

# **IDENTIFYING THE SUPPLY CHAIN RISK FACTORS IN CINNAMON EXPORT INDUSTRY**

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## **ABSTRACT**

Sri Lanka is the number one exporter of Cinnamon in the world. The purpose of this research is to identify the Supply Chain Risk factors in Cinnamon Export industry and find the strategies to mitigate those issues. The unstructured interviews were carried out and a questioner was distributed among those who are involved in the industry to gather data to identify the supply chain structure and to identify the major risk factors in the industry.

This research is mainly based on identification of the supply chain risk factors in Cinnamon Export Industry of Sri Lanka. Risk assessment is an important process in any industry. This study used the risk matrix, which is one of the most commonly used risk assessment methods in risk management studies, to assess the risk factors and it is a semi quantitative method. Nineteen potential risks are assessed in this study. These risk factors are categorized under six topics. Finally, the mitigation strategies for major risk factors are discussed in this research.

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## **LIST OF ABBRIVIATIONS**

RMA - Risk Matrix Approach

EDB- Export Development Board

SAPPTA - Spice council and Spices and Allied Product Producers' and Traders' Association

ITI - Industrial Technology Institute

SLSI - Sri Lanka Standard Institution

DEA - Department of Export Agriculture

MSDS – Material Safety Data Sheet

CUSDEC -Customs Goods Declaration

# CHAPTER 1: INTRODUCTION

## 1.1 Introduction

Sri Lanka is well known for its spices from historic eras around the world and still today the industry is one of the major incomes to the national economy. There are historical evidences that the spices were cultivated prior to colonization. Magama, Kotte and Pihiti kingdoms were famous historical areas where spices were grown. Popularity of the Ceylonese spices around the world, initially attracted the moors to the island and subsequently Europeans such as Portuguese, Dutch and English were attracted and invaded the country. From the historical eras, spices are used to produce flavor, fragrance, season, aromatize and pharmaceutical materials. It is observed that cultivation of spices was superseded after the introduction of commercial plantations such as coffee, tea and rubber by the English.

In the international market, most sought-after spices are Cinnamon, Clove, Pepper, cardamom, nutmeg and vanilla. According to the Sri Lanka Export development board 56% of Sri Lankan agricultural exports consists of spices, allied products and essential oil. Out of the total export of spices, 54% consist of Cinnamon and related products. Hence, the most important spice commodity is the Cinnamon and it is widely used in bakery products, pharmaceutical operations and cosmetics. According to Industrial capability report produced by Export Development Board, Galle, Matara, Rathnapura and Badulla are the geographical distribution of the Cinnamon cultivation in the country.

Due to the high demand for Sri Lankan spices all over the world, it was named Island of Spices and Cinnamon had the highest international demand. Cinnamon is used also as a soft drink and bakery, pharmaceutical and cosmetics products all over the world. Cinnamon is exported in primary forms as well as crushed form and powder form too. The value-added cinnamon products are Cinnamon oil, Cinnamon powder and tablets. It is a unique product exported from Sri Lanka and Sri Lanka is the largest producer and exporter of Cinnamon to the world. (EDB, 2018)

When we consider the strengths of this industry, the strengths identified are uniqueness of the product, geographical location, climate and low cost of labor. The weaknesses observed are, the shortages in the supply as the 70% of cultivation is based on home gardens, supply chain issues

like lack of transportation and warehouse facilities, lack of quality requirements and lack of research and development facilities.

Major challenges confronted by the spices industry are production, productivity, quality, value addition, branding and exporting. If these challenges are successfully tackled, production could be doubled (Silva, 2014). 70 % of the industry depends on the smallholders who cultivate less than one hectare and they should be supported to move from subsistence farming to commercial cultivators.

The major players in the Cinnamon industry are producers, collectors and exporters. They have different supply chain issues in the industry. Some of the issues face by the producers are unstable prices, high cost for fertilizer, lack of peelers, high labor cost ect. The issues face by the collectors are high cost of transport, problems in quality assurance and the high competition among the collectors. The supply chain issues related to exporters are quality assurance, lack of technology, lack of promotional activities in global market, time of delivery, climate changes ect. The research is mainly focus on the supply chain issues confront when exporting the Cinnamon.

Presently there is a lot of organizations are engaged in Cinnamon exporting industry in Sri Lanka and there is a great potential to develop further and enhance the industry. Although there are some private and public organizations like The Spice council, Industrial Technology Institute, Natural Cinnamon Research and Training Station, Sri Lanka Standard Institution, Spices and Allied products producers' and Traders' Association, Department of Export Agriculture, Ministry of Primary Industry related to the cinnamon industry it is observed that the industry still requires improving the technology for cultivation, quality assurance and the supply chain performance to receive more opportunities in international market. The Cinnamon industry still use traditional methods for producing and processing it is needed to develop the research and development methods to improve the industry.

There is a competitor for cinnamon in global level name "Cassia" which is originated in Southern China. Cassia is lower in quality when compared to Ceylon Cinnamon. It is cheaper but widely used product than Ceylon Cinnamon. It is not easy to recognize both physically, but Ceylon cinnamon is considered as the true cinnamon and it has several intrinsic characteristics.

Through this research project it is expected to identify the supply chain risk factors in Cinnamon export industry and also to identify the strategies to mitigate those issues leading to expansion of the export industry.

## **1.2 Purpose of the Research**

The purpose of the research is to study,

- 1) What are the major Supply Chain risk factors associated with Cinnamon Export Industry?
- 2) What are the possible strategies to mitigate the Supply Chain risk in Cinnamon Export Industry?

## **1.3 Objectives of this Research**

The three main objectives of the research are;

- 1) Investigation of the Supply chain Structure in Cinnamon export industry and mapping the process
- 2) Identifying the risk factors related to the supply chain in Cinnamon export industry
- 3) Deriving the best strategies to mitigate the risk in Cinnamon Export Industry.

## **1.4 Significance of this research**

Supply Chain Management involves optimizing the operations to maximize both speed and efficiency. (Mack, 2018). It concentrates the flow of goods and services, information sharing, warehousing and all the other functions related to point of origin to point of destination. The tools and techniques of supply chain management helps the modern companies and as well as the traditional organizations to maximize their efficiency. It improves the operational performance in the entire production process to achieve the competitive edge.

When the supply chain in the industry is considered, the risks involved with transportation, freight forwarding, processing, Quality assurance and value addition can be identified. In addition, lack of the knowledge in industry standards and lack of information flow to the producer level also can be identified as the main problems related to this industry. If the industry has a way to consolidate volume of the harvest, and if they can be improved to the exporters level the outcome will be high. In this research it is expected to identify the risk factors in supply chain process in Cinnamon export industry and to identify the strategies to expand the export industry.

### **1.5 Scope of the Study**

The main purpose of this research is to identify the Supply Chain Risk factors in Cinnamon Export Industry. There are different levels of supply chain players in the industry like cultivators, peelers, collectors, oil producers and exporters. The main players of the industry are producers, collectors and exporters. The three main processes can be identified within the industry and they are

- 1) Plantation and harvesting
- 2) Processing and manufacturing
- 3) Marketing and sales

The research is mainly focused to identify the supply chain structure of the Cinnamon exporting industry and the supply chain risk factors in exporting level.

## **1.6 Overview of the Research**

To present the findings of this research, the study report is consisted of five chapters for a better understanding. The first chapter provides an introduction to the overall study and describes the history and current status of the industry and also the research problems and objectives will be discussed. The second chapter includes the Literature Survey and deals with the study about the Cinnamon industry, the definition of risk, the risk analysis method and about the risk management. The third chapter is consisted of the methodology and describes how to collect and analyze the data. Data Analysis is given in the fourth chapter and research findings will be discussed in chapter five and finally the conclusions and recommendations will be provided in chapter six.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Supply chain Management**

In 1982, Keith Oliver, who was a consultant at Booz Allen Hamilton, introduced the term of Supply Chain Management to the world. But the concept of supply chain Management was there since long before in the 20<sup>th</sup> Century. The main characteristic of the supply chain Management includes cost reduction, programmed with the creation of assembly lines. After the publication of book “Introduction to Supply Chain Management” by Robert B. Handfield and Ernest L. Nichols, Jr the term supply chain management was largely adopted.

With the globalization today, it has expanded beyond the country boundaries and has become a part of every core businesses. Companies are gaining the advantages through supply chain Management, increasing competitive advantages, reducing costs and adding values.

Supply Chain management is the management of flow of goods and services including all processes that transform raw material in to the final product. It involves movement and storage of raw materials at the point of origin to point of destination, while optimizing the operations to maximize speed and efficiency, until the product gets to the end customer. Supply chain Management provides a way to develop competitive advantage and an efficient supply chain Management brings lot of benefits such as reduction of the cost and increases in negotiation power.

Supply Chain Management is to integrate all the value players in the chain like suppliers, manufacturers, warehouses and customers, that products are produced and distributed at the right quantities, to the right location and at the right time, in order to minimize costs while satisfying service level of customer requirements.

There is a material flow, information flow and a financial flow with regard to the supply chain and it is the flow between different stages of the supply chain to meet the customer requirement. In Supply Chain Management the stages of production, storage, distribution and the material control are dependent of each other and they are closely interlinked. The prime objective of the supply chain management is to maximize the overall value created and by reducing the supply chain cost, the profits can be increased.



## 2.2 Cinnamon Industry in Sri Lanka

Sri Lanka is known as the spice island for hundreds of years and Sri Lankan spices are used all over the world and Cinnamon was one of the first traded spices in the world. People used cinnamon as a medicine, spice, perfumery product and as a soft drink. Presently cinnamon is used in bakery, pharmaceutical and cosmetic products all over the world and Cinnamon is exported in primary forms as well as crushed form and powder form. The value-added cinnamon products are Cinnamon oil, Cinnamon powder and tablets. It is a unique product exported from Sri Lanka and Sri Lanka is the world largest producer and exporter of Cinnamon in the world. (EDB, 2018)

Sri Lankan Cinnamon is introduced to the international market as a branded product namely "*Pure Ceylon Cinnamon*", which reflects several intrinsic characteristics of *Cinnamomum Zylanicum*. (EDB, 2018) Cinnamon produced in Sri Lanka has acquired a large reputation all over the world due to its unique color, flavor and aroma, showing an immense potential to penetrate niche market segments worldwide. Sri Lanka's exports represent 41.13% of the world's total export of Cinnamon. (EDB, 2018)

The Cinnamon (*Cinnamomum zealanicum*) plant belongs to the family Lauraceae and the tree naturally grows to a height around 10 meters. In the commercial plantations it is maintained as a bush of 2.5 meters and the cinnamon cultivations mainly spread out in the southern districts, Galle and Matara. The present average annual yield is around 470 kg/ha, harvested in two seasons a year, from March to April and September to October. It is easy to do the harvesting after the rainy season and Cinnamon barks are peeled off from the stem employing skilled peelers.

In the next step, drying must be done carefully, with no effect to the aroma of Cinnamon. Then the quills are dried using the sun light and in the rainy season, mechanical dryers need to be used. Harvested Cinnamon is graded according to the thickness of the bark, quality and appearance. Sometimes it is crushed to the powder form and quills are cut in to pieces and need to be packed in moisture- proof polypropylene bags and stored away from heavy sunlight. After storing it should be regularly checked for signs of spoilage or moisture. The store room should be a clean, dry and cool place and it should be free from pests. Other strongly smelling items should not be stored in the same place otherwise it will be affected to the aroma of Cinnamon. Although the cinnamon is generally sold as quills, the other forms of exporting are quislings, featherings, powder and chips.

After drying the cinnamon, the farmers sell their cinnamon to the collectors or they directly sell them to the exporters. At the collecting points Cinnamon products are normally purchased at the best price. Collectors have the authority to determine the price and they check the quality and give it a value according to the quality of the product. There is no government intervention for the price scheme and instability of the price is a main issue in the market. Finally, collectors sell the Cinnamon to the collecting centers of the exporters or directly to the exporters. Moisture content is checked using the moisture meters or visually. Microbial attacks also need to be checked and cleanliness is the main concern for good quality products.

Processors and Exporters supply the stocks of Cinnamon, to the international and domestic market, both. The supply for the domestic market is 10% out of the total production and the rest is supplied to the international market. (Dr Janaka Wijayasiri, 2017)

The major export markets for cinnamon are Mexico, USA, Peru, Colombia, Ecuador, Egypt, Guatemala, Germany, Spain and Singapore and the emerging cinnamon markets are Seychelles and Madagascar. Cinnamon Research Institute at Kamburupitiya, is involved in developing technology as a technical institution.

The forms and respective grades of Cinnamon available in the current Cinnamon market are;

1. Cinnamon Quills
2. Cinnamon Quillings
3. Cinnamon Featherings
4. Cinnamon Chips
5. Cinnamon Powder
6. Cinnamon Leaf oil
7. Cinnamon Bark oil
- a. Cinnamon Quills

There are three quality standards for quills and they are Continental(C), Mexican(M) and Hamburg(H). The quills are available in bale form or any custom size.

➤ Specifications for Cinnamon Quills

**Table 2.1 Specification for Cinnamon Quills**

<b>Grade</b>	<b>Diameter (max.mm)</b>	<b>Minimum number of 42” long quills(per kg)</b>	<b>percentage rough quills(per kg)</b>	<b>Minimum length of quills in a bail</b>	<b>Maximum number of single quality quills per bail</b>
Alba	6	45	None	200	1
Continental(C)					
C00000 Sp.	6	35	10	200	1
C00000	10	31	10		
C0000	13	24	10		
C000	16	22	15		
C00	17	20	20		
C0	19	18	25		
Mexican (M)					
M00000Sp.	16	22	50	200	2
M00000	16	22	60		
M0000	19	18	60		
Hamburg (H)					
H1	23	11	25	150	3
H2	25	9	40		
H3	38	7	60		

Source: Department of Export Agriculture

#### b. Cinnamon Quilling

The broken pieces of Cinnamon quills are considered as quilling and there are different shapes and sizes of them. The quality of the product is same as quills and processing need to be done carefully because when the other substances like wooden stems are mixed the quality of the product will be decreased. When processing the quills, the quailing is separated, and it will be dried separately.

#### c. Cinnamon Featherings

The left overs in the process of making cinnamon quills are collected separately and the feather like pieces are called cinnamon featherings.

#### d. Cinnamon Chips

The cinnamon chips are scrapped off from the cinnamon bark and it is inferior in quality. The hygienic conditions need to be maintained during the processing of Cinnamon chips and two grades prevail in the market, as Grade 1 and Grade 2.

#### e. Cinnamon Powder

The dried cinnamon quilling will be crushed to a form of powder and it is used for several purposes in cooking and medicine.

#### f. Cinnamon Leaf oil

The cinnamon leaf will be used in a distillation process to make cinnamon leaf oil. The leaf oil is used in manufacturing soap, because of its strong aroma and it also is used in Ayurvedic medicine.

#### g. Cinnamon bark oil

The Cinnamon quills and feathering are used in distillation of cinnamon bark oil and it is used in flavoring the tooth paste and ayurvedic medicines.

### 2.3 Commercial specifications for Cinnamon

Cinnamon is normally sold as quills and its light brown in color and should be well dried. Below parameters are for true cinnamon as per the Sri Lanka Standard Specification.

**Table 2.2 : Commercial specification for Cinnamon**

Character	Specification
Color	Pale brown to slightly reddish color Ground cinnamon – yellowish to reddish brown in color
Odor	Characteristic fresh aroma
Flavor	Delicate and sweet flavor characteristic to Ceylon cinnamon. It shall be free from foreign flavor. Including mustiness.
Moisture	Moisture content need to be not more than 15% for quills and 12% for other grades
Volatile Oil	Volatile oil content need to be minimum 1% for quills and 0.7% for other grades on dry basis
Shelf Life	Minimum is only 1 year
Packing	Packing materials must be clean, dry packages, made of of jute cloth, polyethylene bags or paper.

Source: Sri Lanka Standard Specification for Ceylon Cinnamon – SLS 81: 2010)

### 2.4 Cinnamon Extent and production 2003- 2017

There is a notable growth in total volume of Cinnamon exported from Sri Lanka, during the last decades and it is not adequate when compared to the growth of export level of Cassia, which is the competitor to Cinnamon at global context. (Thanthirige, 2011) Again the supply chain partners also are not satisfied with the current situation in the market. There is a threat to decline in the

industry because of the cost of production, lack of technology and quality controlling issues prevail in the industry.

**Table 2.3: Cinnamon Extent and production**

<b>Year</b>	<b>Extent (Ha)</b>	<b>Production (Mt)</b>
2003	27,074	14,153
2004	27,207	14,879
2005	27,424	15,898
2006	27,759	15,792
2007	28,405	16,795
2008	28,971	14,691
2009	29,415	15,765
2010	30,107	16,435
2011	30,523	18,250
2012	31,049	17,165
2013	31,551	17,500
2014	31,867	17,600
2015	32,342	17,707
2016	32,682	18,945
2017	32,985	22,341

Source: (National Export strategy of Sri Lanka, 2016)

When the strengths and weaknesses of the industry are considered, strengths are uniqueness of the product, geographical location, climate and low cost of labor. Weaknesses identified are shortage of supply as 70% of cultivations are based on home garden level, supply chain issues like cost of transportation and warehouse facilities, lack of quality requirements and lack of research and development facilities.

## 2.5 Major Export Destination for Sri Lankan Cinnamon

Sri Lanka is the largest exporter for Cinnamon globally and Mexico, United state countries are the largest importers for Sri Lankan Cinnamon.

**Table 2.4: Major export Destination for Cinnamon**

Importers	Export value (USD thousands)	Annual growth in value 2012-2016 (% per year)
Mexico	69 311	-1
United States	25 002	13
Peru	13 910	5
Colombia	7 506	1
Ecuador	7 286	8
Bolivia	5 768	11
India	4 344	7
Guatemala	4 067	2
Chile	3 384	18
Spain	2 957	-2

Source: (National Export strategy of Sri Lanka, 2016)

## 2.6 Export value and Share for Sri Lankan Cinnamon

Cinnamon is the largest producer and exporter for Ceylon Cinnamon, and it is exported under HS codes HS090611 and HS090620. Cinnamon plays a vital role in export spice species in Sri Lanka and the export share is as below.

**Table 2.5: Export share**

HS chapter	HS 6-digit product	Share in Sri Lanka's exports (%)
HS 0906: Cinnamon (Ceylon)	HS090611: Cinnamon Cinnamomum zeylanicum	57
	HS090620: Crushed or ground cinnamon and cinnamon-tree flowers	3

Source: (National Export strategy of Sri Lanka, 2016)

**Table 2.6: Export Value**

	Export Value USD Million						
	2010	2011	2012	2013	2014	2015	Target in 2020
Cinnamon	86	81	102	131	161	166	300

Source: (National Export strategy of Sri Lanka, 2016)

## 2.7 Supply chain risk for Cinnamon Industry

With the globalization the demand for the spices like Cinnamon is increased a lot. With the increase of tourism industry, the consumers look for new tastes and products. The growing trends of food industry, development of logistics facilities has increased the demand for all spices. The demand for the value-added products in Cinnamon for Cosmetics and medicine is growing fast in India and Europe.

There is a growing trend for Organic products especially in Europe. Consumers preference has increased for the agricultural products which is grown without any chemicals like pesticide and weedicide. If Sri Lankan Cinnamon Industry can cater this market it will be a strong opportunity.



To develop the Cinnamon Industry following are the issues need to be address soon. (National Export strategy of Sri Lanka, 2016)

- 1) Absence of quality packing materials and labelling
- 2) Unavailability of skilled and unskilled labor
- 3) Limited training opportunities
- 4) Implementation of standards in processing
- 5) Limited links between private and public sector
- 6) Poor trade information flow and limited opportunities to promote the brands in international level
- 7) Limited contracts between producers, collectors, producers and exporters
- 8) Traceability for organic products
- 9) Limited infrastructure facilities

The Cinnamon industry can be depicted as a one interconnected chain with separate sections or phases of different areas. The Cinnamon industry can be grouped in to 3 main processes indicated below. (Thanthirige, 2011)

1. Plantation and harvesting
2. Processing and manufacturing
3. Marketing and sales

The Cinnamon Industry consist of many players and some of them are producers, collectors, peelers and exporters. The cultivation is mainly done by the small holders and wholesale collectors collect the harvest from them and sell stocks to the exporters. The processing is done by the exporters according to the customer requirement. We can identify the main three players in the industry as farmers, collectors and exporters.



When we consider the farmers level in the Cinnamon Industry the main supply chain risks involved are lack of labor, high labor cost, unstable prices for the product and unavailability of quality planting materials for the cultivation.

When we consider the Collectors, the main supply chain risks are high transportation cost and competition in the market. And the risk related to the exporters level is much more complex and there are many risks involved in supply chain regarding transportation, warehousing, Quality assurance, Value addition and Freight Forwarding.

## **2.8 Supportive institutions to improve the Cinnamon Industry**

There are number of public and private institutions to support the Cinnamon industry in Sri Lanka. In public sector there are semi government organizations like Industrial Technology Institute (ITI), National Cinnamon Research and Training Station, Department of Export Agriculture (DEA), Ministry of primary Industry (MPI), Sri Lanka Standards Institution (SLSI).

In Private sector there are Spice council and Spices and Allied Product Producers' and Traders' Association (SAPPTA). All organizations established and work for the betterment of the Spice industry in Sri Lanka.

### **1) The Spice Council**

The Spice Council was established in 2003 work under the mission “Sri Lanka to be within the top five brander and value-added spices and Allied product marketers in the world”. It consists of producers, collectors, processors, exporters and other stake holders in the spice industry. They work with them to ensure that Sri Lankan spices compete effectively and efficiently in both international and domestic markets. They offer training and developments programs and promote scientific research related to the spices. They also work with Sri Lanka Standard Institution to develop the standards in the industry.

### **2) Industrial Technology Institute (ITI)**

Industrial Technology Institute (ITI) is the most important institute for the scientific research and development in Sri Lanka which comes under Ministry of Science,

Technology and Research. They support the industry to improve quality, undertaking tests, provide consultancy service and introduce innovative process and systems.

3) National Cinnamon Research and Training Stations (NCR & TS)

This Organization comes under Ministry of Minor Export Crops promotion and Department of Export Agriculture which is in Matara. It Support to strengthen the Cinnamon Industry and all the stake holders in the industry. It provides training and development programs, transfer technology related innovative for the betterment of the Cinnamon Industry.

4) Sri Lanka Standard Institution (SLSI)

It is the most important organization in Sri Lanka to promote the quality and standardization which comes under Ministry of Science, Technology and Research. SLSI is a member of International Organization for standardization. The service includes formation, revision and amendment of national standards, product specification, system certifications, testing services, quality assurance, investigating import products, training and development programs on quality standards and provide information for relevant industries.

5) Spices and Allied products producers' and Traders' Association (SAPPTA)

SAPPTA was established in 1984 and plays a vital role in spice industry. It covers all spice products including cinnamon and consists of producers, exporters and other stakeholders in relevant industries. The organization collaboratively working with other public and private organizations to promote the Sri Lankan spices globally. They identify the problems in product quality, exporting issues and publish prices of all spices in weekly basis. It also lobbies the government on behalf of the industry. When government imposed CESS tax for all spices in 2014, SAPPTA stress the government to remove the CESS tax and it was removed by the government in 2015.

## 6) Department of Export Agriculture (DEA)

Department of Export Agriculture was established under Ministry of Minor Export Crops promotion and their main objective is to improve the quality and quantity of the export agricultural products. They investigate and give solutions to the producers and increase the production of export. They carry out training and development programs for the stake holders and do the researches for the industry.

## 7) Ministry of Primary Industry (MPI)

MPI is a government institution established in 2015 the vision of the organization is to “enabling environment for right share of Ceylon Exports in the global competitive market” (MPI, 2019) They work for the sustainability to increase the productivity and focus on protecting the environment. They also find innovative technologies to diversify the products and support exporters to get the export opportunities.

## **2.9 Definition of risk**

Risk can be defined as the future uncertainty about deviation from uncertainty of expected income. It includes strategic failures, financial failures, operation failures, market disruptions, environmental disasters and regularity violations. Presently there are various risks originated under various situations resulting in a diversity of risks. Risk can also be identified as the intentional interaction with the uncertainty.

According to Ray (2017), although the risk sounds negative, it is not. It is preventative, as the issues will inevitably come up and one need a mitigation strategy to mitigate the risk.

As indicated in the International organization for Standardization publication ISO 31000 ,ISO Guide 73:2002, definition of risk is the 'effect of uncertainty on objectives'

Uncertainty, harmfulness are two other key descriptions of risk and the standard definition of risk provided by ISO 2002 is the combination of the probability of an event and its consequence.

There are three basic components of a risk:

1. Risk factor refers to the conditions leading to a potential loss.
2. Loss means all kinds of unexpected loss, including casualty and financial cost caused by risk.
3. Incident may be the key component as the direct reason which changes potential loss to actual loss.

According to the (Lopez, 2017) supply chain risk is everywhere, and it may cause million dollar disruption. The five basics of supply chain risks are indicated below. (Precoro, 2017)

1. Financial risks
2. Legal risks
3. Environmental risk
4. Sociopolitical risk
5. Human Behavior risk

## **2.10 Definition of risk management**

Management of a risk is a complex process. Outcome of the business activities is much uncertain and risk management is important to mitigate the risks.

Risk management is the process of identification, analysis and acceptance or mitigation of the uncertainty. It is needed to quantify the potential for losses and need to take appropriate actions according to its objectives. Inadequate risk management can result in severe damages to the individuals and organizations.

According to the ISO 31000 the risk management refers to coordinated set of activities and methods that is used to direct an organization and to control the potential risks that can affect its ability to achieve objectives.

According to (Ray, 2017) there are six steps of risk management, as defined below;

1. **Identify the risk** – There are many ways to identify the risks and it is needed to collect the data in a risk register
2. **Analyze the risk** – through quantitative and qualitative risk analysis, the risk factor can be determined, and variety of metrics can be identified

3. **Prioritize the risk** – the list of risks can be categorized as high risks, medium and low. High risks need to be focused in earlier stage and other risks are not.
4. **Assign an owner to the risk** – after identifying and evaluating the risk, the risk is assigned to someone for handling, who is adequately skilled and experienced
5. **Respond to the risk** – It is needed to develop a strategy to prevent or need to implement contingency plan to respond to the risk
6. **Monitor the risk** – it is needed to track and evaluate the progress towards resolution.

### **2.11 Supply Chain risk management in Cinnamon Export Industry**

There are various risks that can affect to the industry with regard to the supply chain. Some of them are related to transportation, legal, warehousing, forwarding, technological, value addition services, quality assurance and freight forwarding. The 70% of the industry is based on small holders and if the industry can collaborate more in export, the efficiency and the market level can be increased. There are various costs involving in transporting, freight forwarding and consolidating the product through information technology-based structure, will help to manage such costs.

Lack of knowledge over the quality standards and value addition activities also are risks associated with the industry and if there is a proper way of information flow downward, it will also mitigate the risk and it will cause a better improvement to the industry.

## **CHAPTER 3: RESEARCH METHODOLOGY**

### **3.1 Introduction**

The main objective of this research is to identify the supply chain risk factors in Cinnamon Export industry and find the strategies to mitigate those issues.

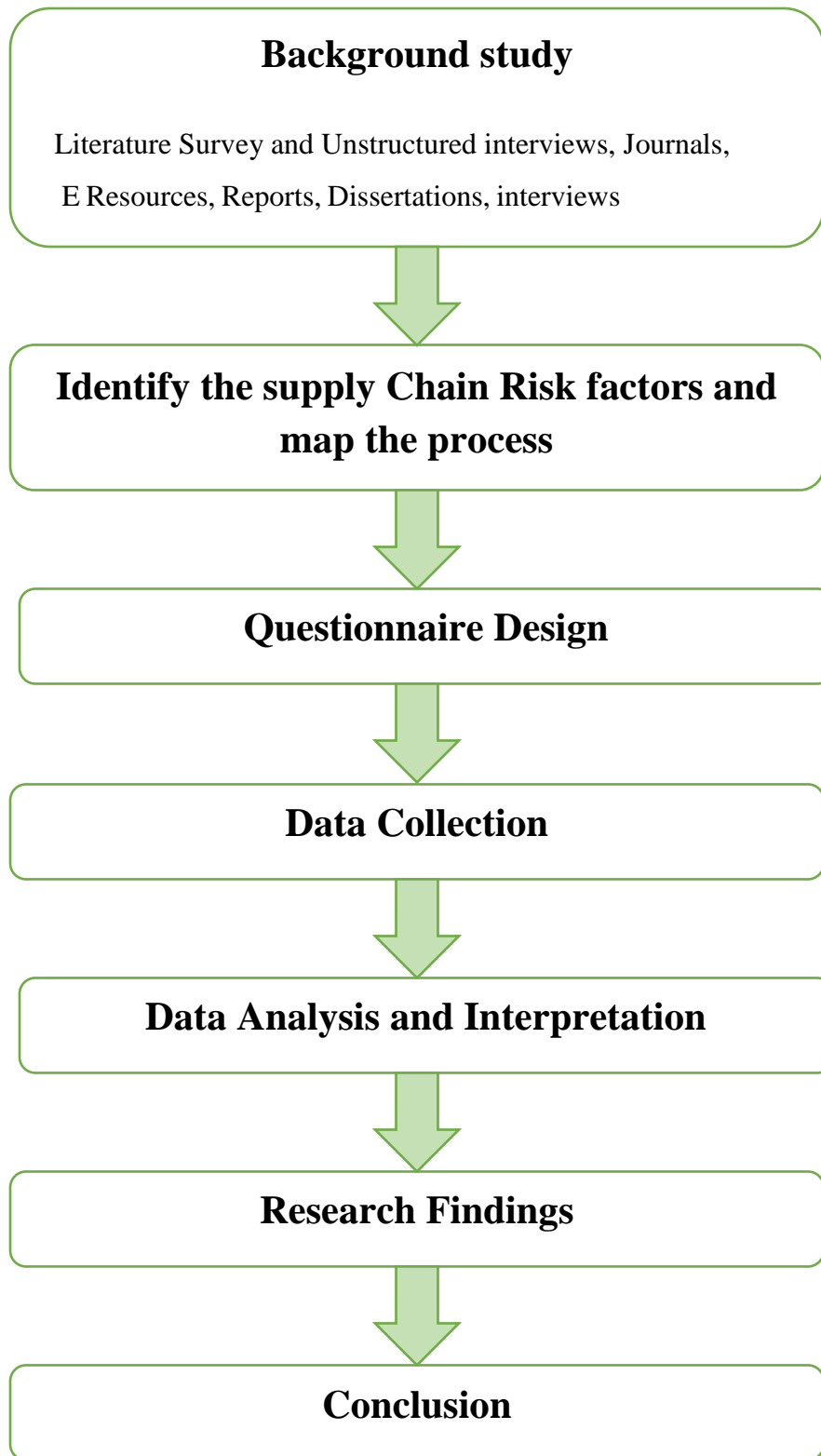
Research approaches can be categorized to two parties named Quantitative and Qualitative. Quantitative research, is defined as a the systematic investigation by gathering quantifiable data and performing statistical, mathematical or computational techniques and in this approach information is gathered from existing or potential customers by using sampling methods and sending out online surveys, online polls, questionnaires etc. (Bhat, 2019). The Qualitative approaches are interviews with one to one or with focused groups, ethnographic, case study research or process of observation.

The research will be conducted in two stages. In the first stage an extensive study of literature and unstructured interviews with industry related persons will be carried out to find the supply chain risk factors in Cinnamon Export Industry. Based on the findings, in stage one a questionnaire will be developed, and risk matrix will be used to analyze the data. Finally, the risk mitigation methods will be identified referring the general practices in the industry and published research literature.

### **3.2 Research Design**

The research will be conducted in two stages. In the first stage an extensive study of literature and unstructured interviews with industry related persons will be carried out to investigate the structure of Supply Chain and to find the supply chain risk factors in Cinnamon Export Industry.

Based on the finding in stage one a questionnaire will be developed, and risk matrix will be used to analyze the data. Finally, the risk mitigation methods will be identified referring the general practices in the industry and published research literature



*Figure 3.1: Process of the Research*



### 3.2.2 Supply Chain risk factors in Cinnamon Export industry

After doing the Literature survey by referring the Journals, E resources, reports, dissertations and unstructured interviews the risk factors are identified under six categories.

They are;

1. Logistical and infrastructural risk
2. Market related risk
3. Management and Operational risk
4. Public Policy and Institutional risk
5. Political risk
6. Biological and Environmental risk

The above risk factors will be categorized further into sub categories as below.

<b>Logistical and Infrastructural risk</b>	-Risk of Inventory
	-Risk of transport
	-Risk of Freight Forwarding
	-Communication Risk
<b>Market related Risk</b>	-Changes related to the market & demand
	-Impact of domestic & international prices
	-Timing of product delivery
<b>Management and Operational Risk</b>	-Management Decision making
	-Quality Control
	-Changes in Labor Force
	-Lack of technology
<b>Public Policy and institutional risk</b>	-Financial and Tax policies
	-Regulatory and legal policies
	-Trade & market Policies
	-Weak institutional capacity
<b>Political Risk</b>	-Political instability within the country
	-Interruption of trade due to Dispute
<b>Risk related to Nature</b>	-Natural Disasters
	-Biological & Environmental risk

Figure 3.2: Risk profile for Cinnamon Exporters

### **3.2.3 Questionnaire Design**

There will be four open questions to identify the supply chain structure of the company and around twenty-two Likert scale Questions to identify the risk factors in the industry.

In the questioner five-point Likert scale will be used and probabilities will be allocated in the scale to demonstrate the weight for each question leading to find out the likelihood of the event. To identify the severity which means the impact of the event, Likert scale again will be used.

Responses in the questionnaire are ranged from very high to very low and options would be;

1. Very High
2. High
3. Moderate
4. Low
5. Very Low

### **3.2.4 Sample Design**

The Sri Lanka Export Development Board known as the SLEDB is the state organization for the development and promotion of exports. There are around 250 registered companies in Sri Lanka involved in export of Cinnamon. The Objective of this research is to identify the supply chain risk factors in Cinnamon Export Industry and therefore management level employees from these registered companies will be selected to gather the information for my research.

### **3.2.5 Data Collection**

First to gather the relevant information regarding the supply chain risk unstructured interviews will be conducted with the people involved in the industry and preliminary Literature survey will be done to identify the supply chain risk factors and to develop the risk profile.

The main role players in the industry is producers, collectors and exporters. Unstructured interviews with 15 producers, 10 collectors and 5 exporters will be conducted to identify the supply chain structure of Cinnamon industry.

Then after identifying the risk factors they will be categorized under six categories. Then the questionnaire will be sent to the people employed in the export companies to identify the major risk factors in the industry. Finally, the data gathered will be analyzed using a risk matrix approach. The questionnaire will be distributed among the managerial level employees of the selected companies.

Questioner will be consisted of 2 sections as below.

**Section 1** – To identify the general information about the organization

**Section 2** – To identify the major supply chain risk factors in the industry.

In Section 1, general information about the company like Name of the company, average annual income, export market region will be collected.

In section two the probabilities and severity of the identified risk factors will be collected to analyze the risk factors in the industry.

### **3.3 Data Analysis**

#### **3.3.1 Risk Matrix**

Risk Matrix is one of the best methods to analyze the data in risk management. Probability and severity of an event are considered as the two variables which are used to build the matrix. The steps of building the risk matrix is as below.

**Step 1** : Scaling the probability and severity of an event – Five point Likert scale is used to scale the probability and severity.

- 1) Very High
- 2) High
- 3) Moderate
- 4) Low

5) Very Low

**Step 2** : Identify the output of Risk index

The scale index table is used to analyze the index of the probability and impact of the event. Probability is denoted by “P” and severity is denoted by “S”.

**Table 3.1: Scale Index table**

Probability (P)			Severity (S)		
Likert Scale	Index	Numerical Index	Likert Scale	Index	Numerical Index
Very Low	P1	1	Very Low	S1	1
Low	P2	2	Low	S2	2
Moderate	P3	3	Moderate	S3	3
High	P4	4	High	S4	4
Very High	P5	5	Very High	S5	5

Risk is identified as the multifaction of Probability and Severity.

Risk (R) = Probability (P) \* Severity (S)

Step 3 : The probability of occurrence and severity is divided into five levels as 1-5 and risk matrix

**Table 3.2: Standard Risk Metrix**

<b>Severity</b>	S5=Very High	5	10	15	20	25
	S4 = High	4	8	12	16	20
	S3= Moderate	3	6	9	12	15
	S2 = Low	2	4	6	8	10
	S1=Very Low	1	2	3	4	5
		P1 = very Low	P2 = Low	P3 = moderate	P4 = High	P5= Very High
		<b>Probability</b>				

Source: (Ristic, 2013)

**Table 3.3 Risk Metrix Index**

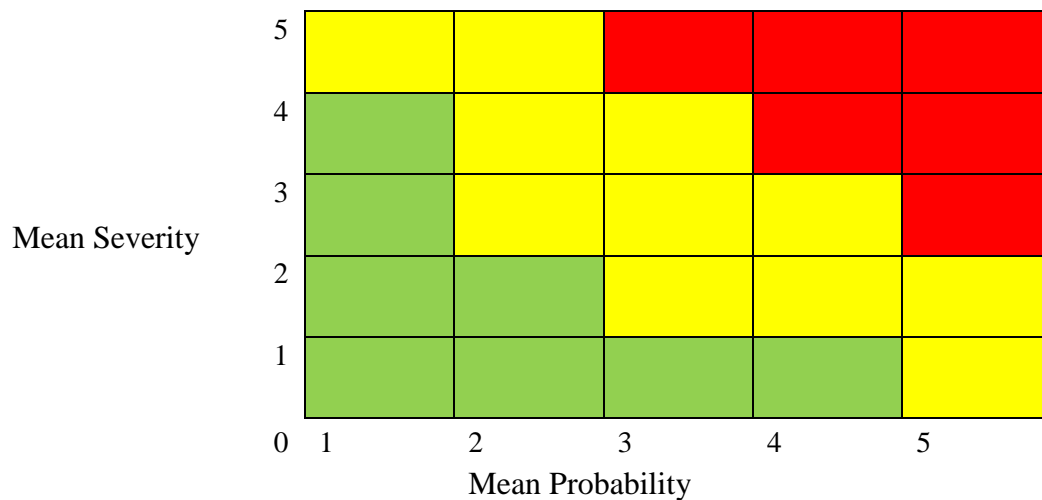
Color	Index	Category
	N	Negligible
	M	Moderate
	C	Critical

Source: (Ristic, 2013)

### 3.3.2 Data Analysis from Grid of Risk Metrix

First the information gathered from the unstructured interviews and Literature survey will be analyzed and the factors will be identified. The risk profile will be developed accordingly and then the questionnaire will be developed to identify the major supply chain risk related to the industry. The collective risk factor analysis will be developed by assessing the risk matrix for each factor. The mean response risk can be calculated to develop the Grid of risk matrix.

**Table 3.4: Grid of Risk Metrix**



Source: (Ristic, 2013)

To map the Supply Chain structure of Cinnamon Export industry, the information gathered from unstructured interviews, published articles and researches will be used. Finally risk mitigation strategies will be discussed to avoid the major risks in Cinnamon Export Industry.

## **CHAPTER 4: RESEARCH FINDINGS**

### **4.1 Supply Chain Structure of Cinnamon Industry in Sri Lanka**

The cinnamon industry is mainly dominated by producers, collectors and exporters. Producers sell their harvest to the collectors or there are collecting centers in near most of the cultivation areas. Small- or large-scale producers may also directly sell their harvest to the processors or exporters. Exporters sell their product to the domestic or international market. There are processors or exporters who own their own land of cinnamon cultivation. They grow cinnamon in their own lands and process the product to export or for the domestic market.

Producers purchase the Cinnamon saplings from private nurseries and from Export Agriculture Department offices. They use both organic and chemical fertilizers in their cultivation to increase the productivity, but they don't use much pesticide and weedicides. There is a high cost involvement for these fertilizers and the producers also need to spend high cost for labor. The producers can get the relevant information regarding the cultivation from Department of Export Agriculture.

After two and half or three years of planting the cinnamon saplings harvest can be collected twice a year. When the bark of the stem turns brown color and when the diameter is 3-5 cm producers can start harvesting and peeling should be done in next step. Peeling should be done by skilled labors and it's a very tiresome work. Then the peeled bark is dried under the sun. Then it is rolled, and quills are made from them. Then it is stored until selling.

Some of the major issues confront by the producers are high cost of fertilizer, high labor cost, unskilled labors, limitation of suitable land for cultivation, lack of technology for peeling.

The small and medium producer trend to sell their harvest to the Cinnamon collectors in village level. Some producers also sell Cinnamon leaves to produce Cinnamon leaf oil. The prices are

always unstable and normally they sell their harvest for the highest offer. The collectors check the diameter of the cinnamon bale and some of them use moisture meters to check the samples. Collectors then decide the price according to the quality of the Cinnamon and they directly send the product to the collecting centers or to the exporters.

Exporters check the quality parameters before buying the products. They grade the Cinnamon according to the quality. The Cinnamon should be transported with good hygienic conditions and it should be free from microbiological attacks. The supply chain issues faced by the collectors are poor hygienic conditions in transport, lack of knowledge for quality standards and high transportation cost.

Exporters mainly get the product from collectors and sometimes they directly buy from the producers. The Communication barrier is there, and the exporters sometimes can't find the supply for their demand.

Exporters supply Cinnamon to both international and domestic markets. 90% of the total production is exported and major countries to export is Mexico, USA and Peru. Normally Mexico buyers do not require much quality standards but most of the European countries concern a lot about the quality standards in products and processes. There is a market for organic products in Europe and if the exporters can cater their requirement it will be a huge improvement in the industry.

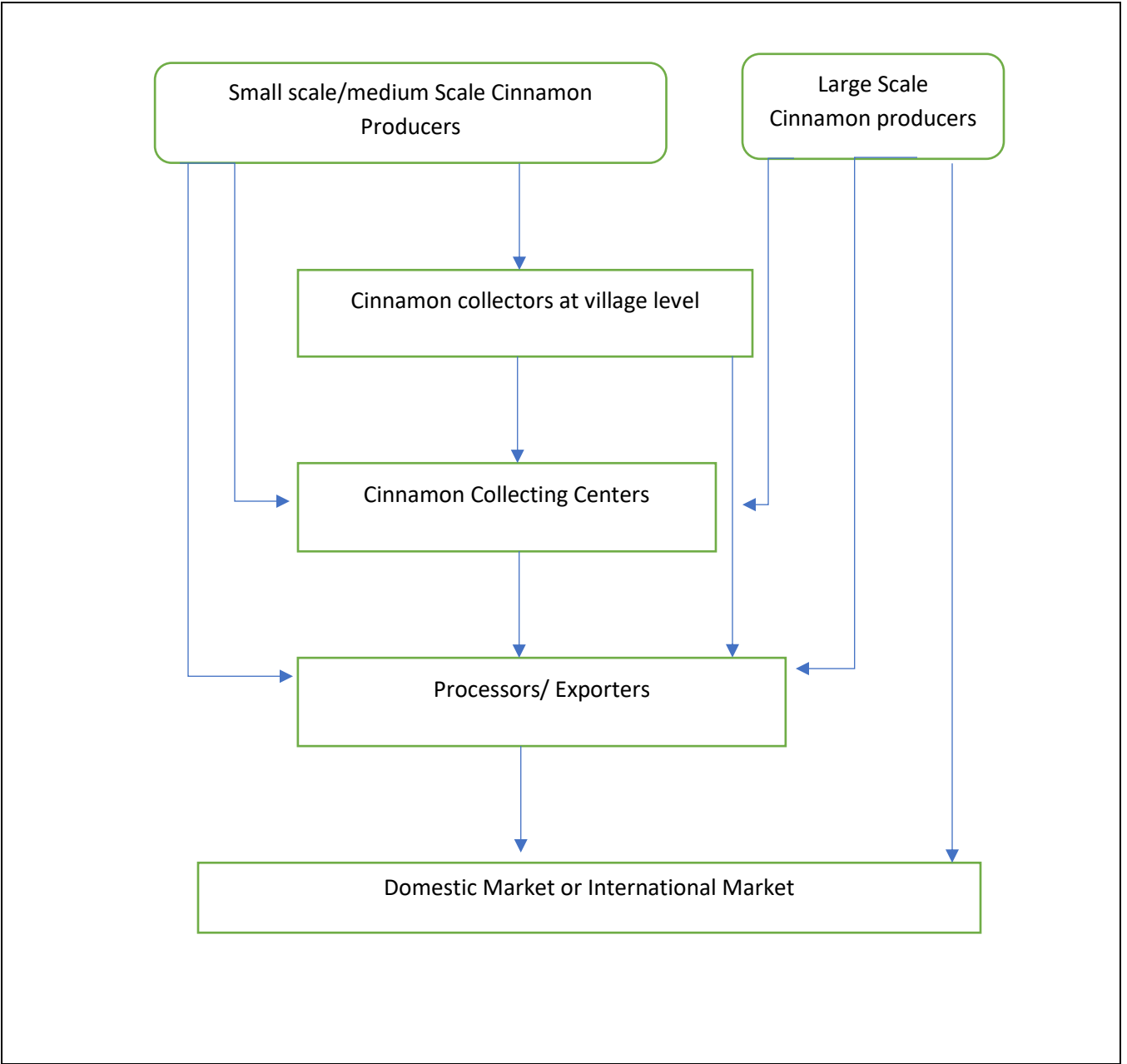


Figure 4.1: Map of the Cinnamon Supply Chain Structure



#### 4.2 Data Analysis using Standard Risk Metrix

The research findings for the risk factors for the exporting level in Cinnamon Industry are analyzed using the standard risk Metrix and risk Metrix index.

**Table 4.1 : Standard Risk Metrix**

<b>Severity</b>	S5= Very High	5	10	15	20	25
	S4 = High	4	8	12	16	20
	S3 = Moderate	3	6	9	12	15
	S2 = Low	2	4	6	8	10
	S1= Very Low	1	2	3	4	5
		P1 = very Low	P2 = Low	P3 moderate =	P4 = High	P5 = Very High
		<b>Probability</b>				

Source: (Ristic, 2013)

**Table 4.2 : Risk Metrix Index**

Color	Index	Category
	N	Negligible
	M	Moderate
	C	Critical

Source: (Ristic, 2013)

## 4.2.1 Logistics and Infrastructural Risk

### 1) Risk of Inventory

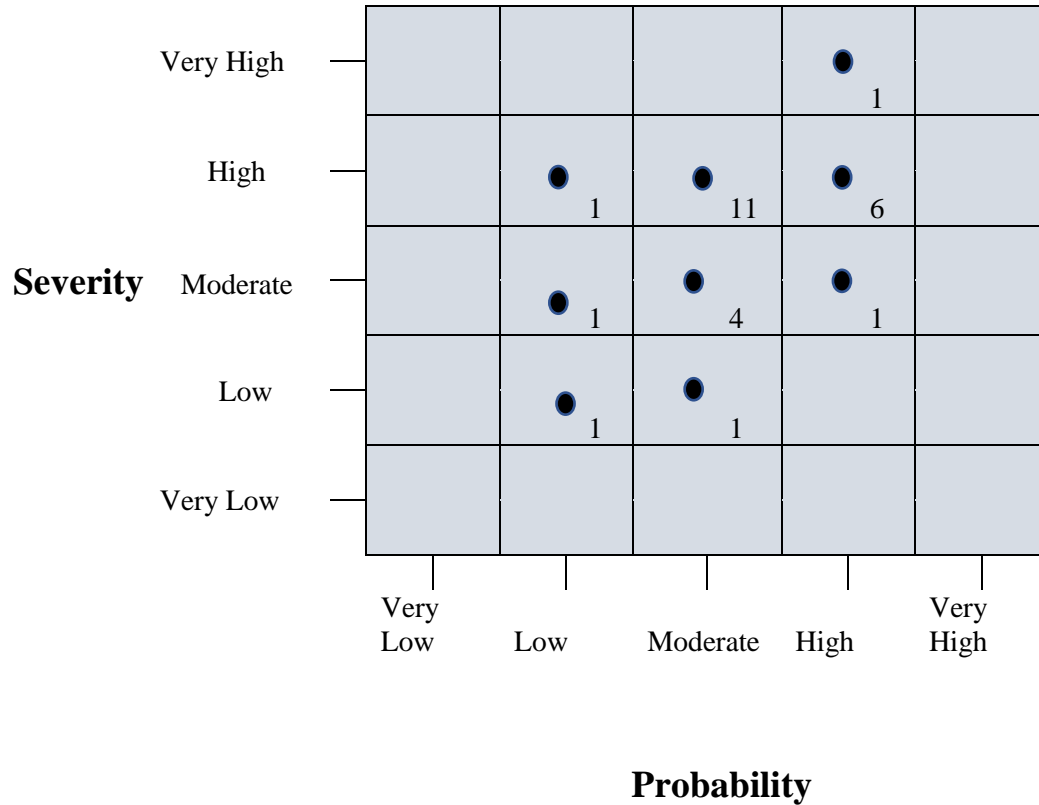


Figure 4.2 : Inventory risk Matrix

According to the Inventory risk Matrix seven responses are experiencing the risk of inventory as critical and nineteen responses are experiencing the inventory risk as medium and only one response is experiencing the inventory risk as negligible.

Space and utility are the main problem in the inventory. The product can be stored for a long time, but the aroma will be affected to the quality, if the product is not stored properly. There is no major risk from the pest and diseases. The maintenance of stores also is a problem. Dust can affect the quality of the product and if it is not maintained correctly, it will be affected. The aroma will be

reduced if it stored for a period longer than 8 months. The moisture conditions need to be controlled properly and if the moisture content is high the quality will be reduced. There must be proper ventilation system within the warehouse to avoid the growth of fungus. The Cinnamon bales are stored in poly sack bags and most of them have no proper racking systems in their inventories. If there is no proper maintenance, it would cause severe problems in the rainy season.

Some of the exporters have collecting centers and they collect the Cinnamon from the farmers and collectors and tend to store the product till the customer order is received, while some of the exporters start to collect the product after they on the receipt of the orders from the customers. They don't worry much about the inventory but because of the seasonality issue most of the exporters need to have inventory in their location.

They don't use any ERP systems or computer software to update the data on the inventories. All are based on manual systems and they don't use any inventory valuation method like First in First Out (FIFO). If they have a proper computer-based system, it will be easy to store data and issue the stocks. They don't have any batch or serial system to identify the cinnamon stocks by the date wise or farmer wise. They don't have any tracking system when there is a problem and most of them have no proper system to collect data and store data.

## 2) Risk of Transport

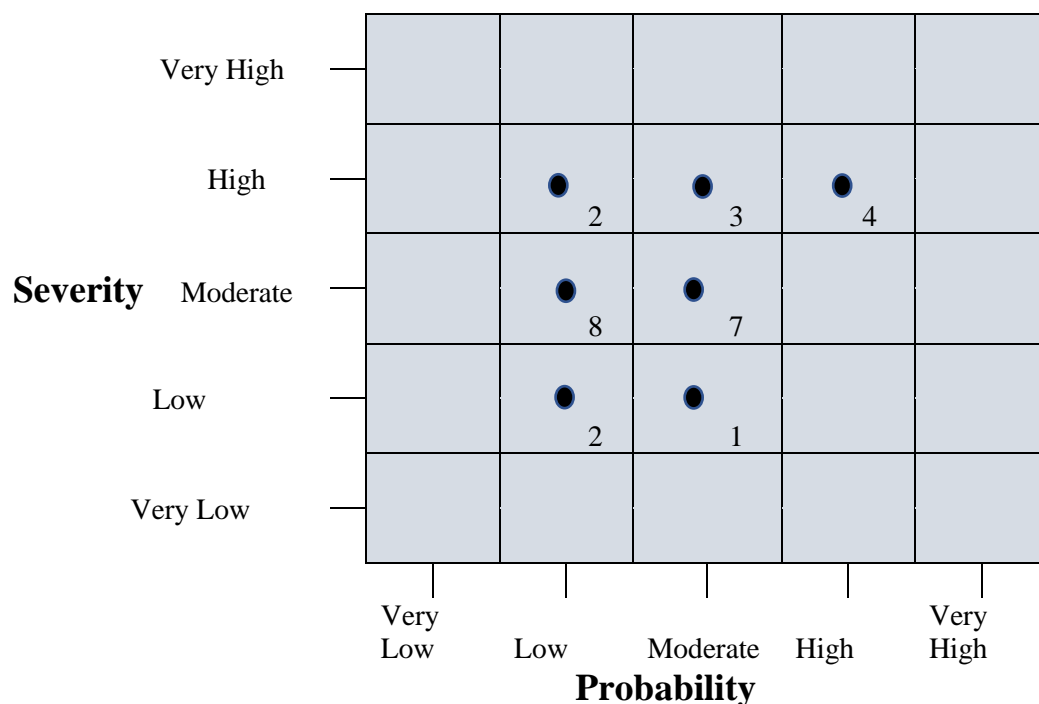


Figure 4.3: Transport risk Matrix

According to the transport risk Matrix, four responses are experiencing the risk of transport as critical and twenty-one responses are experiencing the transport risk as medium and only two responses are experiencing the risk as negligible.

As most of the cinnamon cultivation areas are spreaded out in Galle, Matara and Rathnapura districts, most of the collecting centers and exporters are based in these areas. Because of that the transport cost is high and additionally they have to bear the highway cost when they are transporting Cinnamon from South to Western province. The containers need to be hygienic and it must be properly controlled for moisture conditions. Consolidations of the transport according to the customer requirement is done to minimize the cost. Loading and unloading charges also involved in transporting.

### 3) Risk of Freight Forwarding

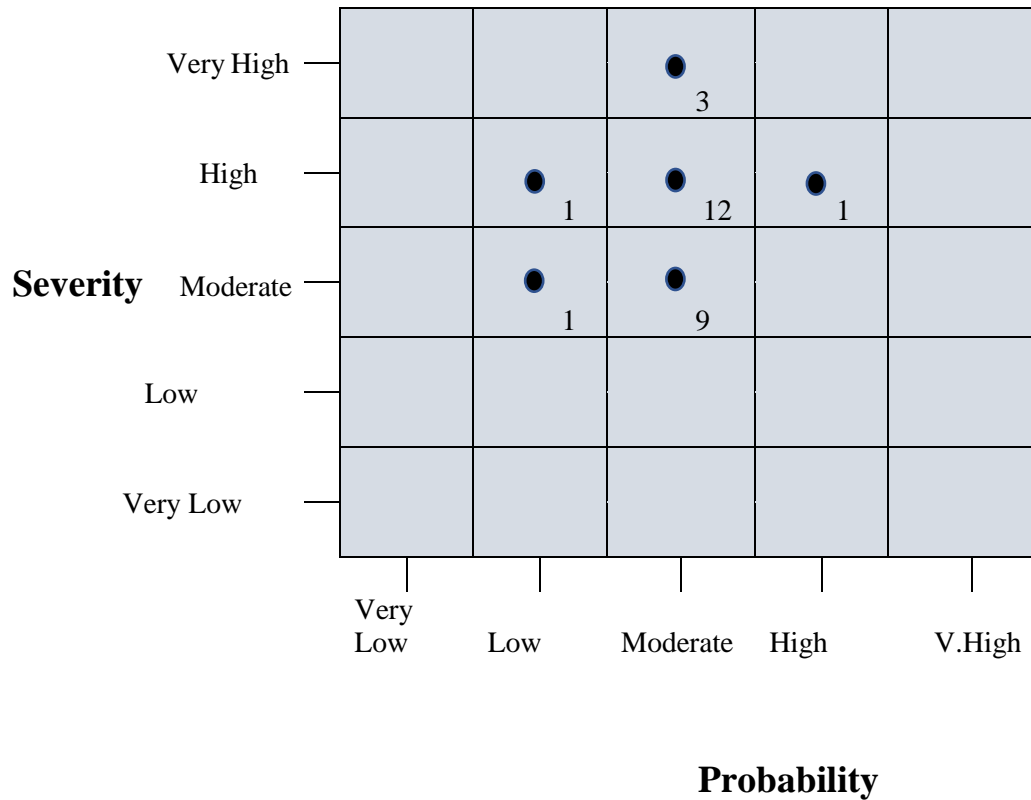
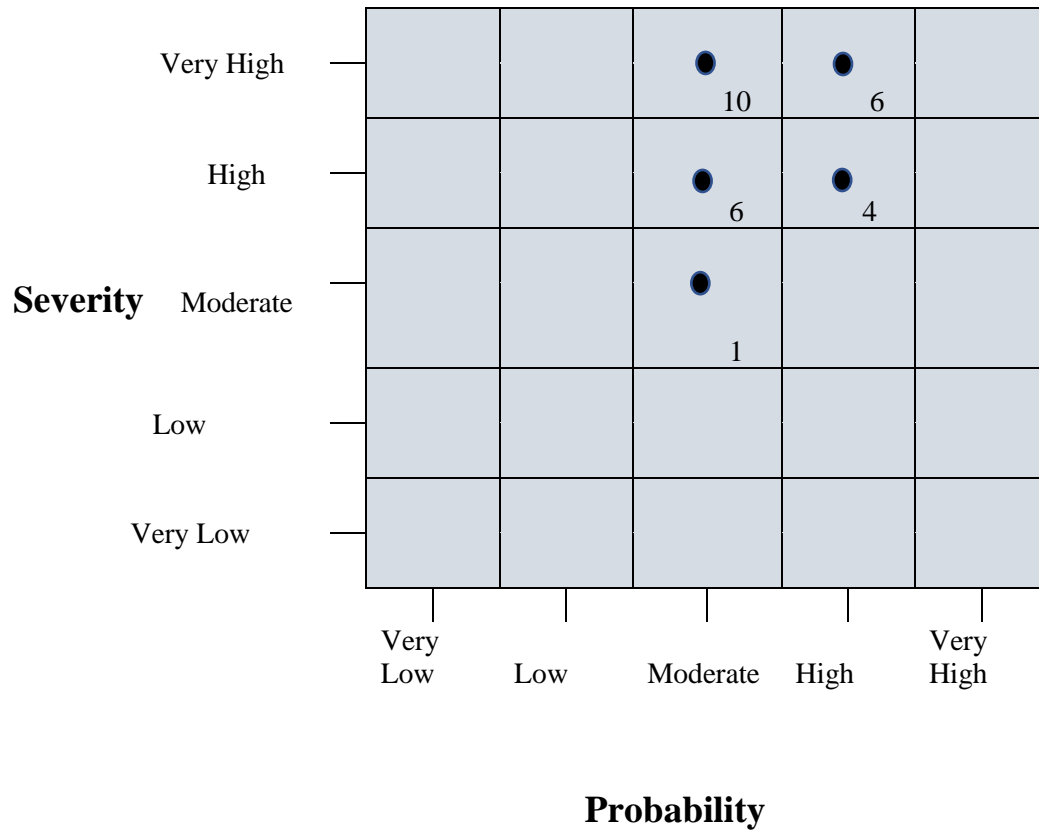


Figure 4.4: Freight Forwarding risk Matrix

According to the Freight Forwarding risk Matrix four responses are experiencing the risk of freight forwarding as critical and twenty-three responses are experiencing the freight forwarding risk as medium and none of the respondents are experiencing the risk is negligible.

Freight Forwarding is much critical for the cinnamon industry as when the shipment has a long transit it will get delayed and they can't make the shipment on time. Normally the Cinnamon bales and oil is going via sea shipments. Most of the shipments are exported to Mexico, USA and Peru and it gets nearly 45 days for one sea shipment. If it is delayed the quality of the product is reduced and sometimes the total shipments get rejected due to this reason. Some of the customers make penalties if they are delayed and it will affect the quality of the product. When the shipments are rejected the exporters need to get the quantity returned and they have to use it to make other value-added products. Exporters are using same forwarding companies to avoid these types of issues and they are getting updates and communicate with the customers about the estimated delivery dates regarding the shipments.

#### 4) Communication Risk



*Figure 4.5: Communication Risk Matrix*

According to communication risk Matrix twenty responses are experiencing the communication as critical and seven responses are experiencing the communication risk as medium and none of the respondents are experiencing the risk as negligible.

Communication is a very important factor when achieving the overall objectives in every organization. To streamline the process and to meet the customer expectations to satisfy them, communication need to flow smoothly. Exchanging information with the customers and understanding the expectations of the customers need to be done carefully.

There is a risk in communication as miscommunication can be occurred due to the language and cultural barriers and the email hackers can also affect the communication systems and they can get the details easily. To avoid the language barriers some exporters even have language translators as

some of the customers have very low skills to communicate in English. Most of the exporters don't use any computer software to keep the records and they are generally based on the manual systems. As the on-time delivery is critical in the industry, any delays of the shipments due to miscommunication should be avoided. So, communication is a very critical factor and the exporters need to monitor their communication system carefully to avoid such issues. Due to such issues caused by miscommunication, they might even lose their customers.

#### 4.2.2 Market Related Risk

##### 1) Changes related to the Market and Demand

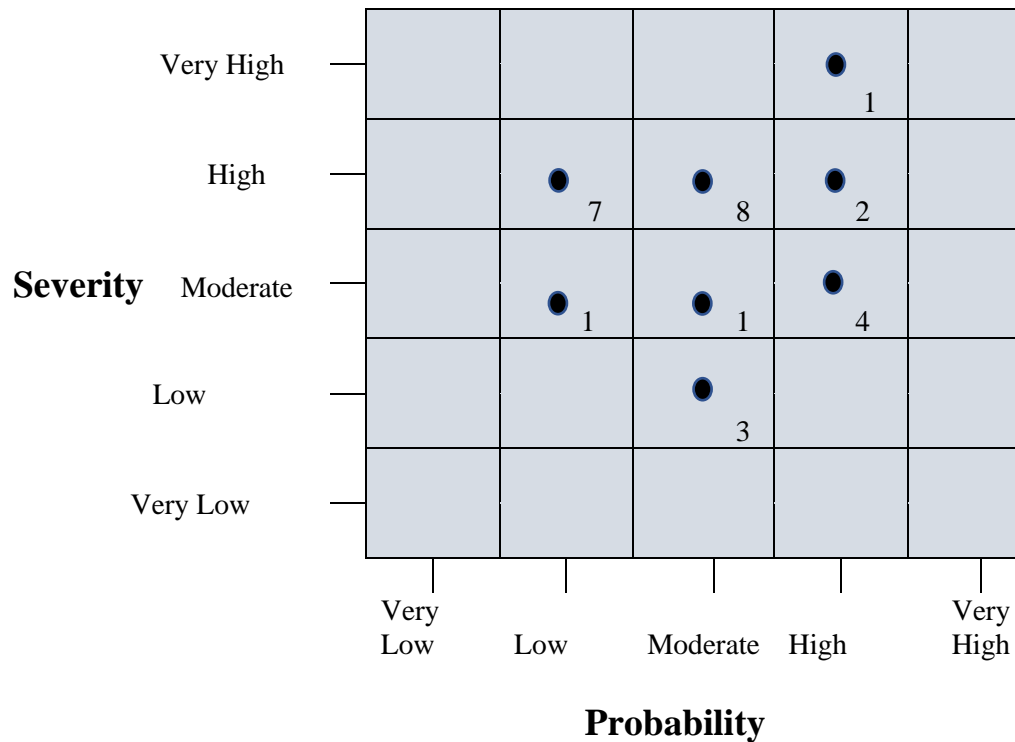


Figure 4.6: Changes Related to the market and demand risk Matrix

According to changes related to the market and demand risk Matrix, three responses are experiencing the risk of changes related to market and demand as critical and twenty four responses are experiencing the changes related to market and demand risk as medium and non-respondents are experiencing the risk as negligible.

It is observed that the unpredictable nature of the weather causes major issues for demand. It is favorable when normal weather conditions prevail, but sudden changes in natural weather pattern will affect the market and demand. There is an international competitor called “cassia” from china for the Cinnamon product and it affects its international trade too. “Cassia” is low in quality when compared to Cinnamon, but it is difficult to distinguish them from each other as both have similar appearance physically.

Seasonality is another problem for Cinnamon and the supply is not consistent over the year. So exporters need to have additional stocks to cater the customer requirement when the supply is low. Lack of technology and labor is another big problem in the industry. The “peelers” plays a big role in the industry and there is lack of skilled labors in the industry. Most of the young generation dislikes this kind of time consuming, tiresome work and the peelers also have a low recognition in the industry.

The collectors have no proper mechanism to collect the cinnamon. The 70% of the cultivators are small holders who cultivate less than two hectares. They depend on the regular supply and the new farmers don't trend to cultivate Cinnamon. This also is a reason for the low supply and government also doesn't seem to have any effective mechanism to develop the industry.

There seems to be low marketing related activities when consider the global level and exporters have less opportunities to market their product in international level. They have to spend on their own to participate the international trade fairs and if they have more support from the government, the market could be easily developed.



2) Impact of domestic and International prices

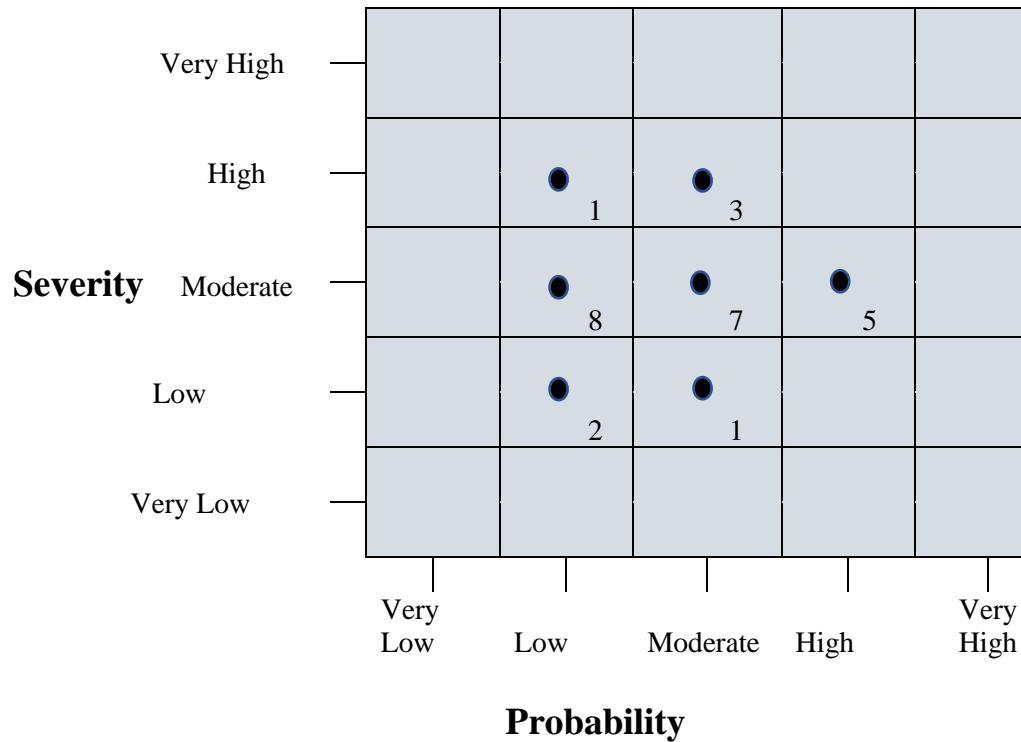


Figure 4.7 : Impact of domestic and International prices risk Matrix

According to the impact of domestic and international prices risk Matrix, none of the respondents are experiencing impact of domestic and international prices as a critical risk and twenty-five responses are experiencing the risk of domestic and international prices as medium and two responses are experiencing the risk as negligible

The domestic price is varying because of the seasonality and weather conditions, but international prices normally does not change drastically. As a solution they are used to maintain stocks of Cinnamon in warehouses. The exchange rate fluctuations also has an impact when considered the international prices and when the rate is high, they can have low profits. But rupee fluctuation affects the other costs like fuel and the impact of the domestic and international prices have medium impact on the total income.

### 3) Timing of Product Delivery

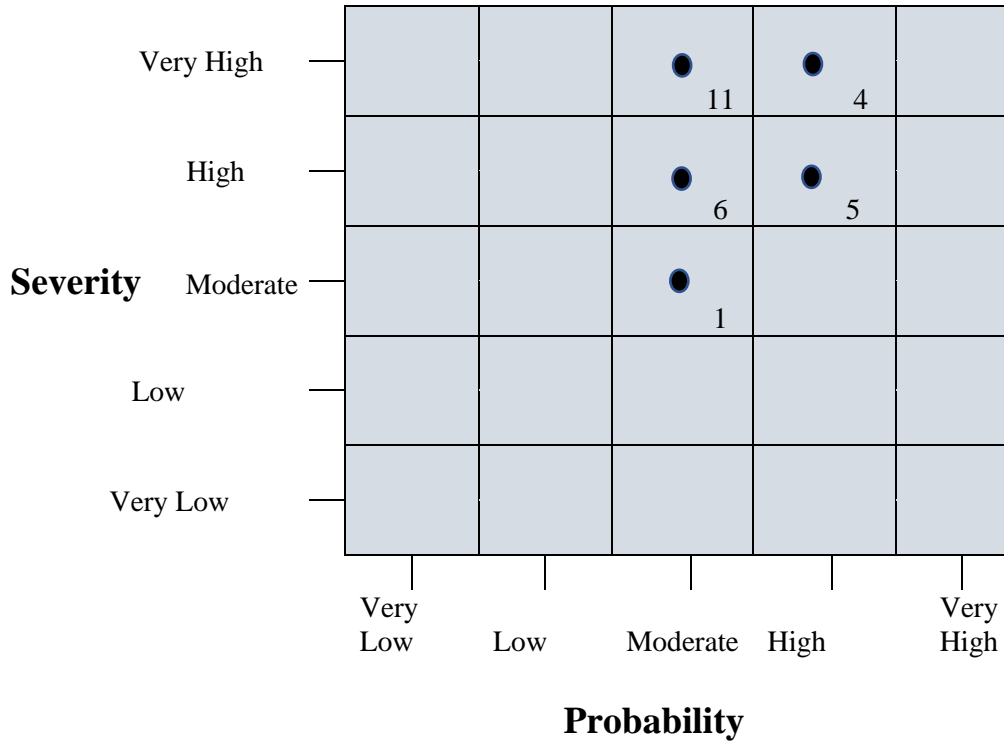


Figure 4.8 : Timing of Product delivery risk Matrix

According to the timing of product delivery risk Matrix, twenty respondents are experiencing timing of product delivery as a critical risk and seven responses are experiencing the timing of product delivery as medium risk and none of the respondents are experiencing the risk as negligible.

Timing of product delivery is a considerable risk in the industry as when the supply is low or when there is a delay in the deliveries, the quality of the product can be affected. When the local deliveries are considered, the exporters may get late deliveries due to the bad weather conditions or other transport problems and if they have no enough stock to arrange the deliveries, they are unable to arrange the shipments on time.

When the shipments take a long time for the deliveries due to long transits, the quality of the product will breach. If the shipment delays and couldn't make it on time, some of the customers will charge 5% from the total payment.

Sometimes the customers will reduce the price, or they return the shipments from their end. Also, the wrong documents also delay the clearance of the shipments. So submitting the correct documents also is very important. So, the time taken to deliver the products is very important in the Cinnamon Export industry.

### 4.2.3 Management and Operational Risk

#### 1) Management Decision Making

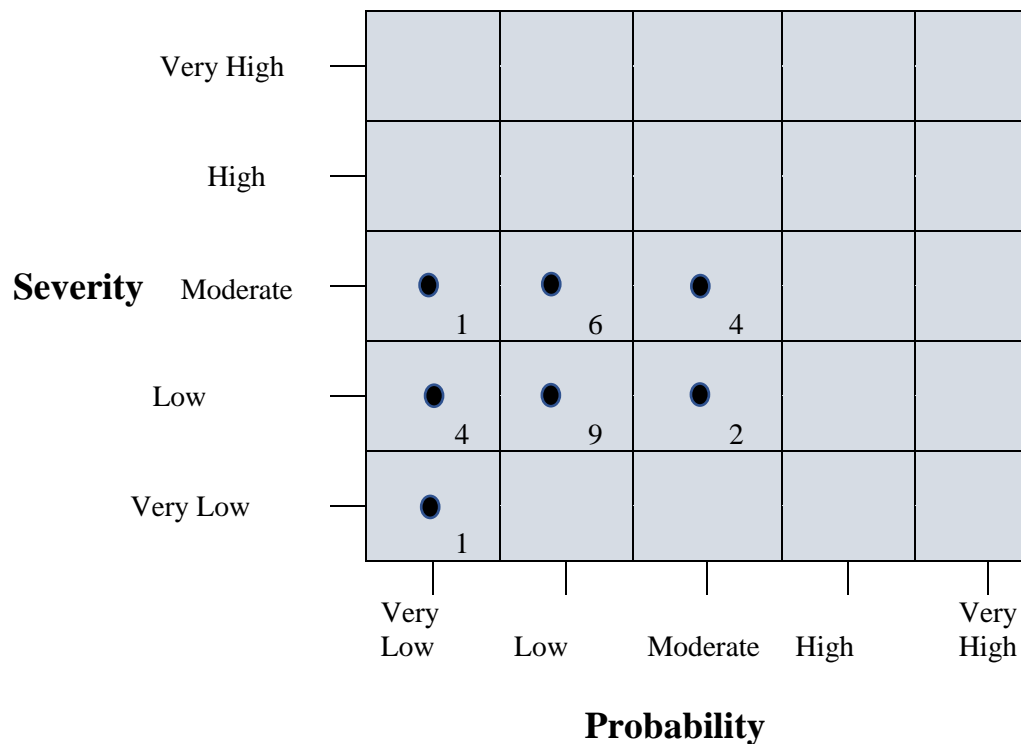


Figure 4.9: Management Decision making risk matrix

According to the management decision making risk Matrix none of the respondents are experiencing management decision making as a critical risk and twelve responses are experiencing the management Decision making as medium risk and fifteen respondents are experiencing the risk as negligible.

The survey shows a minor impact on the management decisions. Most of companies run the business as a family business, and they mostly are satisfied with the management decisions. As all other industries, the Cinnamon industry also need to be developed with the technology and there should be marketing, and supply chain strategies also need to be developed. The industry doesn't use much computer software for their processes and systems. They are running their business in traditional ways and there is a less involvement of technology. They don't like to invest funds anymore as they fear that if they invest more on those, they will lose profits. But if they consider such investments, on long time basis they can gain the advantages.

2) Quality Control

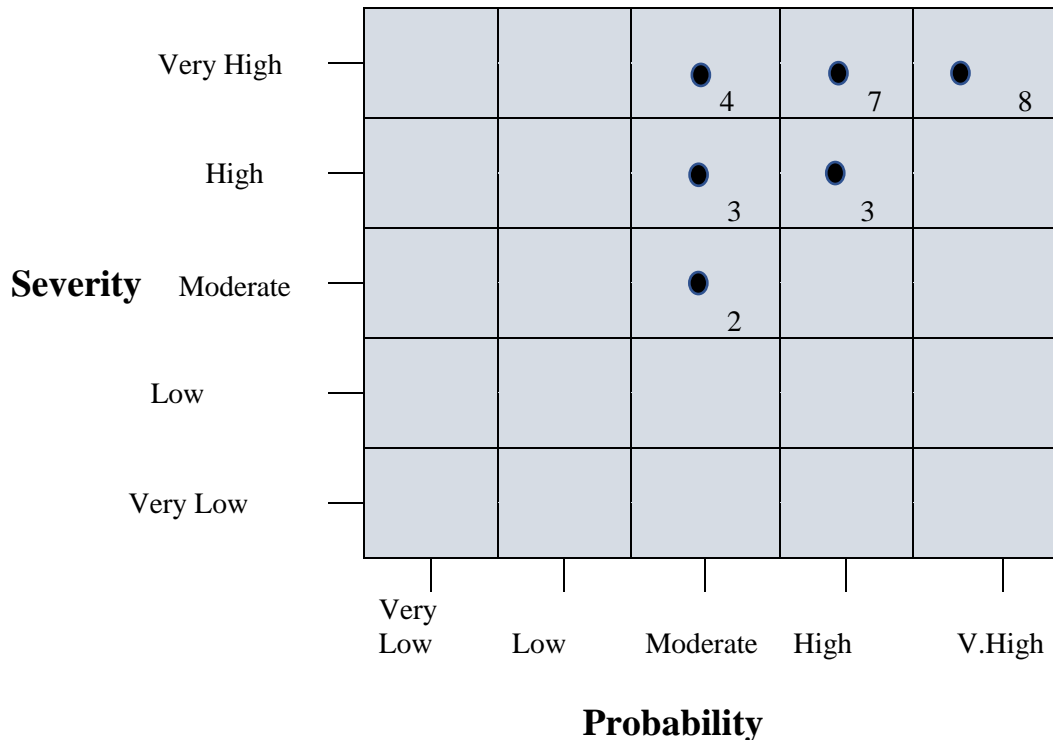


Figure 4.10: Quality control risk Matrix

According to the quality control risk matrix twenty-two respondents are experiencing Quality Control as a critical risk and five respondents are experiencing Quality Control as medium risk and none of the respondents are experiencing the risk as negligible.

They strictly control the appearance and aroma; as if they are reduced, the quality of the stock of cinnamon also will be reduced. The selling price of the stock also will be reduced if they are not in the expected Quality. There is a grading system for Cinnamon and if it is in a good quality it will gain a higher price. When collecting the Cinnamon, they grade the Cinnamon at the purchasing stage and make the payments to the farmers according to the respective grades. When the cinnamon is stored in the warehouse, it should not be affected by the humidity. When there is a high humidity the aroma will be reduced. There may be fungus attacks too, if they are not stored properly. The dust also will reduce the quality and hygienic conditions must be maintained properly in warehouses and in the transport stage.

There are governing bodies to check the quality and issue the quality certificates. After loading the product to the containers, fumigation process is used to control the quality, while in the shipping process. Exporters pay a lot of attention to the quality control as if it is not doing properly the shipments can be rejected and it will affect the profits.

### 3) Changes in labor Force

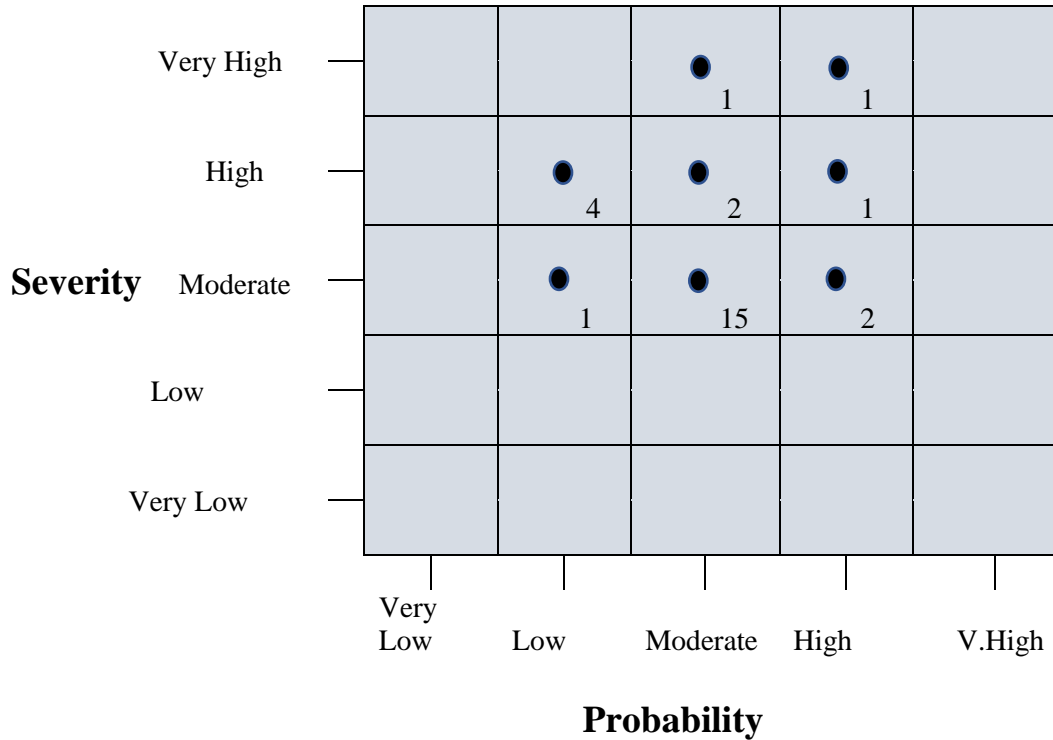


Figure 4.11: Changes in Labor Force risk Matrix

According to changes in labor force risk Matrix three respondents are experiencing changes in labor as a critical risk and twenty-four responses are experiencing changes in labor force as medium risk and none of the respondents are experiencing the risk as negligible.

Cinnamon Industry is largely a labor-intensive industry and the cultivators need labor to maintain the cinnamon plantations. Again the peeling Cinnamon also needs skilled labors. Processing the product also needs people. So, lack of skilled labor is one of the major risks in the industry. It is observed that due low recognition, most of the people do not tend to work in the industry and especially young people don't like to join the industry as laborers. Lack of an adequate labor force, the industry may undergo a major risk in near future. So it is extremely essential to manage the human resources carefully and if they are motivated, it will effect substantially to develop the industry.

It is observed that there is a lack of labors who can work according to the global standards, at most of the processing centers based in rural areas. For the exporters, language is a barrier to

communicate with the foreign customers and recruiting the skilled labor in those areas is a critical problem. Lack of technology also cause problems and if the technology is further developed, the industry needs less labor and government need to focus more to develop the technology to upgrade the industry.

4) Lack of Technology

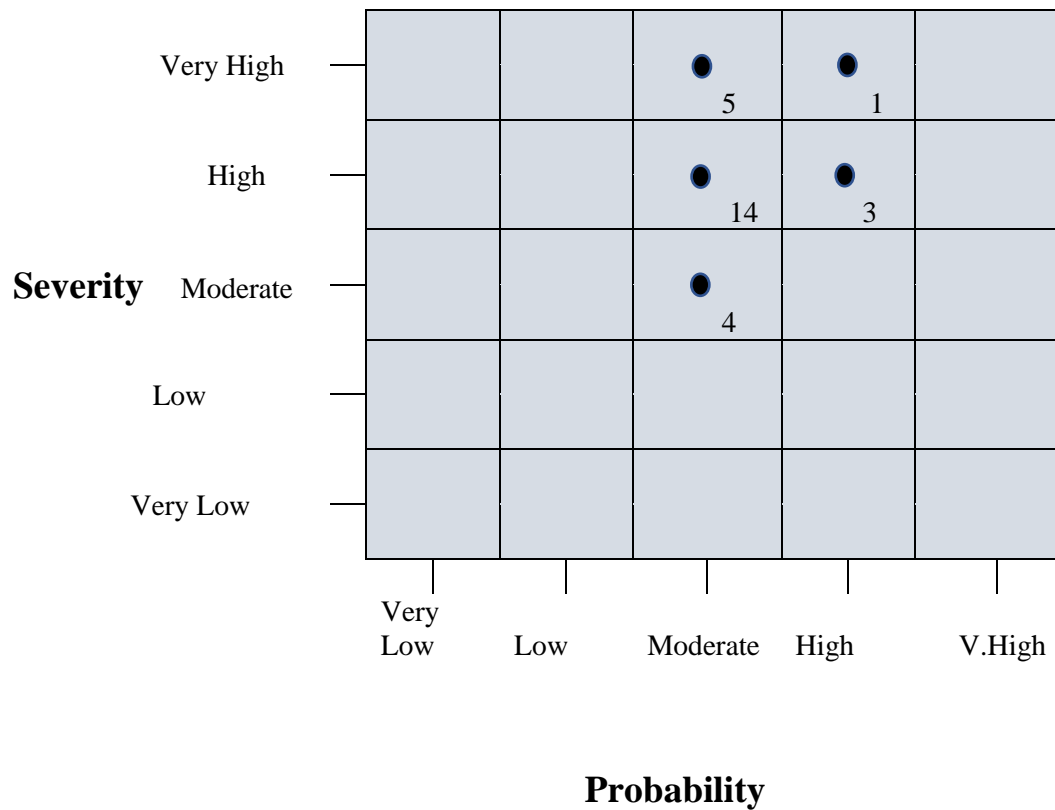


Figure 4.12: Lack of Technology Risk Metrix

According to lack of technology risk Metrix nine respondents are experiencing lack of technology as a critical risk and eighteen respondents are experiencing lack of technology as medium risk and none respondents are experiencing the risk as negligible.

The technological competency is one of the main factors to gain the competitive advantage in every industry. It requires experience and knowledge, positive attitudes, innovativeness and creativity.

To increase the productivity and efficiency, the Cinnamon industry also need to develop the technology such as new machines, computer software or mobile app. To get the competitive advantage, the industry also needs to develop the technology for value added products. Diversified products normally have the price advantage and the industry needs more innovative ways to develop the industry.

Developing the technology involves cost aspects and most of the people in the industry hesitate to start technical initiatives. But in the long run, it is a must to implement new technologies. It will reduce the cost and need less human resources and it also will reduce the processing time.

Government should direct the Research and Development facilities to introduce new technologies to the industry and it will invariably increase the productivity and efficiency in the industry.

#### 4.2.4 Public Policy and Institutional risk

##### 1) Financial and Tax policies

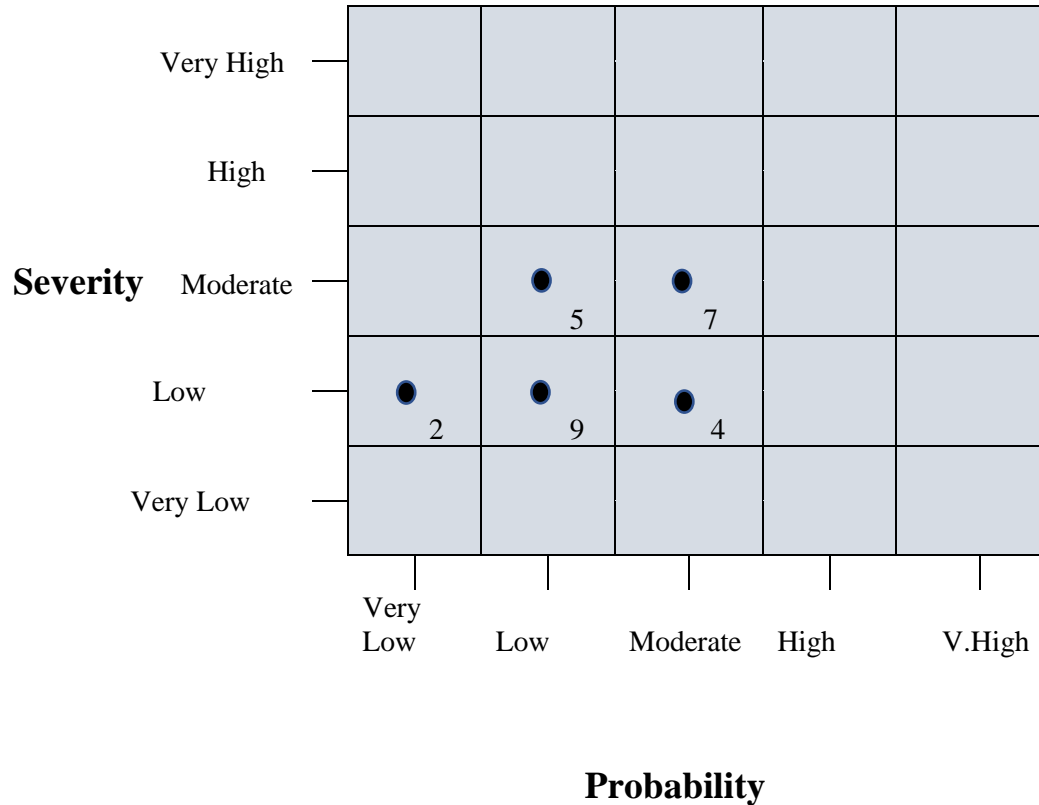


Figure 4.13: Financial Tax policies and risk Metrix



According to financial and tax policies risk Metrix, none of the respondents are experiencing Financial and tax policies as a critical risk and sixteen responses are experiencing Financial and Tax as medium risk and eleven respondents are experiencing the risk as negligible.

Department of Inland Revenue is imposing a general income tax for the exporters and normally the income tax is 28% from the profit. But as a concession for the Cinnamon exporters, it is only 14% from the profit.

When it comes to VAT (Value Added Tax) and NBT (Nations Building Tax) normally it is 15% and for Cinnamon, those Taxes are Zero.

There are no tax policies related to exports, but when some countries have sanctions over other countries money transaction become a big problem. For example, if USA imposes sanction over Mexico it will affect the countries like Sri Lanka for money transaction through the banks. Still there is no major risk involving the Financial and Tax policies but if the government can help the exporters in some way for a subsidy, it will be beneficial for the industry.

## 2) Regulatory and legal policies

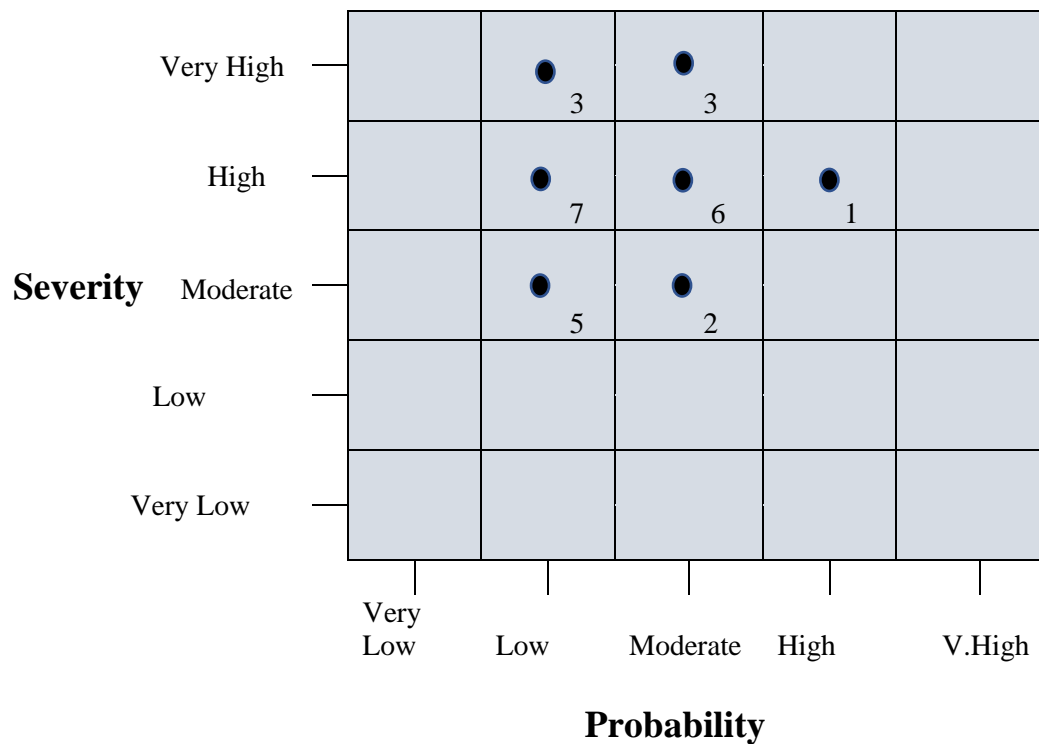


Figure 4.14: Regulatory and legal policies risk Metrix

According to regulatory and legal policies risk Metrix four respondents are experiencing Regulatory and legal policies as a critical risk and twenty-three responses are experiencing Regulatory and legal policies as medium risk and none respondents are experiencing the risk as negligible.

The Cinnamon industry is an international business and there are a lot of transactions and legal procedures. Number of formats and different types of documents need to be filled in the export procedure. The customers need a timely delivery of stocks and a smoothly running export procedure which would assure an on-time dispatch of the product.

A person who is exporting Cinnamon required to register with Sri Lanka Export Development Board (SLEDB), Inland revenue Department and Sri Lanka Customs. A register number is given from the Export Development Board and Tax identification number (TIN number/ VAT number) will be given by the Inland Revenue Department. To register with the above institutions, the exporter required to produce the original business registration and other related documents. After getting these registrations from the institutions then the exporter must have the license to use Pure Ceylon Cinnamon logo and pre inspection certificate. License to use Pure Ceylon Cinnamon logo will be issued by the Sri Lanka Export Development Board and inspection certificates will be issued by the Sri Lanka Standard Institution (SLSI) or SGS Lanka (Pvt) Ltd.

The legal agreement between the importer and exporter is called the sales contract. The product, names of the buyer and seller, information regarding the cost and delivery, terms and conditions of sale will be mentioned in the sales contract. It will give the legal protection for both parties.

When exporting the products, exporter needs to submit relevant documents. The Performa invoice will be prepared by the exporter and need to send to the buyer. Product description, Quantity, price, terms of payments (L/C, D/P, D/A ect), terms of delivery ( CIF, FOB, Ex works etc.) packing details will be mentioned in the Performa invoice.

Commercial Invoice is prepared by the exporter and it includes the all particulars regarding the product. It is also required by the Customs Authority of importing country and selling price and other specific costs for freight, insurance and packing, terms of delivery and payment should be mentioned. In the packing list, the weight and dimensions, number of packages have to be included.

Certificate of Origin (GSP certificate) is required by the Customs Authority of the importing country for the buyer to obtain the duty concessions under GSP. The statement is signed by the exporter and attested by Department of Commerce mentioning that the product being shipped originated in Sri Lanka. Certificate of Origin also is required by the Customs Authority of importing country and is issued by Chamber of Commerce (Ceylon Chamber of Commerce, National Chamber of Commerce). Fumigation certificate also is required by the buyer to import agricultural products.

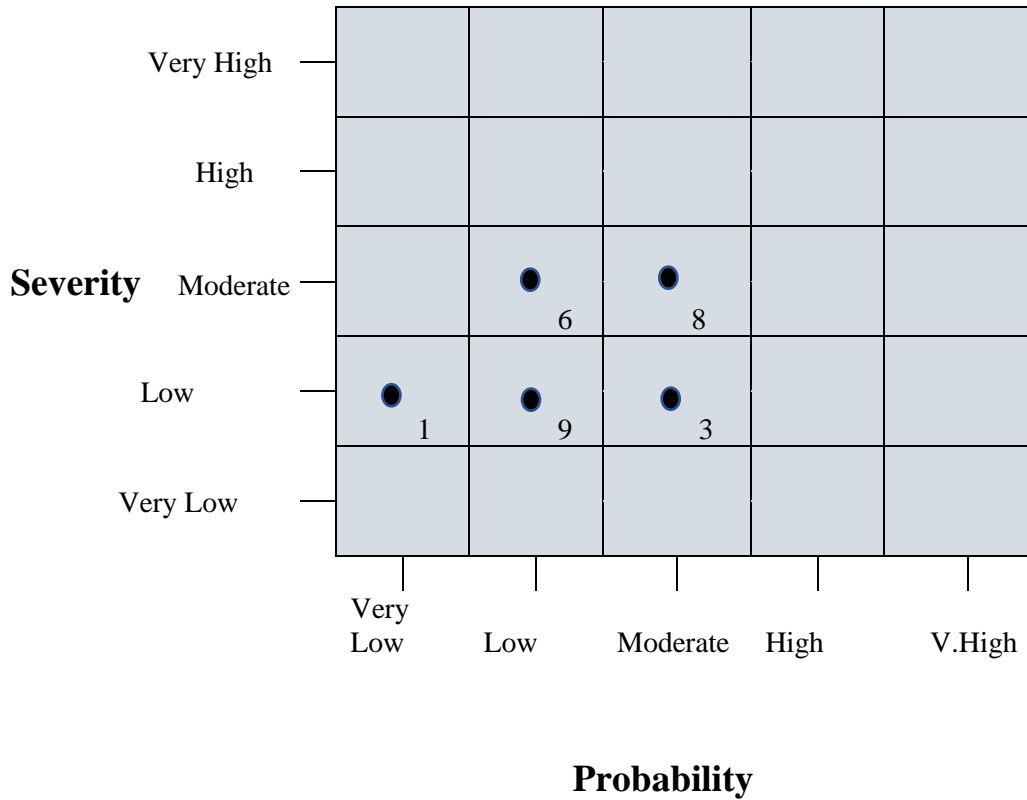
The cinnamon leaf oil and bark oil are considered as dangerous cargos (DG cargo) and it is essential to submit Material Safety Data Sheets (MSDS) along with the shipments. Other than packing lists, Bill of Lading (BL), certificates of Origin, fumigation certificates also should have for each shipment.

Quality reports, Analysis reports, transaction certificates, certificates relevant to organic Cinnamon also should be submitted according to the customer requirement.

In Customs Goods Declaration (CUSDEC) the details of product being imported or exported are provided and it is declared to the relevant authorities in international trade. The CUSDEC need to be filled carefully as it is vital to declare the statistical implications and revenue details.

Packaging also plays a vital role in exporting Cinnamon. The information of the buyer and seller, labelling, sequential numbers, weight and handling details, the treatments to avoid high humidity must be clearly included in the packing materials.

### 3) Trade & market Policies



*Figure 4.15: Trade and Market policies risk Metrix*

According to trade and market policies risk Metrix none of the respondents are experiencing trade and market policies as a critical risk and seventeen responses are experiencing Trade and market policies as medium risk and ten respondents are experiencing the risk as negligible.

SAPTA, the agreement on SAARC preferential Trading Agreement is applicable for the seven member countries of South Asia, to liberalize the trade among the SAARC countries. It promotes the mutual trade and economy among the member countries. It also negotiates the tariff reduction, in the trade. Again, there is Indo Sri Lanka Free Trade Agreement (ISFTA) which provides which provides duty free concessions to the products including Cinnamon traded between two countries.

4) Weak institutional capacity

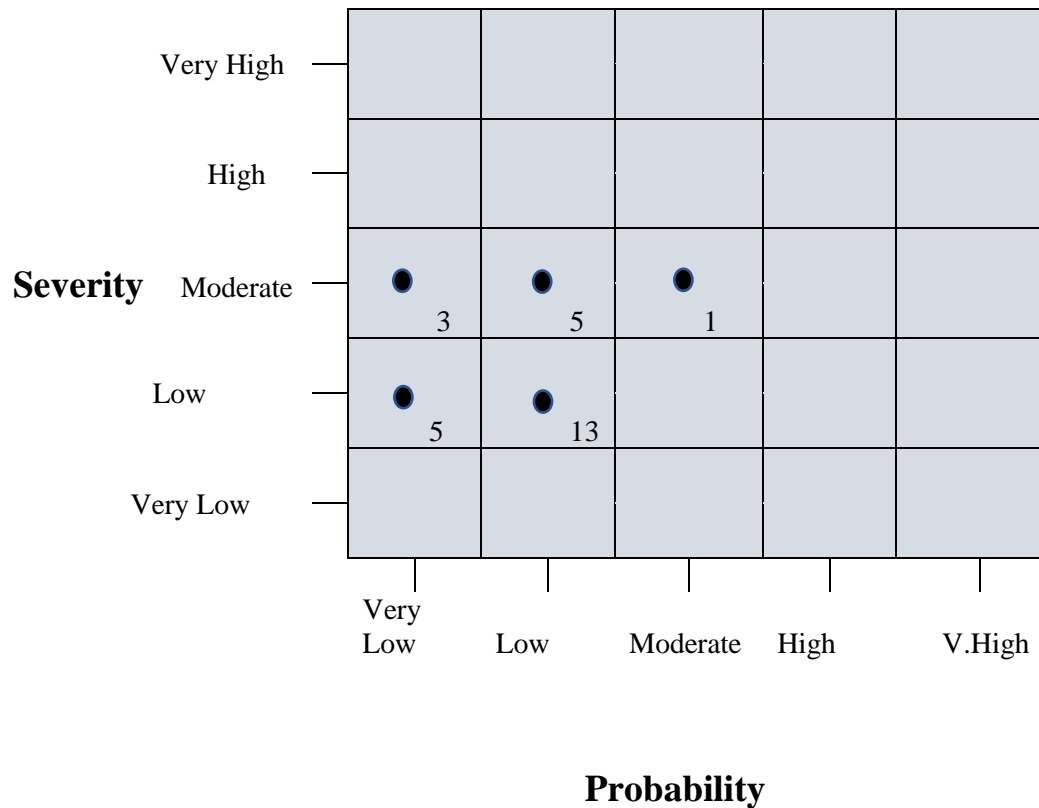


Figure 4.16: Weak Institutional Capacity risk Matrix

According to weak institutional risk Matrix none of the respondents are experiencing weak institutional capacity as a critical risk and six responses are experiencing weak institutional capacity as medium risk and twenty-one respondents are experiencing the risk as negligible.

The inspection certificates regarding the quality of the product will be issued by the institutions like Sri Lanka Standard Institution (SLSI) and SGS Lanka (Pvt) Ltd. The humidity, weight, dimensions of the product will be checked before dispatching every shipments and inspection certificates will be issued accordingly. But most of the processing centers are based in the southern province and the quality institutions are based in Colombo, making it difficult to obtain required certificates prior to the shipment.

As cinnamon industry is a main foreign currency generator, the main export governing body of the country, EDB should make more effort to develop the industry. Presently any of the governing bodies do not have any mechanism to promote the Ceylon cinnamon world over. The only access to new markets for Sri Lankan cinnamon exporter is participation in the species exhibitions such as Gulfood, IFEAT and Global spices. Even such events are not sponsored by the EDB or any other government institute.

#### 4.2.5 Political risk

##### 1) Political instability within the country

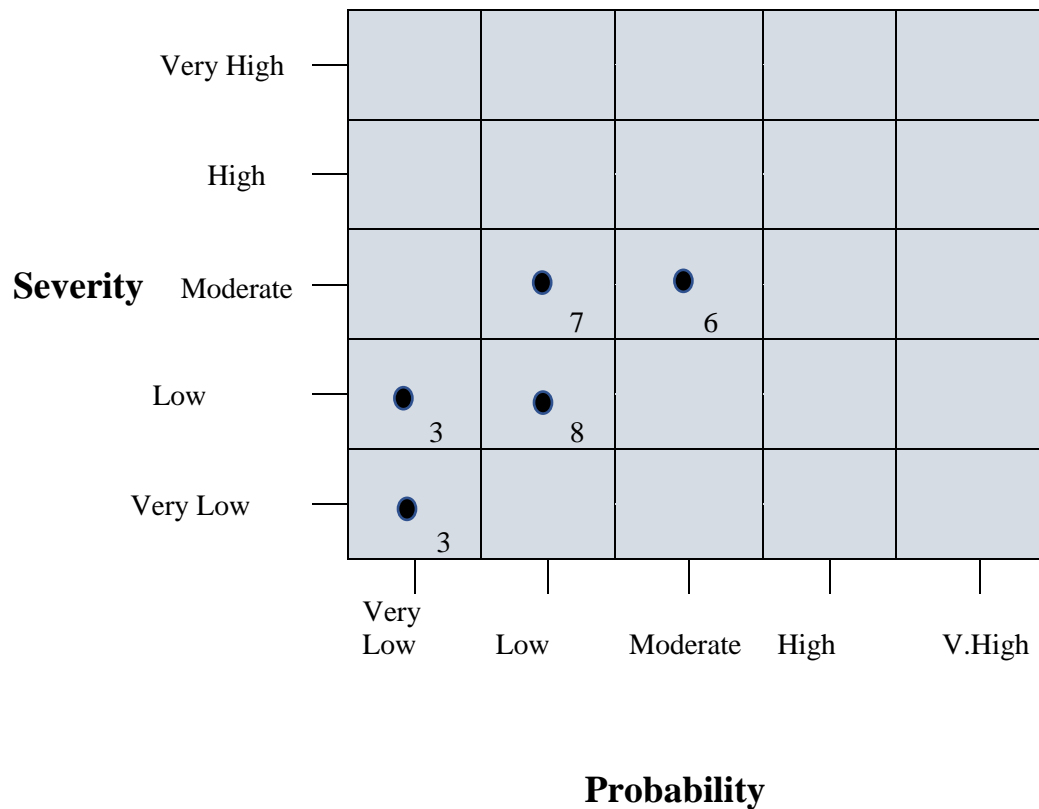


Figure 4.17: Political Instability within the country risk Metrix

According to political instability within the country risk Metrix none of the respondents are experiencing Political instability within the country as a critical risk and thirteen responses are experiencing political instability as medium risk and fourteen respondents are experiencing the risk as negligible.

During past few years the countries' political situation was more turbulent which helped to have proper policies to develop the industry by the government. However, the political instability in the country does not have any effect to the demand of the Ceylon cinnamon in the world market.

2) Interruption of trade due to Dispute

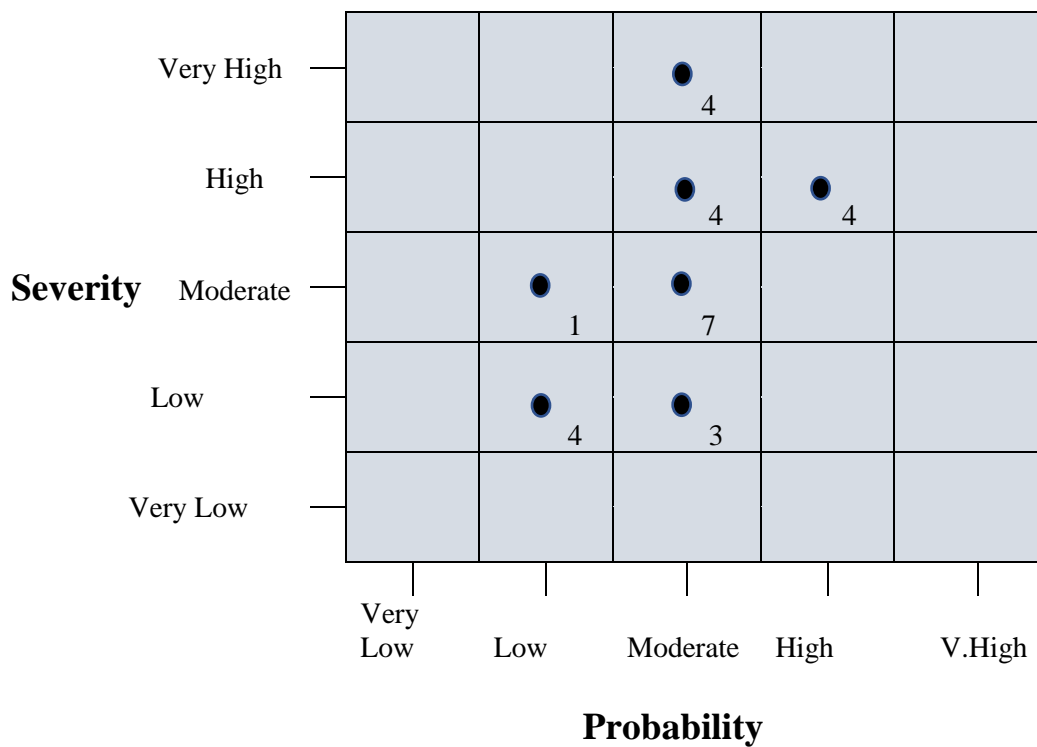


Figure 4.18: Interruption of trade due to Dispute risk Matrix

According to interruption of trade due to dispute risk Matrix eight respondents are experiencing Interruption of trade due to dispute as a critical risk and fifteen respondents are experiencing interruption of trade due to dispute as medium risk and four respondents are experiencing the risk as negligible.

Sri Lanka as a non-aligned country do not have any trade dispute with any other country in the world. From ancient history, Ceylon cinnamon has a good recognition in the international

spices market and the exporters have maintained that recognition without any dispute. However, as a member of United Nation (UN) and world Trade Organization (WTO), the country is bound to adhere to the decisions and trade policies imposed by such organizations. When such organizations impose a sanction to any country, Sri Lanka will have to avoid trade with such countries. As UN have imposed sanctions to Iran, Sri Lanka has missed the Iranian market for the cinnamon. Further, when a power full country in the world like America, impose sanctions to any country.

#### 4.2.6 Risk related to Nature

##### 1) Natural Disasters

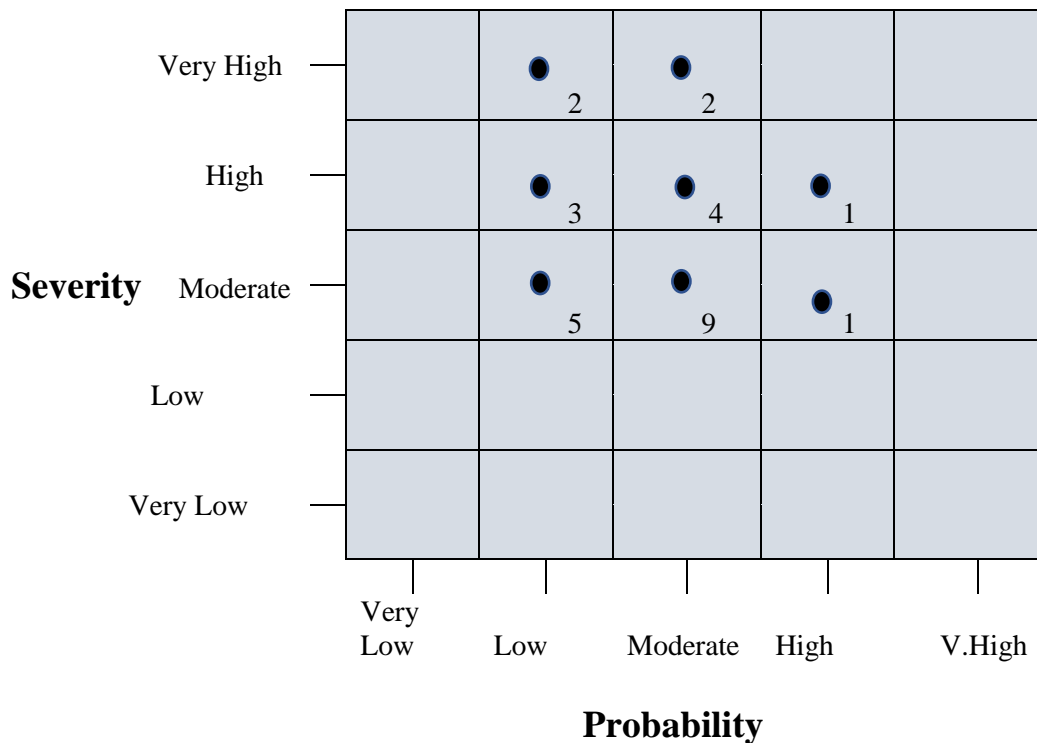


Figure 4.19: Natural disasters risk Matrix

According to natural disasters risk Matrix three respondents is experiencing natural disasters as a critical risk and twenty-four respondents are experiencing natural disasters as medium risk and one respondent is experiencing the risk as negligible.



Cinnamon as an agricultural product, is more sensitive to natural disasters like flood, landslide, tsunami etc. All farmers, collectors and exporters are prone to natural disasters. Cinnamon cultivation could be affected by the flood, landslide and tsunami and processing centers and storage facilities also could be affected by natural disasters. In the year 2006, tsunami destroyed most of processing centers and small collection centers, located along the southern coast line.

Further, raining seasons also increase the risk of increasing the humidity of the product storages which will increase the risk of fungi growth in the warehouses, which are not maintained properly.

2) Biological & Environmental risk

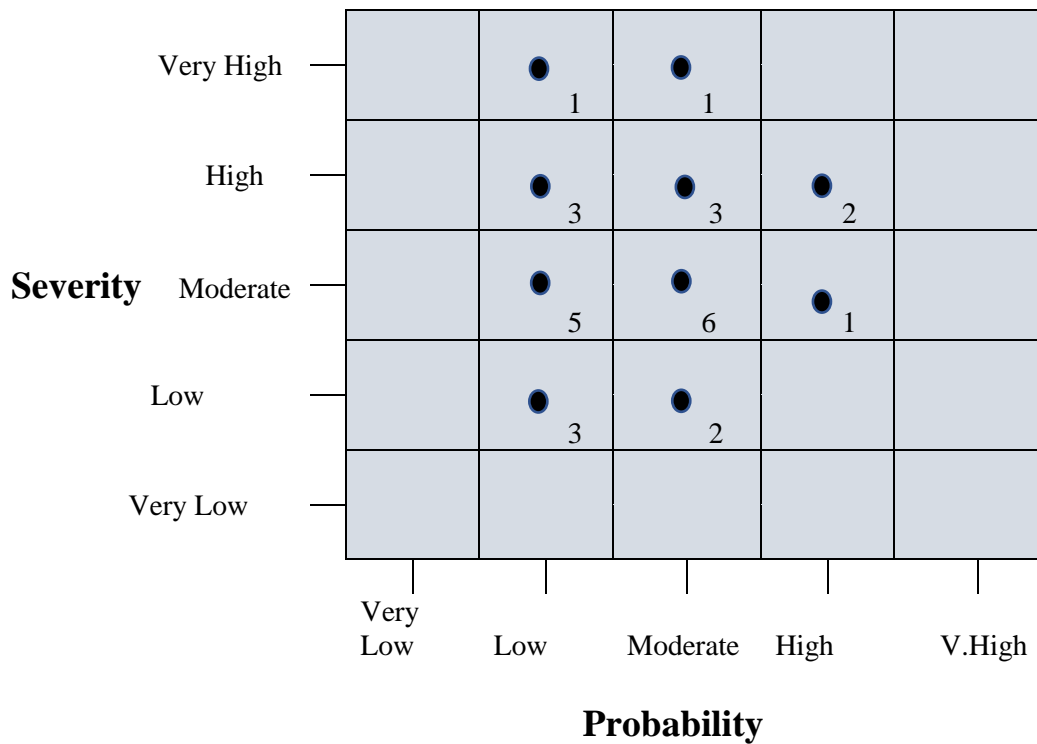


Figure 4.20: Biological and Environmental Risk Matrix

According to biological and environmental risk Matrix, one respondent is experiencing biological and environmental risk as a critical risk and twenty-three responses are experiencing biological and environmental risk as medium risk and three respondents is experiencing the risk as negligible.

Cinnamon cultivation is normally less affective to biological conditions, but humidity is a critical issue when the product is in stock and during the shipment. Ventilation is essential to prevent growth of fungus in the stock and humidity control methods need to be applied when storing and the shipping. The hygienic conditions also need to be monitored carefully and if not, dust will affect the quality of the Cinnamon. When the customer receives a poor-quality product, it will affect the reputation which will be a huge loss for the exporter.

There is a huge demand for the organic cinnamon and if cinnamon can be cultivated in a chemical free environment, the price and demand will be high for organic Cinnamon. If the knowledge can be shared among the farmers how to cultivate Cinnamon organically, the industry can be improved further and will be able to meet the high demand for organic cinnamon, in the international and local market.

### 4.3 Collective factor Analysis for Supply Chain Risks in Cinnamon Industry

**Table 4.3 Mean Value for the Supply Chain Risk factors**

		Mean value of the probability	Mean value of the severity	Mean value for the Risk
<b>Logistical and Infrastructural risk</b>				
1)	Risk of Inventory - A	3.18	3.66	11.64
2)	Risk of transport - B	2.70	3.22	8.69
3)	Risk of Freight Forwarding - C	2.96	3.74	11.07
4)	Communication Risk - D	3.37	4.55	15.33
<b>Market related Risk</b>				
1)	Changes related to the market & demand - E	2.96	3.66	10.83
2)	Impact of domestic & international prices - F	2.77	3.03	8.39
3)	Timing of product delivery - G	3.33	4.51	15.02
<b>Management &amp; Operational Risk</b>				
1)	Management Decision making - H	2.00	2.37	4.74
2)	Quality Control - I	3.96	4.62	18.30
3)	Changes in Labor Force - J	2.96	3.40	10.06
4)	Lack of technology- K	3.14	4.07	12.82
<b>Public Policy and institutional risk</b>				
1)	Financial and Tax policies - L	2.33	2.44	5.69
2)	Regulatory and legal policies- M	2.48	3.96	9.82
3)	Trade & market Policies- N	2.37	2.51	5.95
4)	Weak institutional capacity- O	1.74	2.33	4.05
<b>Identification of Political Risk</b>				
1)	Political instability within the country - P	2.00	2.37	4.74
2)	Interruption of trade due to Dispute - Q	2.96	3.33	9.86
<b>Risk related to Nature</b>				
1)	Natural Disasters - R	2.70	3.59	9.69
2)	Biological & Environmental risk- S	2.66	3.14	8.35

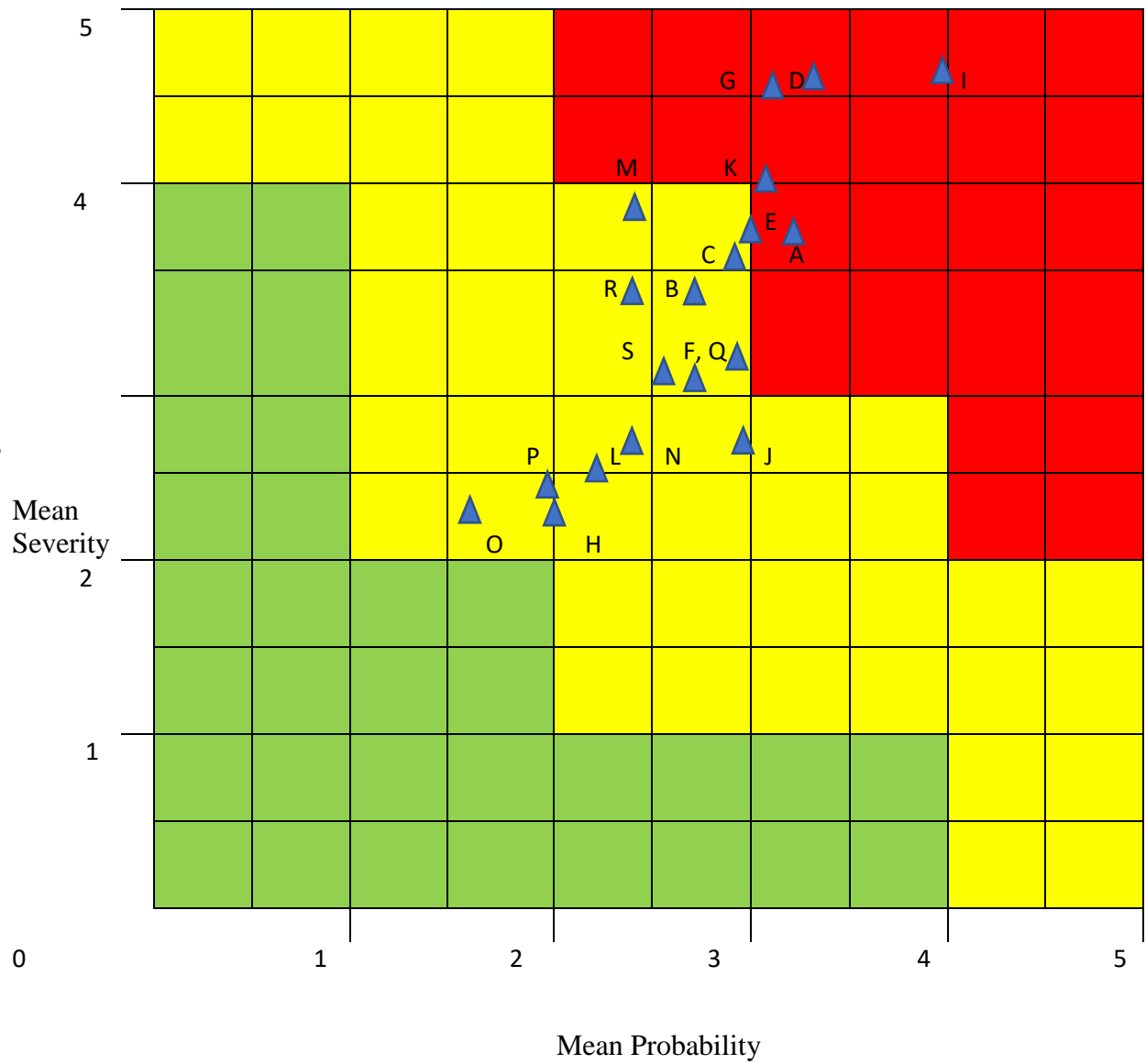


Figure 4.21 : Supply Chain risk Metrix for Cinnamon Export Industry

According to the Supply Chain Risk Matrix, there are five factors in the Critical level, indicated below;

- 1) Quality Control
- 2) Communication Risk
- 3) Timing of Product Delivery
- 4) Risk of Inventory
- 5) Lack of Technology

#### **4.4 Risk Mitigation strategies for Major Risk factors**

Risk mitigation strategies need to be addressed for these critical factors and companies and the management authorities need to take immediate actions to mitigate those risks.

##### 1) Quality Control

- Research and Development – Need to increase the research and Development facilities to develop the industry and government should focus on promoting the awareness, skills and knowledge among the farmers, collectors, processors, exporters and other stakeholders in the industry, sharing experiences.
- The Quality inspection institutions need to be opened their branches within southern province to render their service to the Cinnamon industry, conveniently.
- Introduce new technologies to control the quality of the product. For example, to control humidity within the warehouses, dehumidifier controlling units can be applied.
- Knowledge sharing sessions can be conducted to share the experience and knowledge about the best Quality practices with experienced professionals in the industry.
- Initiate Competitions, rewarding and recognitions to encourage the improvement of the quality standards in the Cinnamon industry

##### 2) Communication Risk

- Provide opportunities to increase the language skills of the people who are involved in the export process
- Recruit the skilled professionals to fill the language gaps in the industry
- Encourage to move toward with automated systems from the manual systems for supply chain management to run the process smoothly.

- Develop Enterprise Resource Planning (ERP) systems to cater the supply chain requirement in the industry
- Introduce barcode technologies to increase the traceability of farmer details for the organic products.
- Introduce mobile app to develop the communication with the farmers and collectors to increase the demand and supply
- Improve the cyber security measures to mitigate the risk of hacking industry related details by competitors

### 3) Timing of product Delivery

- As the product delivery time is a very critical factor in the Cinnamon export industry, the exporters need to pay more concern about the time taken by shipments of product to reach the destination. Hence the exporters need to be concerned about the Estimated Time of Delivery (ETD), while planning the shipments.
- Track the shipments and keep records to update the customers, regarding shipment details.
- Submit correct documents (Invoice, packing lists, inspection reports, Bill of Lading, Inspection reports, Country of Origin certificates, fumigation certificates, etc.) on time to ease the clearance process in the buyer's country
- Exporters can consolidate the shipments according to the buyer's requirements to reduce the freight cost and to get a better service.

### 4) Risk of Inventory

- Introduce ventilation systems or humidity control systems to the warehouses where the products are stored.
- Promote the awareness of the people involved in the industry, with regards to the importance of the maintaining hygiene conditions during processing, collection and storing in the warehouses.
- Introduce automated stock control systems to increase the accuracy and to reduce communication gaps and lapses.

- Introduce standard packing methods, during collection and storing process which will smoothen the loading unloading and storing in the warehouses.
- Introduce proper rack systems to warehouses which will help in stock controlling, handling, maintaining standard humidity and hygiene of the cinnamon.
- Introduce First In First Out (FIFO) stock controlling systems to warehouses.
- Move warehouses which are situated within the natural disaster-prone areas to safer areas. Warehouses within the flood prone areas may be moved to identified safer areas.

#### 5) Lack of Technology

- Public and private sector need to be involved collaborately to develop the research and development programs
- Develop new machines for traditional methods like peeling
- Conduct awareness programs for all the stake holders
- Develop process and systems to smooth the communication process with producers, collectors and exporters
- Introduce Enterprise Resource Planning (ERP) system for processors and exporters
- Introduce new value-added products and increase the quality of the available products
- Reward and recognition for new finding

## **CHAPTER 5: CONCLUSION AND RECOMMENDATIONS**

### **5.1 Introduction**

There are number of supply chain risk factors involved in different levels in Cinnamon Export industry in Sri Lanka. This research is focused on the supply chain risk factors in exporters level. In this chapter the summery of the findings and the limitation of the research is discussed.

### **5.2 Summery of the findings**

The supply chain risk factors involving in Cinnamon industry at exporting level has been identified under six categories.

They are;

1. Logistical and infrastructural risk
2. Market related risk
3. Management and Operational risk
4. Public Policy and Institutional risk
5. Political risk
6. Biological and Environmental risk

The above risk factors will be categorized further into sub categories as below.

- 1) Logistical and infrastructural risk
  - Risk of Inventory
  - Risk of transport
  - Risk of Freight Forwarding
  - Communication Risk
- 2) Market related risk
  - Changes related to the market & demand
  - Impact of domestic & international prices
  - Timing of product delivery
- 3) Management and Operational risk
  - Management Decision making



- Quality Control
  - Changes in Labor Force
  - Lack of technology
- 4) Public Policy and Institutional risk
- Financial and Tax policies
  - Regulatory and legal policies
  - Trade & market Policies
  - Weak institutional capacity
- 5) Political risk
- Political instability within the country
  - Interruption of trade due to Dispute
- 6) Risk related to Nature
- Natural Disasters
  - Biological & Environmental risk

After doing the collective risk analysis for the findings five critical supply chain risk factors can be identified. They are

- 1) Quality Control
- 2) Communication Risk
- 3) Timing of Product Delivery
- 4) Risk of Inventory
- 5) Lack of Technology

Following risk mitigation strategies can be adopted to reduce the risk involving in the Cinnamon Export industry.

- 1) Quality Control risk mitigation strategies
  - Develop research and development opportunities
  - Knowledge sharing with stake holders

- Introduce new technologies
  - Training facilities need to develop
- 2) Communication Risk mitigation strategies
- Increase the opportunities to develop language skills
  - Develop communication among the producers, collectors and exporters
  - Move towards the automated systems
  - Introduce new technologies like barcode systems to develop traceability
- 3) Timing of Product Delivery
- Introduce Enterprise Resource Systems (ERP) to smooth the process
  - Track the shipments, keep the records and give the updates regarding the shipments
  - Submit correct documents to ease the clearance process
  - Consolidate the shipments according to the buyer's requirement
- 4) Risk of Inventory
- Training and develop the employees regarding the inventory process
  - Introduce new technologies to control the humidity, ventilation and other quality concern
  - Use of racking systems and better packing materials and labelling methods
  - Move warehouses to disasters prone areas
- 5) Lack of Technology
- Introduce new technologies for the traditional methods
  - Develop research and development facilities
  - Training and conduct awareness progress for the stakeholders
  - Public and private sector need to work together to identify the technical gaps
  - Reward and recognition

### **5.3 Limitation of the research**

This research is conducted to identify the major supply chain risk factors in Cinnamon Export industry.

- The research findings are limited to export level and the supply chain issues for producers and collectors are not discussed
- The reluctancy to share the information with outsiders were major issue when conducting the study with industry people
- Only twenty-seven respondents could be involved to gather information because of the limited time period
- The research is based on qualitative data and quantitative methods have not been used to analyze data

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## APPENDIX – Research Questionnaire

### Identifying the Supply Chain Risk Factors in Cinnamon Export Industry

Conducted By: S.P.A.V.S. Samarakoon

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Faculty of Engineering, University of Moratuwa

### Section A

#### Information about the Organization

1.) Name of the company

.....

2.) Number of employees

- < 100
- 100 - 200
- 200 - 300
- 300 <

3.) Average Annual Export Turnover (\$ million)

- < 5
- 5 - 10
- 10 - 12
- 12 <

4.) Export Market Region

- U.S.A/ South American Countries
- Europe
- Middle East
- Other

## Section B

### Select the suitable option

Probability Options:

V.L-Very Low (0.00-0.10 ) L-Low (0.10-0.40) M-Moderate (0.40-0.60 ) H-High (0.60-0.90 )

V.H-Very High (0.90-1.00 )

Severity Options:

V.L-Very Low L-Low M-Moderate H-High V.H-Very High

### Identification of Logistical and Infastructural risk

Risk Factor	Probability					Severity (Impact)				
	V.L	L	M	H	V.H	V.L	L	M	H	V.H
Risk of Inventory	1	2	3	4	5	1	2	3	4	5
Risk of Transport	1	2	3	4	5	1	2	3	4	5
Risk of Freight Forwarding	1	2	3	4	5	1	2	3	4	5
Communication Risk	1	2	3	4	5	1	2	3	4	5

### Identification of risk related to the Market

Risk Factor	Probability					Severity (Impact)				
	V.L	L	M	H	V.H	V.L	L	M	H	V.H

Changes related to the market and demand	1	2	3	4	5	1	2	3	4	5
Impact of domestic and international prices	1	2	3	4	5	1	2	3	4	5
Timing of product Delivery	1	2	3	4	5	1	2	3	4	5

### Identification of Management and Operational risk

Risk Factor	Probability					Severity (Impact)				
	V.L	L	M	H	V.H	V.L	L	M	H	V.H
Management Decision Making	1	2	3	4	5	1	2	3	4	5
Quality Control	1	2	3	4	5	1	2	3	4	5
Changes in Labor Force	1	2	3	4	5	1	2	3	4	5
Lack of Technology	1	2	3	4	5	1	2	3	4	5

### Identification of Public Policy and institutional risk

Risk Factor	Probability					Severity (Impact)				
	V.L	L	M	H	V.H	V.L	L	M	H	V.H
Financial and Tax policies	1	2	3	4	5	1	2	3	4	5
Regulatory an legal policies	1	2	3	4	5	1	2	3	4	5

Trade and market poicies	1	2	3	4	5	1	2	3	4	5
Weak Institutional Capacity	1	2	3	4	5	1	2	3	4	5

### Identification of Political risk

Risk Factor	Probability					Severity (Impact)				
	V.L	L	M	H	V.H	V.L	L	M	H	V.H
Political instability within the country	1	2	3	4	5	1	2	3	4	5
Interruption of trade due to disputes	1	2	3	4	5	1	2	3	4	5

### Identification of risk related to nature

Risk Factor	Probability					Severity (Impact)				
	V.L	L	M	H	V.H	V.L	L	M	H	V.H
Natural disasters	1	2	3	4	5	1	2	3	4	5
Biological and Enviromental risk	1	2	3	4	5	1	2	3	4	5

Thank You,  
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