045
<b>T8</b>	0.066	2	0.132	1	0.066	1	0.066
<b>T9</b>	0.064	1	0.064	1	0.064	1	0.064
<b>Total</b>	<b>1</b>		<b>1.494</b>		<b>2.266</b>		<b>1.739</b>

Table 17: Quantitative Strategic Planning Matrix (External Factors)

<b>External factors</b>		<b>Strategy 13</b>		<b>Strategy 14</b>		<b>Strategy 15</b>	
<b>Opportunities</b>	Weight	AS	TAS	AS	TAS	AS	TAS
<b>O1</b>	0.068	3	0.204	1	0.068	1	0.068
<b>O2</b>	0.059	3	0.177	1	0.059	1	0.059
<b>O3</b>	0.044	2	0.088	2	0.088	1	0.044
<b>O4</b>	0.04	1	0.04	1	0.04	1	0.04
<b>O5</b>	0.044	1	0.044	1	0.044	1	0.044
<b>O6</b>	0.045	4	0.18	1	0.045	1	0.045
<b>O7</b>	0.049	2	0.098	3	0.147	2	0.098
<b>O8</b>	0.067	1	0.067	1	0.067	1	0.067
<b>O9</b>	0.066	4	0.264	1	0.066	1	0.066
<b>Threats</b>							
<b>T1</b>	0.064	1	0.064	1	0.064	1	0.064
<b>T2</b>	0.056	1	0.056	1	0.056	1	0.056
<b>T3</b>	0.058	3	0.174	4	0.232	3	0.174
<b>T4</b>	0.056	1	0.056	1	0.056	1	0.056
<b>T5</b>	0.05	1	0.05	1	0.05	1	0.05
<b>T6</b>	0.056	1	0.056	1	0.056	1	0.056

<b>T7</b>	0.045	1	0.045	1	0.045	1	0.045
<b>T8</b>	0.066	1	0.066	4	0.264	4	0.264
<b>T9</b>	0.064	1	0.064	1	0.064	1	0.064
<b>Total</b>	<b>1</b>		<b>1.793</b>		<b>1.511</b>		<b>1.36</b>

Table 18: Quantitative Strategic Planning Matrix (External Factors)

External factors		Strategy 16		Strategy 17	
Opportunities	Weight	AS	TAS	AS	TAS
<b>O1</b>	0.068	2	0.136	1	0.068
<b>O2</b>	0.059	1	0.059	1	0.059
<b>O3</b>	0.044	1	0.044	1	0.044
<b>O4</b>	0.04	4	0.16	1	0.04
<b>O5</b>	0.044	3	0.132	4	0.176
<b>O6</b>	0.045	3	0.135	1	0.045
<b>O7</b>	0.049	4	0.196	2	0.098
<b>O8</b>	0.067	3	0.201	1	0.067
<b>O9</b>	0.066	3	0.198	1	0.066
<b>Threats</b>					
<b>T1</b>	0.064	4	0.256	4	0.256
<b>T2</b>	0.056	2	0.112	1	0.056
<b>T3</b>	0.058	3	0.174	3	0.174
<b>T4</b>	0.056	3	0.168	1	0.056
<b>T5</b>	0.05	3	0.15	1	0.05
<b>T6</b>	0.056	4	0.224	1	0.056
<b>T7</b>	0.045	4	0.18	1	0.045
<b>T8</b>	0.066	3	0.198	1	0.066
<b>T9</b>	0.064	3	0.192	4	0.256
<b>Total</b>	<b>1</b>		<b>2.915</b>		<b>1.678</b>

Each strategy was prioritized according to the highest average value to lowest value as shown in table 19.

**Table 19: QSPM Summery**

Strategy Number	IFE	EFE	Average
1	2.225	1.936	2.08
2	1.775	1.388	1.58
3	2.031	1.804	1.92
4	1.801	1.393	1.6
5	2.311	1.851	2.08
6	2.063	1.719	1.89
7	1.52	1.281	1.4
8	1.836	1.986	1.91
9	1.429	1.057	1.24
10	1.494	1.445	1.47
11	2.266	2.009	2.14
12	1.739	1.743	1.74
13	1.793	1.627	1.71
14	1.511	1.627	1.57
15	1.36	1.377	1.37
16	2.915	1.942	2.43
17	1.678	1.621	1.65

(Source: QSPM Matrix analysis data)

According to the summary,

1. Understand the gaps in the Sri Lankan coir substrate industry and develop a strategic plan with the collaboration of CDA and related industry association
2. Organization of international-level trade fairs within the country
3. Introducing a standard logo for international reorganization as a branded product from Sri Lanka was the most prioritized strategy.

An action plan was suggested for each strategy for future implementation as below.

**Table 20: Prioritized strategies and developed action plan**

Prioritized order	Prioritized strategy	Action plan
1	Develop and implement on strategic plan to fill gaps in industry by collaborative work of CDA and related industry associations	<ul style="list-style-type: none"> <li>• Developing action plans to mitigate immediate and long-term challenges of the industry by CDA and related industry associations</li> </ul>
2	Organization of international level trade fairs within country	<ul style="list-style-type: none"> <li>• Organizing international level coir-based substrate trade fair within country with clear time schedule</li> </ul>
3	Introducing standard logo for international recognition as a branded product from Sri Lanka	<ul style="list-style-type: none"> <li>• Introducing a logo for quality coir substrate products from CDA</li> </ul>
4	Promoting manufactures to produce more value-added products which currently export in raw form without value addition	<ul style="list-style-type: none"> <li>• Impose regulations and increase tax/cess for the materials which are export in raw form without value addition</li> <li>• Conducting sessions for extentioning manufactures regarding the importance of value addition for the raw materials they export</li> </ul>
5	Focus on product and market diversification	<ul style="list-style-type: none"> <li>• Organize a competition among researchers, manufacturers and other related parties for new ideas and suggestions to promote new innovations in the coir substrate industry.</li> <li>• Developing innovative prototypes related to coir substrates by CRI</li> </ul>
6	Establishing a processing zone out of the coconut triangle	<ul style="list-style-type: none"> <li>• Establishing a coir substrate processing zone related to coconut mintriangle.le</li> <li>• Development of infrastructure facilities related to coconut mini triangle</li> </ul>

7	Extension about the importance of gaining internationally accepted quality standards/ guidelines with a certificate for Sri Lankan products	<ul style="list-style-type: none"> <li>• Conducting extension programmes for manufacturers regarding different quality certifications and issuing institutes and maintaining proper quality of substrate products by the involvement of CDA and other related industry associations</li> </ul>
8	Establishing a Platform to access world market information	<ul style="list-style-type: none"> <li>• Launch a website with all available data related to exportations from Sri Lanka and over years, demanding countries and world production of coir substrates. Update the website with current data in a frequent manner</li> <li>• Launch a mobile App that is accessible to all stakeholders with the above information and current information</li> <li>• Introduce a monthly e-newsletter and circulate it among the fraternity wide</li> </ul>
9	Establish a center to maintain required laboratory testing for quality maintenance	<ul style="list-style-type: none"> <li>• Establishing a laboratory with all facilities required for proper testing of samples for coir substrate products in coconut triangle</li> </ul>
10	Establishment of promotional stores at all Sri Lankan airports and ports	<ul style="list-style-type: none"> <li>• Establish retail outlets for coconut-based productions in Sri Lankan ports and airports</li> </ul>
11	Develop a domestic awareness campaign to promote awareness of the local community about “Kapruka Programme” and the importance of coconut husk for manufacturing industries	<ul style="list-style-type: none"> <li>• Television and other social media advertisements for convey information to society regarding the importance of coconut husks and their product values for national income.</li> <li>• Properly implement on Kapruka programme and inspect the programme through CDA regional officers</li> </ul>

12	Conducting research to estimate utilizable coconut husks in domestically	<ul style="list-style-type: none"> <li>• Conducting national level market researches related to coir substrate industry to determine resource availability and to determine coconut husk utilizing patterns on industrial and household scale</li> </ul>
13	Introducing low-cost machinery	<ul style="list-style-type: none"> <li>• Reduce tariff for machinery imports and induce a tax refund mechanism for machinery investment to promote new machinery imports</li> <li>• Developing stage for introducing innovative machinery for local producers</li> </ul>
14	Introducing environmentally friendly levels of chemicals used for buffering	<ul style="list-style-type: none"> <li>• With the involvement of the Central Environmental Authority (CEA) and CDA it needs to determine a suitable chemical range for chemical buffering and inform manufacturers regarding the social and economic impacts of buffering and the maximum chemical ranges that could be included in wastewater</li> <li>• Introducing other chemically buffering methods which has minimum impact on the environment other than Calcium Nitrate. (Ex: Calcium sulfate, calcium carbonate, calcium bicarbonate, Calcium Oxalate, etc.)</li> </ul>
15	Maximizing the productivity of existing coconut plantations	<ul style="list-style-type: none"> <li>• Increasing the number of new trees per hectare and introduce different varieties <ul style="list-style-type: none"> <li>• Hybrid varieties</li> <li>• Draught resistance varieties</li> <li>• Less space utilizing varieties</li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>• Conducting researches for identify pest and disease controlling to minimize their impacts on the husk</li> </ul>
16	Introducing low interest loan schemes for solar systems	<ul style="list-style-type: none"> <li>• Develop a procedure to provide a Solar panel subsidy or introduce a low interest loan scheme for manufactures with collaboration of government and privet banks</li> </ul>
17	Sustainable land development and management	<ul style="list-style-type: none"> <li>• Rollout an awareness campaign with an incentive to encourage residential coconut growing with a proper timeline and target number of trees by region</li> <li>• Come up with a detailed plan for releasing unutilized government lands to the private sector on lease with an annual release target with special attention to the industry stakeholders</li> <li>• Introduce a standard milestone plan for private sector growers who receive lands from the government on lease and monitor the progress</li> </ul>

### Limitations of the study

Rating each factor was the challenging step of IFE and EFE matrixes because it inevitably involves subjectivity. Expert judgments and results from comparisons of past successful and failed projects are relied on to improve the creditability of the model.

### CONCLUSION

In conclusion, the survey data underscores the critical factors contributing to the raw material scarcity in the Sri Lankan coir substrate industry, notably the inadequacy of coconut production and an inefficient husk collection mechanism. Leveraging qualitative research, this study



successfully identified key SWOT factors and formulated prioritized strategies through the application of QSPM analysis.

The study revealed that the primary strength lies in the substantial market share enjoyed by Sri Lankan coir substrate products on the global stage, while the industry's labor-intensive nature emerged as a major weakness. The prioritized opportunity identified was the escalating global demand for washed and buffered products. However, a notable threat emanates from the increasing production of low-quality items by some manufacturers, leading to customer rejections as reported by the Coconut Development Authority (CDA). This threat is particularly concerning as it has the potential to tarnish the reputation of all high-quality products originating from Sri Lanka.

The IFE - EFE matrix analysis categorizes the Sri Lankan coir substrate industry into a quadrant necessitating more competitive strategies for sustained success. Among the 17 strategies evaluated through QSPM analysis, the strategic plan's development, in collaboration with the CDA and relevant industry associations, emerged as the top priority. This strategic initiative aims to address critical gaps in the industry, paving the way for improvements and policy implementations.

As the inaugural SWOT study for the Sri Lankan coir substrate industry, the findings presented herein hold significant implications for investors, the Coconut Development Authority, industry associations, and policymakers. The insights garnered from this research not only contribute to informed decision-making within the sector but also serve as a foundation for future policy formulations, industry enhancements, and targeted actions.

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