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Identifying the influencing factors in sustainable tea supply in the Sri Lankan tea industry

Mahawattage Dona Ranmali Pradeepa Jayaratne
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**IDENTIFYING THE INFLUENCING FACTORS IN
SUSTAINABLE TEA SUPPLY IN THE SRI LANKAN
TEA INDUSTRY**

**A thesis submitted in fulfilment of the
requirement for the award of the degree of**

DOCTOR OF PHILOSOPHY

from

UNIVERSITY OF WOLLONGONG

by

MAHAWATTAGE DONA RANMALI PRADEEPA JAYARATNE

Diploma in Transport (UK)

Advanced Diploma in Transport (UK)

Masters in Logistics – Distinction Award (Australia)

SYDNEY BUSINESS SCHOOL

JUNE 2015

THESIS CERTIFICATION

I, Mahawattage Dona Ranmali Pradeepa Jayaratne, declare that this thesis submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Sydney Business School, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institutions.

Mahawattage Dona Ranmali Pradeepa Jayaratne

June 2015

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2. Jayaratne P, Styger L E J and Perera N (2012), “The Role of Supply Chain Mapping?”, in *Proceedings of the 2nd International Conference in Management (ICM) – 2012*, Langkawi Kedah, Malaysia, 11th – 12th June 2012. (Peer reviewed).
3. Jayaratne P, Styger L E J and Perera N (2011), “Sustainable Supply Chain Management – Using the Sri Lankan Tea Industry as a Pilot Study”, in *Proceedings of the 25th Australian and New Zealand Academy of Management (ANZAM) Annual Conference – 2011*, Wellington, New Zealand, 7th - 9th December 2011. (Peer reviewed).
4. Jayaratne P, Styger L E J and Perera N (2011), “What is Sustainable Supply?”, SBS Business Review, Sydney Business School, University of Wollongong, Australia.
5. Jayaratne P (2011), "Sustainable Supply and Supply Chain Mapping-Sri Lankan Tea Supply Chain", *Sydney Business School Higher Degree Research Students Conference – 2011*, September, Innovation Campus, University of Wollongong, Australia.

ABSTRACT

In monetary terms, the Sri Lankan tea industry was until 1995 consistently the country's largest exporting element. The tea industry has always played an important role in the Sri Lankan economy, because it uses mainly local resources and over 20% of the population directly depends on it.

The Sri Lankan tea industry also plays a significant role in the global tea industry. For over three decades it was the largest tea exporter into the global supply chain (in both value and volume). However, Sri Lanka is currently ranked as the fourth-largest tea exporter in the world. Tea-production volume has stagnated at around 300,000 metric tonnes in Sri Lanka, while at the same time global production volumes have increased considerably in other tea-producing countries. Production costs have increased in real terms globally. Importantly, Sri Lanka has the highest production cost among all producers. Thus the sustainability of the tea industry in Sri Lanka is at risk.

Previous research has indicated that the characteristics in the agricultural sector, including tea production, are now similar to many characteristics of the manufacturing sector. However, this has not yet been fully investigated in the Sri Lankan tea sector. Even though some research has explored supply chain management aspects of agricultural products such as coffee, potatoes and cocoa, little attention has been paid to the tea industry.

The main objective of this research was to explore the tea supply chain, specifically focusing on the Sri Lankan tea industry. This research identified the influencing factors on a sustainable tea supply chain by mapping the supply chain for both smallholders and large-scale producers.

Predominantly, the research used the Sri Lankan tea industry as a case study. This research has used a qualitative research approach: primary data was collected through focus-group discussions and individual interviews with the main stakeholders in the tea supply chain. Secondary data such as industry statistics, annual reports and other related reports were used to support the analysis. The data was analysed using NVivo software. The analysis used an explorative inductive approach to map the tea supply chain and then to identify the influencing factors on sustainable tea supply chain management.

The mapping process revealed that the fragmented nature of the tea supply chain has been the main influencing factor on sustainability. The analysis highlights that the lack of customer focus and lack of end-to-end supply chain configuration have been primary factors for the continuous deterioration of the performance of root-level suppliers in the tea supply chain. Adverse government policy implementation has been the main obstacle for operators to implement the best supply chain management strategies to improve their performance. This has hindered the benefits that can be achieved through the implementation of good corporate social responsibility and sustainable initiatives along a tea supply chain that has a customer-focused structure.

This thesis recommends that there is a need for a stronger, customer-focused supply chain, which can be achieved by refining the supply chain structure. This includes the reduction of policy barriers in the tea-marketing channel, especially for large-scale producers who have the capacity and capability to operate in a customer-focused environment. It is also essential to organise tea smallholders to work collaboratively to implement sustainable initiatives that increase the benefits to root suppliers, such as farmers and primary producers, who are the critical stakeholders in the tea supply chain.

This research contributes to the supply chain management arena both academically and practically. More specifically, the findings contribute by filling the gap in supply chain mapping and end-to-end supply chain configuration, while the influencing factors identified are an added contribution to the field of sustainable agri-supply chain management.

The findings also have a practical contribution, by giving industry stakeholders insight to implement strategies to increase the long-term sustainability of the tea supply chain. The findings are also useful to policy-makers as they provide insights to understand the issues faced by industry operators and highlight the negative impact of adverse policy decisions that have been implemented in the industry.

The research also has a methodological contribution. Supply chain management research has mainly employed quantitative research, using deductive approaches and positivist paradigms. There is a need for more qualitative research in the field because business operations are more complex and subjective. This research contributes to fill

this gap. The use of focus groups as the main data collection method is another methodological contribution, since the use of focus groups is not prominent in supply chain management research. Furthermore, this research used multiple data- collection methods, and this can also be considered as a methodological contribution.

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List of Abbreviations

CBSL	Central Bank of Sri Lanka
CEO	Chief Executive Officer
cm	Centimetres
CRM	Customer Relationship Management
CSR	Corporate Social Responsibilities
CTC	Crush-Tear-Curl
CTTA	Colombo Tea Traders Association
ECR	Efficient Consumer Response
ETO	Engineer-to-Order Product
FAO	Food and Agricultural Organisation
GDP	Gross Domestic Product
GSCF	Global Supply Chain Forum
IFC	International Finance Corporation
JIT	Just-in-Time
Kg	Kilograms
Km	Kilometres
MBBS	Bachelor of Medicine
Mn	Million
MT	Metric Tonne
MTO	Make-to-Order Product
Rs	Sri Lankan Rupees
SC	Supply Chain
SCM	Supply Chain Management
SCOR	Supply-Chain Operations References
SLTB	Sri Lanka Tea Board
SSCM	Sustainable Supply Chain Management
TCD	Tea Commissioner's Division
THSDA	Tea Small Holdings Development Authority
TRIPS	Trade-Related Intellectual Property Rights
US\$	United States Dollar
WTO	World Trade Organization

CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

The term “supply chain management” (SCM) first appeared in the literature in the early 1980s. Since then SCM concepts have captured significant attention from academics and practitioners in the field (Cooper, Lambert & Pagh 1997). In a globalised business environment, SCM plays an important role due to increased focus on achieving overall revenue growth and performance, instead of merely trying to achieve individual cost reductions (Chandra & Kumar 2000).

Gardner and Cooper (2003) argued that to achieve optimal supply chain performance, it is essential to map the supply chain to show the overall connectivity of every partner in the system. Gardner and Cooper (2003) further argued that a well-developed supply chain map can be used as a tool to bridge supply chain strategy and corporate strategy. A well-developed supply chain map helps to understand the supply chain design, which in turn helps to bridge corporate strategy, supply chain strategy and sustainable strategy (Cetinkaya, Cuthbertson, Ewer, Klaas-Wissing, Piotrowicz & Tyssen 2011). Bechtel and Jayaram (1997) also argued that strategic planning is the most important component in supply chain management, as it is mainly based on core philosophies such as total quality management, system thinking, cost analysis and re-engineering.

A supply chain map shows the connectivity along the supply chain as it goes beyond the individual’s vision, helping to communicate and implement firms’ visions and strategies collectively (Yacher 2011). Developing a supply chain map serves as a strong starting point to inform not only chain managers, but also CEOs, product developers and engineers, production managers, production and purchasing schedulers, suppliers and customers, helping them to understand the characteristics of their supply chain and to manage it effectively (Farris II 2010). Faisal, Banwet and Shankar (2006) further stressed that developing a supply chain map helps to identify the bottlenecks in the supply chain, manage the supply chain risk, measure performance at each supply chain node, and most importantly, reduce the total supply chain cost. Therefore, it is important

to identify a specific supply chain; only then it is possible to implement a strategy effectively to achieve a competitive advantage.

Furthermore, with increasing supply chain complexity in a dynamic business environment, managers need to make quick decisions to overcome the uncertainties that occur along the supply chain and to meet customer needs (Gattorna 2003). However, without knowing how a supply chain is designed and operated, managers face a greater challenge during the decision-making process and greater overall risk to operations and supply chain performance.

While the SCM concept has been an important topic in the manufacturing sector to achieve competitive advantages in the globalised context for many years, SCM concepts have recently received more attention in the agricultural sector, for several reasons. These include increasing dependence on the agriculture sector, structural changes in the sector, increased competition and customer awareness. The agriculture sector plays a vital role in many developed and developing countries' economies. It has been a major source of income especially for many Asian countries where a larger portion of the population depend mainly on the agricultural industry (Nee 2008). Agricultural developments significantly improve the standard of living and reduce poverty in many countries. A large portion of the poor lives in rural areas, where agriculture or related work is the main source of income. Moreover, the development of agricultural products is an important task in the economy of many developing countries because it increases foreign-exchange earnings (Stamm, Jost, Kreiss, Meier, Pfister, Schukat & Speck 2006).

Salin (1998) highlighted that the agricultural industry is in the middle of major structural changes in operations due to changes in areas such as product characteristics, geographical spread of production and consumption, development of technology and increasing the scale of operation. Additionally, controlling food quality and safety, managing uncertainty in demand and supply in the global market, uncertainty of weather conditions and increasing the awareness of sustainability concepts in the agricultural sector are some of the other key challenges observed in agri-supply chains.

Improving the agri-supply chain increases the potential for the development of basic rural infrastructure such as transport, electricity and water. It helps to reduce transport

and transaction costs. This can improve the interaction between all parties involved in the agri-supply chain and offset the degree to which the relatively lower development in the agriculture sector and lack of employment opportunities in rural areas cause rural-urban migration (Stamm et al. 2006).

Most importantly, the agriculture sector is increasingly following the manufacturing industries in demanding more tightly aligned value chains or supply chains. It has further increased the pressure on the agri-food supply chain. The pressures for chain formation appear to surface in a three-phase sequence (Boehlje, Hofing & Schroeder 1999):

- Capturing efficiencies and controlling costs
- Reducing risk (quality, quantity and safety)
- Responding to customer demands

Due these factors the application of supply chain management concepts in the agricultural sector increasingly becomes important and vital to achieve long-term sustainability.

However, the literature review for this work revealed that most supply chain management literature has focused on the manufacturing sector. Even though the agri-sector – particularly the tea industry – also now includes a manufacturing component, this shift has not yet been explored enough from supply chain management perspectives. This suggests a legitimate need to carry out work in this area, not only because it helps to fill the gap in the literature, but also because it will help to improve an industry that plays an important role in economic development in many developing countries, including Sri Lanka.

1.2 PROBLEM STATEMENT

The tea industry in Sri Lanka plays a vital role in economic development, contributing around 3.2% of the national GDP in Sri Lanka. According to the Sri Lanka Tea Board Annual Report (2011), it plays a vital role in both national and rural income. Most importantly, as highlighted in the Central Bank Annual Report (2012a), the tea industry, as Sri Lanka's second-largest export in terms of earnings, contributes considerably to

national income. It can be argued that the tea industry has a great potential to contribute more to the Sri Lankan economy. However, to survive in the complex business environment, the industry needs to identify a core strategy to gain a competitive advantage and ensure sustainability in a dynamic globalised environment – including, crucially, supply chain management practices.

According to the Food and Agriculture Organization (FAO) (2013a) Sri Lanka was the largest tea exporter in the world a decade ago. However, the FAO database (2013a) shows that Sri Lanka has more recently lost its global market position to other tea-producing countries such as India, China and Kenya in both performance and volume. This indicates that there is a huge challenge for the Sri Lankan tea industry in both supply and demand. On the supply side, tea production has stagnated at between 250 to 300 million kilograms over many decades, while production costs have increased significantly, to where Sri Lanka has the highest tea-production costs in the world (FAO 2013a). On the demand side, increased globalised competition and changes in customers' expectations have increased pressure on the Sri Lankan tea industry. Furthermore, there has recently been greater attention on sustainability concepts, as they have a significant impact on agri-supply chains. This has further increased the challenges to and pressure on tea producers. Despite the problems faced by the industry, there is a lack of research in its supply chain management aspects.

A review of the literature found that most of the research carried out in the tea industry has been focused on social issues (Herath & Weersink 2003; Herath & Weersink 2006; Herath & Weersink 2007; Herath & Weersink 2009; Herath 2002) such as labour (Wickramasinghe & Cameron 2005); health; soil degradation; and other issues related to tea export and marketing (Ganewatta, Waschik, Jayasuriya & Edwards 2005; Kasturiratne 2008; Kasturiratne & Poole 2006). Even though some research has been carried out on agricultural products such as wine (Pullman, Maloni & Dillard 2010) and coffee (Kaplinsky 2004; Kolk 2005; Manning, Boons, von Hagen & Reinecke 2011; Raynolds 2009) these studies have not considered the interrelationship between the triple-bottom-line: environmental, economic and social aspects along the whole agri-supply chain; rather, they have been studied as standalone issues. The consideration of sustainability in the food supply chain is limited (Husti 2006). Most importantly, there

is a gap in research around sustainability in the agri-food supply chain, especially for crops such as tea, where there is a significant impact on the triple-bottom-line. Therefore, due to the fact that the tea supply chain plays an important role in economic activity and the increased globalisation and integration of global supply networks, it is important to identify the factors that influence a sustainable supply chain in the long term. Hence, this thesis aims to explore the Sri Lankan tea supply chain and to identify the possible influencing factors on a sustainable tea supply and managing the tea supply chain.

1.3 OBJECTIVE OF THE THESIS

The overall objective of this research is to identify the influencing factors on a sustainable tea supply chain in Sri Lanka. The research aims to achieve the following specific objectives:

1. Map the tea supply chain in Sri Lanka and explore issues of sustainable supply.
2. Pinpoint the factors that affect the sustainability of the tea industry.
3. Explore, when and how the factors identified above affect sustainable supply.
4. Establish the factors that have an impact on the future sustainability of the Sri Lankan tea industry.

1.4 RESEARCH QUESTION

Based on the research objectives listed above, the main research question is framed as:

“What are the influencing factors for maintaining sustainable supply within the Sri Lankan tea industry?”

To answer this main research question and to achieve the research objectives, a comprehensive literature review was first undertaken in the supply chain management area, specifically focusing on areas such as sustainability, sustainable supply chain management practices, supply chain mapping and agri-supply chains. Based on the literature review the following four subsidiary research questions (RQs) were identified:

RQ1 - What is sustainable supply in the context of the Sri Lankan tea industry?

RQ2 - What are the influencing factors on sustainable tea supply chain management in Sri Lanka?

RQ3 - How do these factors affect the tea supply chain?

RQ4 - In what capacity do they affect the future sustainability of the tea supply chain and its performance within Sri Lanka?

The linkage between the research objectives and the subsidiary research questions and the gaps addressed by this research are presented in Table 1-1.

Table 1-1: Research Objectives, Subsidiary Research Questions and Gaps Addressed by the Study

Research Objectives	Research Questions	Gaps to be Addressed
Map the tea supply chain in Sri Lanka and explore issues of sustainable supply.	RQ1 – What is sustainable supply in the context of the Sri Lankan tea industry?	Incomplete understanding of the processes of the sustainable tea supply chain and their operations, particularly in Sri Lanka
Pinpoint the factors that affect the sustainability of the tea industry.	RQ2 – What are the influencing factors on sustainable tea supply chain management in Sri Lanka?	Incomplete understanding of the factors that influence the sustainability of the tea industry, particularly in Sri Lanka Inadequate empirical evidence from an SCM perspective
Explore when and how the factors identified above affect sustainable supply.	RQ3 – How do these factors affect the tea supply chain?	Lack of understanding of the magnitude of influences and their effect on sustainable tea supply, particularly in the Sri Lankan tea supply chain
Establish the factors that have an impact on the future sustainability of the Sri Lankan tea industry	RQ4 – In what capacity do they affect the future sustainability of the tea supply chain and its performance within Sri Lanka?	Lack of understanding of the long-term sustainability of the industry and its vulnerability, and lack of a framework to identify the factors affecting it

The literature shows that the understanding of the processes and overall operations of the tea supply chain, particularly in Sri Lanka, is incomplete. Therefore, RQ1 aims to fill this gap by exploring the operations of the tea supply chain. As a first step, exploring and mapping the tea supply chain is critical, as without understandings the connectivity between supply chain partners, it is not possible to explore what sustainable supply is or what factors influence it.

Furthermore, to answer RQ2, it is essential to map the tea supply chain and understand the meaning of sustainable supply, as identifying the influencing factors will depend on the basic understanding of the supply chain and sustainable supply concepts. Once the key influencing factors are identified, RQ3 explores when and how these factors affect sustainable supply, particularly in the Sri Lankan tea supply chain, and it aims to fill the research gap accordingly. Based on these findings, RQ4 aims to identify which factors have an effect on the future sustainability of the tea supply chain in Sri Lanka.

It should be noted that even though this research mainly focuses on the Sri Lankan tea industry and its supply chain, the findings are relevant to different SCM theories and concepts, as the tea supply chain, which is a combination of farming and manufacturing supply chains, has similar characteristics to other manufacturing supply chains. This point will be further explored in Section 1.7.

1.5 SCOPE OF THE RESEARCH

The main focus of this research is on the tea supply chain which is an agri-supply chain. This research uses the tea industry in Sri Lanka as a case study. The tea industry has been selected because of the significant role it plays in the social, economic and environmental aspects in the country, where it represents a resource-intensive and labour-intensive industry. Furthermore, the industry makes significant contributions to the national and rural economy (as explained in Section 1.2). The population for this study includes stakeholders in the tea supply chain, from farmers to exporters within Sri Lanka; the chain includes large-scale farmers, tea-smallholders, tea manufacturers (both private and estate factories), brokers, value-added tea producers, tea exporters, tea importers and regulating authorities such as the Sri Lanka Tea Board, Tea Small Holding Authority and other related associations. Additionally, overseas tea importers in Australia are included in the sample. The respondents are made up of senior managers at both administration and operation levels, as they have a comprehensive knowledge of the characteristics of the operations, strategies and performance levels of the industry.

With respect to the theoretical aspects the relevant theories related to supply chain management have been selected and explored in this study. This includes the

transaction-cost theory, system theory, game theory, strategic theories such as resource-based theory and competitive advantage, and psychological theories including organisational learning and networks and inter-organisational networks. This study directly relates to some of these theories, which are discussed at length in Chapter Two.

1.6 RESEARCH APPROACH AND METHOD

A comprehensive literature review on different research methods was carried out before finalising the research design used in this research. The literature review shows that due to the explorative nature of the study, a qualitative research approach is more suitable, as it provides the opportunity to explore the topic under study. For example Merriam (2002) highlighted that qualitative research is appropriate to explore the individuals' interactions and experiences that are relevant to the research area in the real world. According to Creswell (2003) qualitative research generally explores the theoretical ideas or facts that are related to the area of research using a variety of data sources such as interviews, secondary documents and observations.

The literature shows several qualitative research approaches, such as narrative research, phenomenology, ethnography, grounded-theory studies and case studies, that a researcher can use in explorative research (Creswell 2003). Among them, qualitative research strategies such as grounded-theory and case study approaches were explored, as they were identified as potential appropriate strategies to use in this study due to its explorative nature.

Case studies are also used for a qualitative research approach where they can be used to generate theories. "The case study is a research strategy which focuses on understanding the dynamics present within single settings" (Eisenhardt 1989, p. 534). Woodside (2010) says this single setting can be a process, person, household, organisation, group, a industry, a culture or a nationality. As indicated by Dooley (2002), case-study research usually focuses on a specific phenomenon and attempts to understand it completely.

The grounded-theory approach first introduced by Glaser and Strauss in 1967, is also appropriate for developing new theories from data that can be useful for practitioners, as

it can provide some insights on developing and controlling their business operations (Locke 2001).

Since this study is explorative by the nature of the research question (see Section 1.4), a case-study approach was chosen, using the Sri Lankan Tea Industry as the case.

Eisenhardt (1989) says that the case-study uses multiple data-collection methods, including interviews, observation and secondary data. To satisfy the methodological requirements, this research uses focus-group discussions and individual interviews as the main source of data collection. In addition, secondary data such as annual reports, industry data and statistics, is also used to support the findings. As a part of the research several plantations and processing plants were visited to attain a better understanding of the supply chain operations involved in the tea supply chain. The triangulation of data through using different data-collection methods helped not only to enrich the findings but also to increase the validity and the reliability of the findings.

This research uses four focus-group discussions and 26 individual interviews. As highlighted by Bryman and Bell (2003), a moderator/facilitator was used to guide the focus-group discussion. The author's supervisor, who visited Sri Lanka during the data-collection process, served as the moderator for focus-group discussions. He also participated in five individual interviews and two field visits: one to a large-scale plantation (including an estate tea factory) in Nuwara-Eliya district and one to the tea auction house in Colombo (together with the author). While all focus-group discussions were tape-recorded, only 24 individual interviews were tape-recorded as the other two participants did not provide consent to record the interview due to official restrictions. Additionally, the author took notes during the interviews and field visits to increase the validity and reliability of the information. The tape-recorded interviews were transcribed using NVivo, and analysis was carried out using NVivo software. Analysis techniques such as content analysis and coding transcriptions and secondary documents were used in this study.

1.7 JUSTIFICATION FOR AND CONTRIBUTION FROM RESEARCH

The contribution of this study comprises four perspectives: theoretical, empirical, practical and policy. From the theoretical perspective, this study enhances the understanding of sustainable supply chain concepts in the tea supply chain within the Sri Lankan context. Furthermore, these concepts contribute to fill the gap in existing research in the sustainable supply chain management and sustainable agri-supply management fields. The theoretical contribution is concerned with three areas. First, it introduces the link between the new concepts of supply chain mapping and supply chain design. These concepts and models that are developed on the tea supply chain are an added contribution to the agri-supply chain research. Second, the influencing factors on a sustainable tea supply chain can be considered as added theory to the agri-supply chain context. Third, the study also contributes to system theory, as it shows that focus on collaboration and integration with supply chain partners is essential to enhance the long-term sustainability of the tea supply chain. It also contributes to resource-based theory, mainly because the tea industry is a resource-intensive industry where both tangible and intangible resources play a significant role. This study shows that lack of focus in managing resources effectively and efficiently has been a main reason for the Sri Lankan tea industry to lose its competitive advantage in the global market, and that this has adversely affected the long-term sustainability of the tea supply chain. For example, this research shows that in the global tea market there is a strong acceptance for the quality of the tea that comes under the “Ceylon Tea” brand name. Mills, Platts and Bourne (2003) said that such strong brands can be used to obtain premium prices in the global market. However, the Sri Lankan producers have outsourced their brand name, as they mainly export tea as bulk-teas, so that the value-added operations are completed by the overseas buyers. These empirical results provide real-life examples to these theoretical areas and show that a complete understanding of these theories is important to achieve long-term sustainability, especially in the Sri Lankan context.

From a practical perspective, the study provides insight for managers in the tea industry regarding the challenges in the industry and how they affect the long-term sustainability of their business and operations. These findings will further shed light on formulating their firms’ strategies to overcome the challenges and to achieve competitive advantage

thereby increasing the long-term sustainability. This study also shows that even though there are resource limitations and policy restrictions, focusing on the triple-bottom-line principle – social, economic and environmental factors – can enhance the performance of the industry.

With respect to policy implications, the research findings provide an overall view of the industry and the challenges faced by the industry operators. Government officials and the policy-makers in the sector can use these findings as a foundation to develop strategies and policies to enhance the tangible and intangible benefits for industry operators and customers. This in turn, can not only increase the performance of the industry, but also help to expand operations, which will in turn help to improve the national economy while increasing the opportunities to enhance the long-term sustainability.

To date, SCM research has mainly employed quantitative research using deductive approaches and a positivist paradigm. There has been a greater need for qualitative research, as business operations are complex and subjective, and quantitative research cannot capture their real essence. Even though, qualitative research approaches have recently begun to appear in the SCM literature, there is still a lack of explorative research in areas such as agri-supply chains and sustainable supply chain management. This research also helps to fill this gap as it has used a qualitative approach and multiple data-collection methods such as in-depth focus-group discussions, interviews and secondary data, while the data analysis was carried out using qualitative methods such as coding and content analysis. This study can then be considered as a methodological contribution to the SCM research arena.

1.8 ETHICAL ISSUES

Special attention was given to the ethical considerations of this research because it involves human interactions. As mentioned in the National Statement on Ethical Conduct in Human Research – 2007 (2013), the author took every possible measure to give the required confidentiality for the information collected, treat all participants equally and respect their individual values and beliefs. The research was conducted in an ethical manner in accordance with the requirements of the University of

Wollongong's Code of Practice – Research and the Australian Code for Research – Responsible Conduct of Research. The researcher obtained ethics approval from the university Ethics Committee before conducting the field work. Participants' consent was obtained before inviting them for focus-group discussions and interviews. A research information sheet and interview guide approved by the Ethics Committee was given to the participants in advance. The information collected through interviews was stored on a password-secured computer.

1.9 POSSIBLE LIMITATIONS OF RESEARCH

Even though the research successfully answers the research question and contributes to the sustainable supply chain management field, it has some limitations, including limitations of the sample and the time frame. The number of stakeholders involved in the tea sector is large, making qualitative research potentially unwieldy. However, this limitation was minimised by using a number of focus groups and interviews until data saturation was reached. The study adopted a cross-sectional design, where data was collected in three different time frames to minimise these limitations.

Moreover, final consumers of the product (that is, people who buy tea for their own consumption) and input suppliers were not directly involved in the research. The lack of knowledge about supply chain management concepts and terms among the participants (especially tea smallholders and producers) was another limitation of this research. Furthermore, during data collection, the sample covered only four geographical areas in the country, which may also be considered as a limitation.

1.10 THESIS STRUCTURE

This thesis includes eight chapters. This opening chapter provides an introduction to the thesis, the research objectives, the research questions and the scope of the study.

Chapter Two provides the theoretical background for concepts of sustainability and supply chain management. The main objective of this chapter is to establish a basic understanding of sustainable supply chain management aspects. It also reviews the agri-supply chain, critically reviews the existing supply chain practices and concepts related

to supply chain management and explores theories related to supply chain management, which is used to explain the analysis of the current research.

Chapter Three provides an introduction to the Sri Lankan tea industry. It provides a brief history of the tea industry, explores the tea industry in Sri Lanka, provides an industry analysis to understand the dynamics in the industry compared to the global tea industry and explores the current published documents to identify the existing challenges faced by the industry.

Chapter Four describes the theoretical underpinnings of the methodology and the design used in this research. It begins with the philosophical underpinnings of the research to lay down the rationale for the research design, explains the research design used to answer the research questions and provides a justification for using a qualitative approach. It also explains the ethical considerations and the challenges faced during the research.

Chapter Five explains the operations in the tea supply chain and maps the supply chain to illustrate connectivity from end-to-end by exploring the data collected through focus-group discussions and individual interviews, as well as secondary documents such as reports and industry data. It describes the main responsibilities, operations and bottlenecks at each node in the tea supply chain, and explores the connectivity between them.

Chapter Six identifies the major influencing factors on the sustainable tea supply. Data was analysed using NVivo software, and six major themes as main influencing areas on the sustainability of the tea supply chain were identified using coding and content analysis.

Chapter Seven discusses the findings with a focus on the research questions, and links the theoretical underpinnings to the factors identified in Chapter Six.

Chapter Eight summarises the major findings, explains the limitations of the research, provides some recommendations to industry stakeholders and suggests areas for future study.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The previous chapter establishes the scene for the study by providing an introduction and overview for this research; presenting the research problem, question and objective and the limitations; and highlighting the significance of the research and justifications for choosing the Sri Lankan tea industry. This chapter aims to establish the academic foundation for the study from a theoretical perspective.

The main purpose of this chapter is to explore the existing relevant literature related to supply chain management and to understand the basic requirements for sustainable supply chain management, especially focusing on the agri-supply chain. Section 2.2 starts with providing an overall background and importance of supply chain management and sustainable supply chain management concepts. Then it defines supply chain and supply network concepts as well as supply chain management theory, because understanding these concepts provides a basic foundation to define the Sri Lankan tea supply chain which is the first objective of this research. This chapter also explores sustainability and sustainable supply chain management concepts, as these areas are the focal point of this research. It then explores relevant theories that have been used to develop supply chain management theories and concepts. This, in turn, highlights the need for various resources to be managed across many organisations, and for supply chain structures to be designed to achieve collective benefits. For this purpose strategies are necessary that are beneficial to all stakeholders in the supply network, including customers. Hence, several antecedent theories such as system theory, agency theory, network theory, game theory, contingency theory and economic theories have shaped the development of supply chain management theories. Since the Sri Lankan tea supply chain is not yet sufficiently explored, having a better understand of the antecedent theories and their relevance will further strengthen the current research and support its theoretical foundations. Section 2.3 explores the literature relating to agri-supply chain. It is important to explore the literature in agri-supply chain because the current study

focuses on the tea supply chain, which is considered as an agri-supply chain. Section 2.4 explores the literature related to the concept of sustainable supply, since understanding this term is important to develop the research objectives and research questions. This section shows that there is no common definition for sustainable supply, and indicates that there is a gap in the literature, which the current research can fill. Section 2.5 explores the supply network and mapping concepts. It highlights that identifying the partners in a supply chain or supply network is important in understanding the dynamics of the supply network and implementing any strategic decisions. It also explores supply chain mapping techniques and their relevance to the strategic decision-making process. Section 2.6 presents some important practices related to supply chain management to identify areas that are essential to explore in the current research. Section 2.7, aims to establish the research questions based on the literature review. This chapter ends with a summary.

2.2 INTRODUCTION TO SUPPLY CHAIN MANAGEMENT

In the current globalised business environment, supply chain management (SCM) has become important for all businesses due to the increased focus on overall revenue growth and performance, instead of merely trying to achieve individual cost reductions and functional or individual efficiencies (Chandra & Kumar 2000). Many production and service firms around the world have identified that transferring costs to other partners either upstream (suppliers) or downstream (customers) along the supply chain does not increase competitive advantage (Harland 1996). Instead, it increases the overall supply chain cost, which ultimately affects the performance of the whole supply chain. Hence, rather than focusing on a larger share of profits and on individual performance, many industries around the world have focused during the last two decades on achieving overall supply chain performance and excellence, optimisation and integration between all actors in the supply chain (Chandra & Kumar 2000). In recent times, due to the increased awareness of social and ethical concepts, sustainable supply chain management (SSCM) also has gained more attention in the SCM field.

2.2.1 Defining Supply Chain and Supply Network Concepts

There are many definitions for the concept of the supply chain (SC) that focus on different aspects. For example, Chow, Heaven et al. (1994) and La Londe and Masters (1994) defined a supply chain as a chain of entities that connects upstream and downstream to deliver goods to end users. Christopher (1998) defined supply chain as a network of organisations that are linked to deliver value in goods and services to the end consumer. Mentzer, DeWitt et al. (2001) highlighted that along with the flow of products, the supply chain incorporates the flow of finance and information from the original source to the customer. The most recent definitions of the supply chain go further, emphasising the integration of processes and resources to deliver value-added products and services to end users (Sundaram, Zhou, Piramuthu & Pienaar 2010).

In current supply chain management research, the term “value chain” is used frequently. A value chain is described as a combination of many activities required to supply a product or service, starting from inception through many phases including design, production, delivery to the ultimate consumer and disposal of obsolete products (Kaplinsky & Morris 2001).

Porter (1993) introduced the value chain concept into the research world. Figure 2-1 shows the importance of connecting primary activities with supporting activities to increase the profit margin. The value chain concept goes beyond industries themselves, focusing on the whole supply chain. Kaplinsky and Morris (2001) explained that in the real world, value chains are more complex and linked with more than one chain.

As explained above, when defining a supply chain, the focus was initially on functional coordination to reduce individual firms’ supply chain costs. At this level managers mainly look at the immediate suppliers, immediate customers and logistics activities such as warehousing, transportation and production within the firm. This type of supply chain is called a direct supply chain (Figure 2-2(a)) (Ballou 2004; La Londe & Masters 1994).

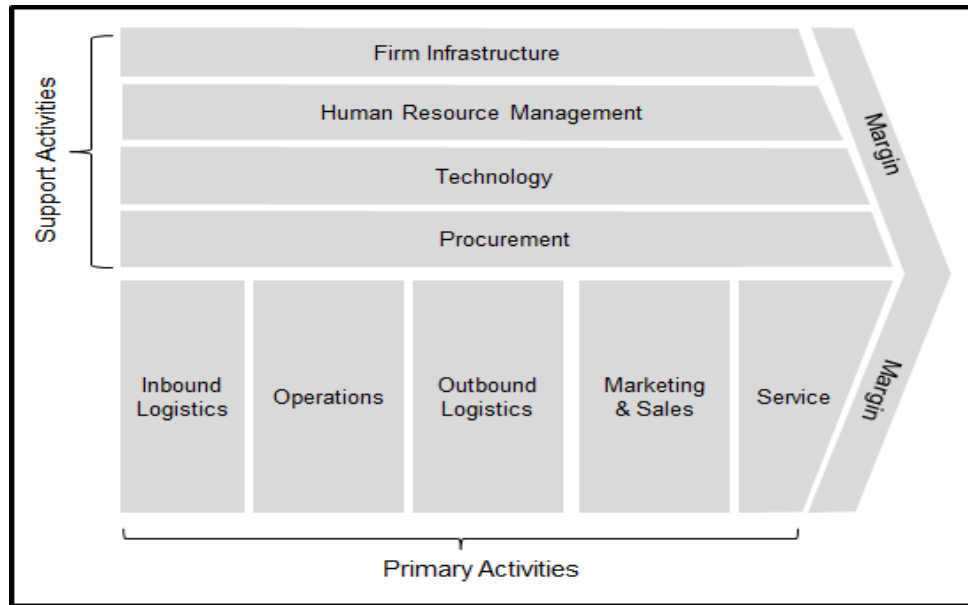


Figure 2-1: Porter's Value Chain

Source: Porter (1993)

Thereafter, the supply chain concept was extended to the supplier's suppliers and downstream players such as wholesalers, retailers and the ultimate consumers. At this stage, managers tried to increase the coordination between the internal functional areas and the relevant functional areas of the external partners along the chain. This type of supply chain is called an extended supply chain (Figure 2-2(b)) (Lambert, Ellram & Stock 1998).

The next generation of supply chain evolution tried to align other activities, such as service providers, research and development, infrastructure suppliers, financial suppliers and marketing, that support the main partners along the chain. At this level coordination was increased between the most important stakeholders along the chain, which in turn increased the connectivity of the processes and activities that support the value addition of the final product or service. A detailed generalised supply chain is shown in Figure 2-2(c), which shows that the value-creation processes are integrated from end to end of the supply chain (Gattorna 2003; Mentzer et al. 2001).

However, supply chains are more complex than an ultimate supply chain, because an individual company simultaneously participates in numerous supply chains (Bowersox, Closs & Cooper 2007), as shown in Figure 2-2(d). This figure shows a non-linear, complex network that is intertwined with many supply chains (Cavinato, Flynn &

Kauffman 2006; Mentzer et al. 2001). Styger (2009) argued that such a supply network is more complex than a linear supply chain, calling it “a non-rational supply network” (Figure 2-3).

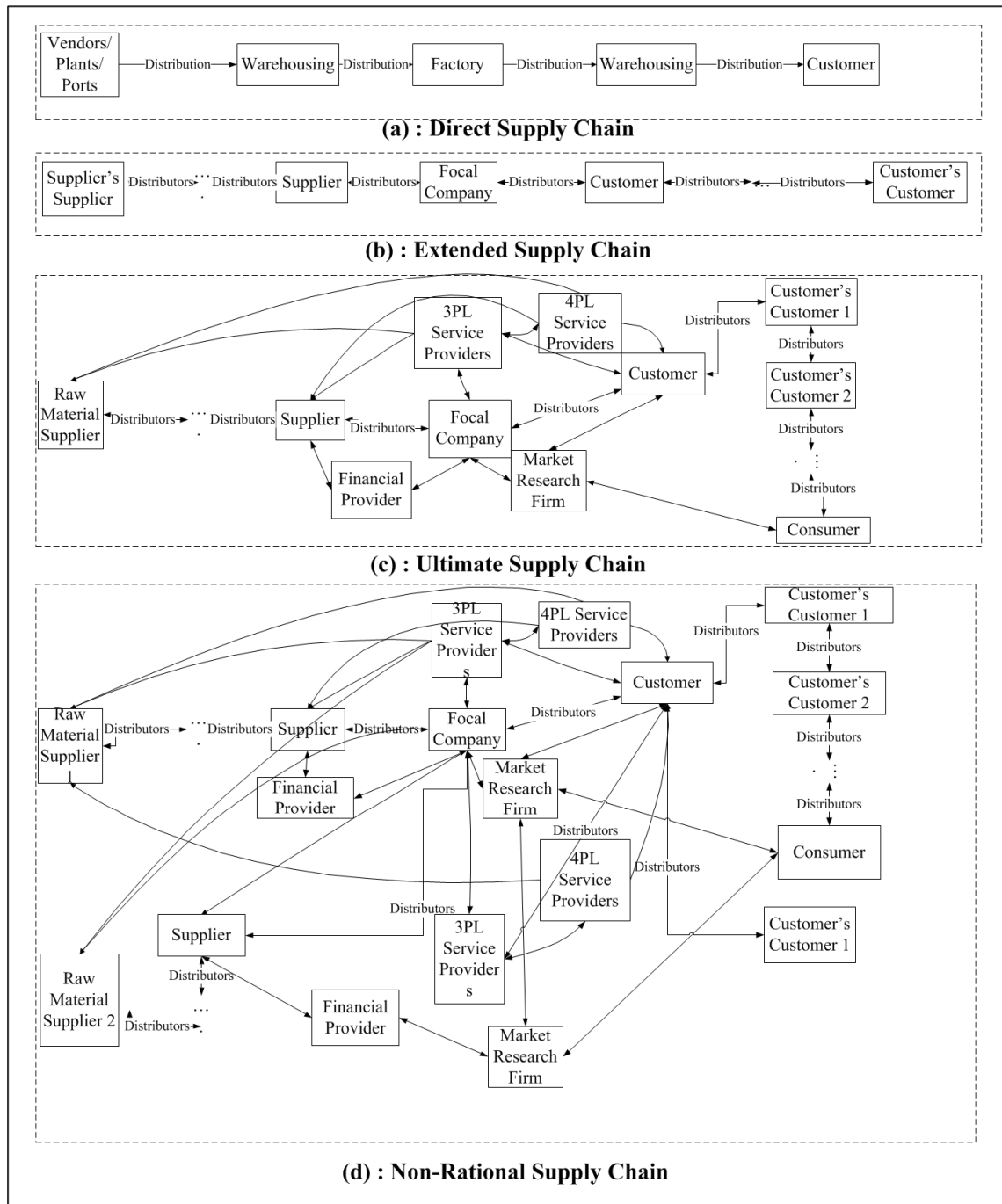


Figure 2-2: Evolution of Supply Chain Concept

Adapted from Mentzer et al.(2001)

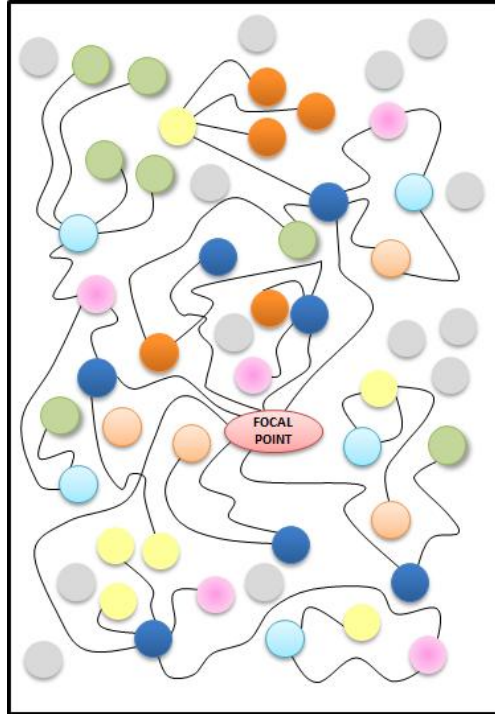


Figure 2-3: Schematic Non-Rational Supply Chain

Source: Styger (2009)

A supply chain comprises activities that are related to product formation and flow, from initial design starting with early raw-materials suppliers to the end user, and includes not only the material flow but also the information and cash flow from end to end. Integrating these activities requires an organisation to synchronise not only their internal activities but also the logistics operations of the external organisations in the network. Understanding the overall connectivity of the supply chain (or more accurately, the supply network) is now becoming extremely important, as the competition is now understood to be between supply chains rather than individual companies (Gattorna 2000). For example, in an agri-supply chain it is essential to integrate and manage all associated activities from “seed to store”, or in a textile supply chain from “concept to consumer” (Hines 2004). Therefore, strategies to manage a complex supply network are important, and thus supply chain management plays a significant role in any business.

Walters and Lancaster (2000) pointed out that it is essential to consider the customer as the first link in developing the value chain or the supply network. They further said that developing a “customer-centric” value chain required the identification of:

- Customer needs and priorities
- The channels that can satisfy those needs and priorities
- The services and products best suited to flow through those channels
- The inputs and raw materials required to create the products and services
- The assets and core competencies essential to the inputs and raw materials.

Walters and Lancaster (2000) further argued that the value of any product or service can be increased only if it has the ability to fulfil the consumer's needs and priorities. Otherwise customers will readily shift to another supplier. Companies thus need to define a value strategy that places the firm in the right position in the value chain, doing the right business and providing the right product and service to the right market segment with the right value-adding operations. Seo, Ranganathan and Babad (2008) highlighted that improving customer satisfaction through implementing appropriate value chain strategies will increase customer retention. It should be noted that acquiring a new customer is more expensive than retaining an existing customer. According to Anderson and Mittal (2000) increasing customer retention results in increased profit margins; it is also one of the best ways attracting new customers, as one satisfied customer will recommend the product to several other people.

2.2.2 Defining Supply Chain Management

“Supply chain management” is no longer a new concept in the business world. However, SCM has been defined by various researchers from different perspectives (Table 2-1). SCM can be defined as a combination of integrated planning and coordination along with the control of all processes and activities along the supply chain to provide a value-added service while reducing the total cost for all stakeholders in the supply chain (Van der Vorst, Beulens & Van Beek 2000).

Table 2-1: Some Selected Definitions for Logistics/SCM

<i>Author/Source</i>	<i>Definition</i>
Oxford Dictionary definition (2009)	“The branch of military science having to do with procuring, maintaining and transporting material, personnel and facilities”
Van der Vorst, (2000)	“The integrated planning, co-ordination and control of all business processes and activities in the supply chain to deliver superior consumer value at less cost to the supply chain as a whole while satisfying the variable requirements of the other stakeholders in the supply chain (e.g. government and NGOs)”
Institute of Supply Management	“[T]he design and management of seamless, value-added processes across organizational boundaries to meet the real needs of the end customer”
Cooper, Lambert and Pagh (1997)	“[A]n integrative philosophy to manage the total flow of a distribution channel from supplier to the ultimate user”
La Londe and Masters (1994)	Supply chain strategy includes “... two or more firms in a supply chain entering into a long-term agreement;...the development of trust and commitment to the relationship; ... the integration of logistics activities involving the sharing of demand and sales data;... the potential for a shift in the locus of control of the logistics process”
Stevens (1993)	“The objective of managing the supply chain is to synchronize the requirements of the customer with the flow of materials from suppliers in order to affect a balance between what are often seen as conflicting goals of high customer service, low inventory management and low unit cost.”
Jones & Riley (1985)	“Supply chain management deals with the total flow of materials from suppliers through end users”

Source: Collated by the Author

According to Hakansson and Persson (2004) SCM is a series of activities and business processes that share and transfer physical materials, information and cash across the chain. Activities such as transport, warehousing and inventory management in both inbound and outbound streams are identified as important logistics activities. The business processes can be identified as operations, research and development, marketing, customer management and supplier management. It can be seen that traditional SCM is basically a process-oriented management approach where the focus is on sourcing, production and delivery of goods and services to end customers (Harland 1996).

SCM incorporates various management philosophies or processes (Mentzer et al. 2001). Many definitions of SCM highlight the importance of integration of the information and materials flow along the supply chain from raw-material suppliers to the final consumer. They also highlight the value of sharing resources and information as well as having win-win relationships to reduce the overall cost and risk along the supply chain. Research shows that the transformation of the world economy and the shift of power, people, capital and other resources have exerted extra pressure on business operations during last few decades. In such a dynamic business environment, better strategies are essential for achieving competitive advantage (Fawcett, Ellram & Ogden 2007).

SCM consists of three closely interrelated elements: the network structure, business processes and management components (Figure 2-4). The network structure comprises intra-firm and inter-firm networks. Supply chain management processes are the business processes that produce a specific product that valued by customers. The management component is the managerial methods that integrate the business processes with the network structure along the supply chain (Mahadevan, Samaranayake & Matawie 2010).

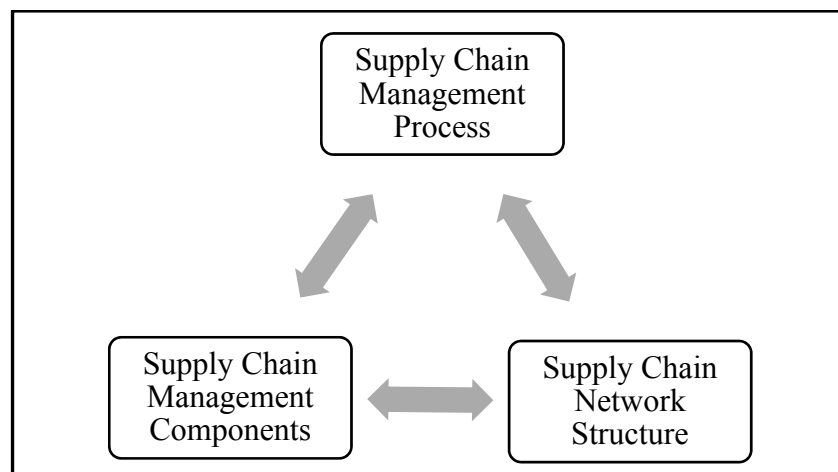


Figure 2-4: Elements in SCM

Source: Mahadevan, Samaranayake & Matawie (2010)

SCM is a broad concept that can be described from different perspectives such as purchasing and supply, logistics and transportation, industrial organisation and strategic management (Croom, Romano & Giannakis 2000).

Porter (1986) stressed that to successfully implement an international marketing strategy, a firm must understand the broader perspective of its own operations, including primary operations (such as production and logistics) and other supporting activities (such as sourcing, IT and technology, infrastructure and human resources). He called it a value chain and highlighted that to gain competitive advantage in the globalised business environment, it is essential to configure the firm's operations globally. It also requires coordinating operations globally and better globalised supply chain management practices.

With the introduction of this perception, the term "value chain management" entered the academic world. To reflect the globalised environment within which most supply chains now operate, the term "global value chain" is widely used. McLaren, Head and Yuan (2002) stressed that even though the term "supply chain management" is still popular, some experts believe that the term "value chain", introduced by Porter (1986), is more suitable to explain operations and management, since it highlights the value-addition process along the chain locally and internationally. However, the literature still uses both terms interchangeably.

Whatever the term, the concept has been evolved over time, with more focus on providing better customer service. In the beginning some authors recognised the supply chain as a continuous chain of functional areas that help move materials from suppliers to consumers (Houlihan 1985; Jones & Riley 1985). However, at that stage no emphasis was given to the information flow along the supply chain (Cigolini, Cozzi & Perona 2004). The next generation of SCM research mainly focused on supply chain efficiency improvement in the logistics and transportation areas.

Traditionally, supply chain strategies were characterised as either push, pull or a combination of both. Push-based supply chains tried to achieve efficiency by continuously producing until raw materials were completely used. The main focus was on managing internal activities and satisfying internal customers. A traditional "push" supply chain system (Figure 2-5) resulted in a "silo mentality" not only between but also within firms as different functional groups inside a company worked independently to achieve the organisational strategic objectives while mainly focusing on individual functional efficiency. There was a lack of coordination between functional-group

activities (Simchi-Levi, Kaminsky & Simchi-Levi 2008). For example, the purchasing function would be concerned with reducing purchasing cost by buying raw material in bulk, resulting in poor performance in inventory and warehouse management. The purchasing function would be awarded for increasing efficiency by achieving the lowest unit cost through economies of scale despite the issue that the cost was transferred to inventory and warehousing.

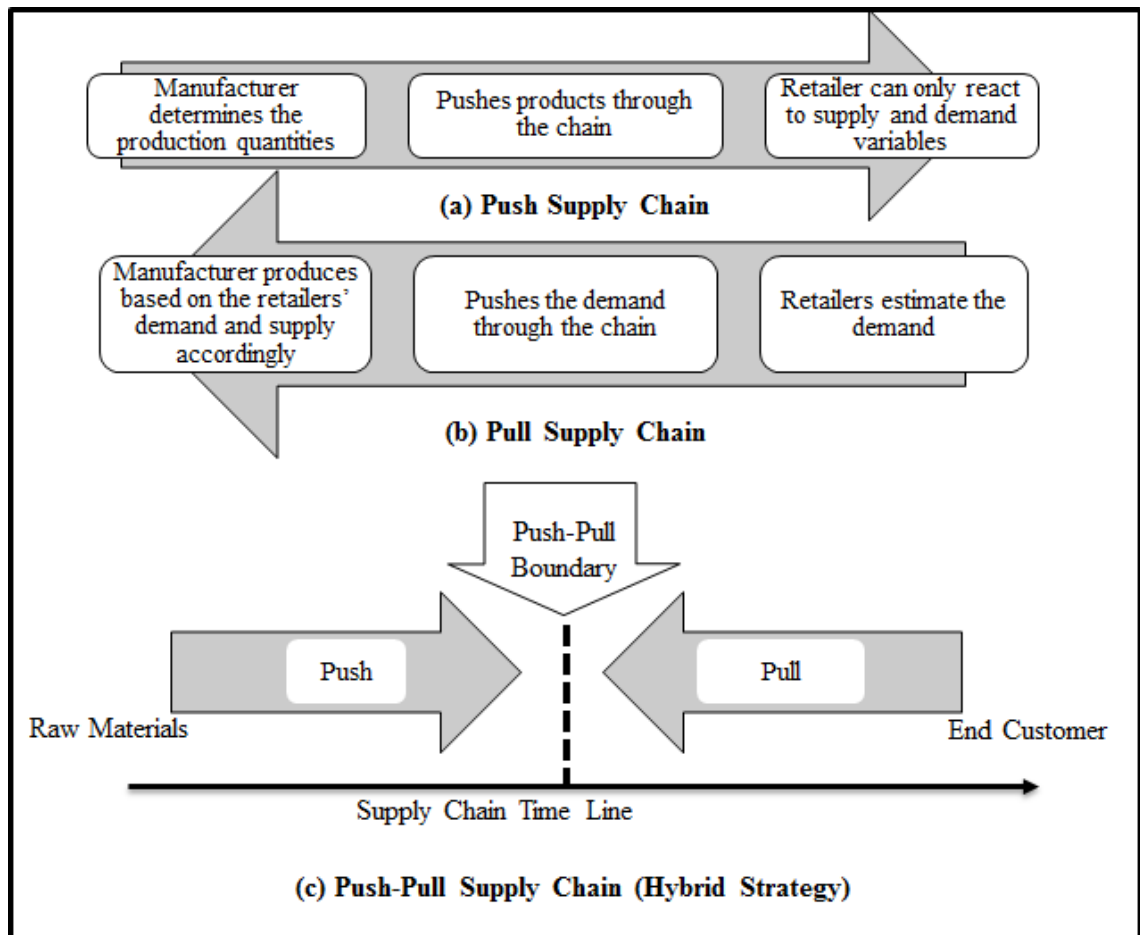


Figure 2-5 : Supply Chain Inventory Management

Source: adapted from Simchi-Levi, Kaminsky & Simchi-Levi (2004)

In contrast a “pull” supply chain operates mainly based on demand, where producers make products according to the buyers’ demand, and buyers are responsible for holding inventory, and for the costs associated with that (Simchi-Levi, Kaminsky & Simchi-Levi 2004).

Both these strategies have a disadvantage, in that one partner has to keep inventory and bear the cost. It also can reduce customer service due to items being out of stock. To minimise such drawbacks, a hybrid push-pull strategy has evolved. Producers maintain work-in-process (WIP) inventories until they receive an order from the buyers. The pull policy is implemented at the final stage and producers complete the production accordingly (Simchi-Levi, Kaminsky & Simchi-Levi 2004). Hahapatra, Yu and Mahmoodi (2012) stressed that the implementation of these three strategies depends on factors such as the nature of the product, the availability of raw materials and product value. Zhang (2009) highlighted that other factors such as demand volume and lead time also need to be considered in choosing the management policy.

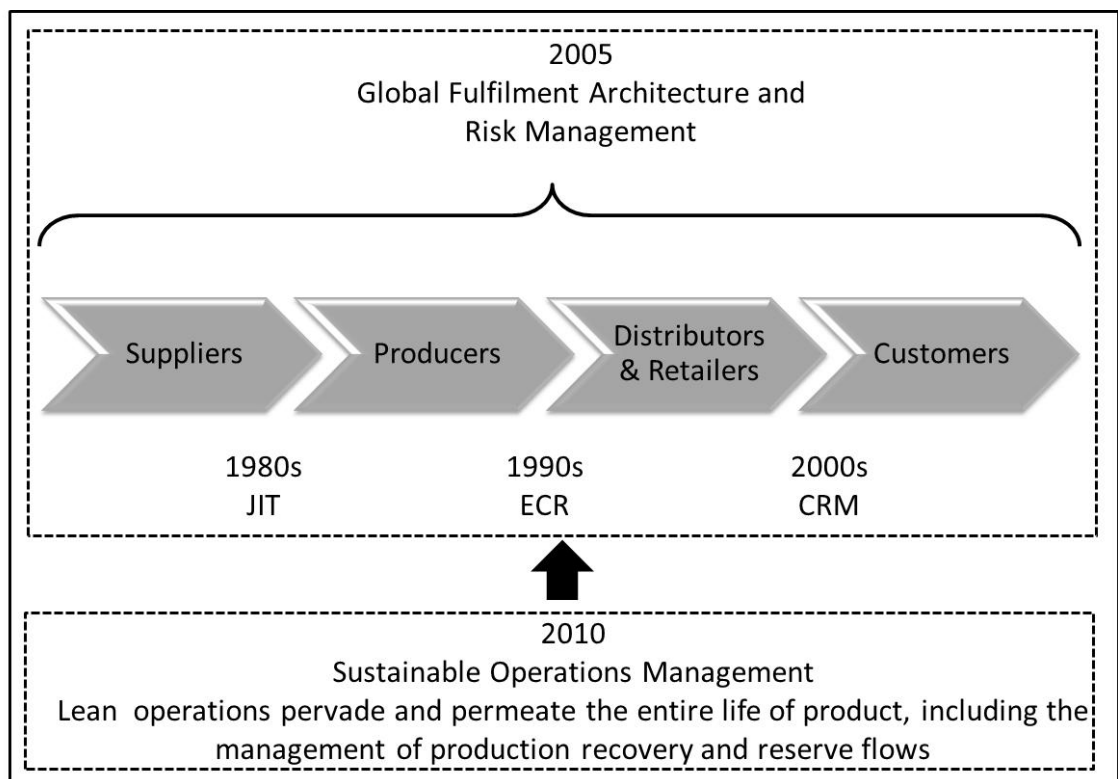


Figure 2-6: Value Chain Restructuring, 1980–2010

Source: Kleindorfer, Singhal & Van Wassenhove (2005)

Meanwhile, as shown in Figure 2-6 the face of competition has changed during the last four decades (Kleindorfer, Singhal & Van Wassenhove 2005). In the 1980s the basis for competition was flexibility in production, time and quality of goods with less inventory (Tan 2001). Cigolini et al. (2004) pointed out that researchers moved towards applying

system-wide coordination of both material and information flow in the supply chain, focusing on improving quality and service.

Alvarado and Kotzab (2001) argued that the SCM concept subsequently moved towards redesigning the whole supply chain to maximise the efficiency and effectiveness of materials and information flow. The main focus was on having strategic alliances among a few selected strategic partners to increase performance along the supply chain (Cigolini, Cozzi & Perona 2004).

With the increase of customer awareness, attention subsequently moved during 1990s and 2000s towards delivering defect-free products, faster and on time; it became a necessity not only to get a competitive advantage in the market but also to survive in the market itself (Kleindorfer, Singhal & Van Wassenhove 2005). During this period efficient consumer response and customer relationship management were more important. Efficient consumer response was a strategy used to improve the relationships between producers/suppliers and distributors on the supply chain (Hill 2000). Customer relationship management was implemented to improve relationships with major customers while increasing the value offered to both customers and stakeholders (Payne & Frow 2005).

The next generation of SCM focused on managing the global supply risk, which became vital with the introduction of the concept of globalisation (Kleindorfer, Singhal & Van Wassenhove 2005). Subsequently, with increasing awareness of sustainability concepts in the globalised context, sustainability of operations management became vital virtually all industries and supply chains. According to Van Der Vorst, Beulens and Van Beek (2005), SCM definitions and strategies began to go beyond the traditional financial and tangible benefits, focusing more on intangible values. Such intangible values are associated with the “Triple P” – people, planet and profit – or sustainability concepts. In addition to financial, environmental and social performances also play an important role in supply chain management. Incorporating concepts of sustainability with corporate social responsibility (CSR) has been popular, and an important topic amongst professionals and academics around the world (Mann, Kumar, Kumar & Mann 2010; Ross 1998).

To accommodate these changes, the way of doing business has changed, and business processes have been restructured during last two decades. According to Harland (1996), integration has expanded beyond the firm's boundaries while including all actors along the supply chain in creating long-lasting relationships, while integration has been strengthened by encouraging information sharing between functional groups and other members of the supply chain. Hill (2000) pointed out that the application of SCM concepts is important not only in the industrial sector but also in the service industry and agricultural sector.

Nuthall (2003) pointed out that implementation of better SCM has attracted the attention of senior executives as they have begun to see it as the best way to increase competitive advantage. SCM strategies create the path to achieve a competitive advantage because in a competitive market, the customer stimulates the market and the market conditions stimulate organisational behaviour. To achieve a competitive advantage, organisations are compelled to fulfil market demand or customer needs. Hence operational dimensions such as cost, quality, reliability, speed of delivery, flexibility and responsiveness determine a company's competitive position in the market (Hines 2004). Better SCM strategies allow a company to increase efficiency and effectiveness using minimal resources. Hence, SCM strategies have gained increased attention during the last few decades due to the increased focus on improving the performance of business operations in the competitive global market (Zachariassen & van Liempd 2010).

The application of SCM strategies is still very uncommon in sectors such as agricultural and services (Van der Vorst 2006). Despite the benefits of applying better SCM strategies, many organisations still mainly focus on individual logistical processes (such as material and information flow, manufacturing processes, transportation, warehouses, retailers, service providers and consumers), business processes (such as new product development, marketing, finance and customer relationship management) and the revenue or value a customer is willing to pay.

2.2.3 Defining Sustainability and Sustainable Supply Chain Management

Sustainability, or the sustainable development concept, became prominent in the business world when the "Our Common Future" report was published by the World

Commission on Environment and Development (WCED) in 1987 (Mebratu 1998). Even though there are many definitions for sustainable development, the definition given by WCED (Brundtland 1987, p 8) is the most well-known:

“[sustainability] development that meets the needs of the present without compromising the ability of future generations to meet their needs”.

Carter and Rogers (2008) argued that “Our Common Future” increased the awareness of sustainable development in both developing and industrialised nations. The impact of sustainability goes beyond the individual territory due to the increase of global participation in business (Foran, Lenzen, Dey & Bilek 2005). Galvic and Lukman (2007) pointed out that terms such as minimising waste, pollution control and prevention, global warming, depleting natural resources and minimising the use of natural resources were already in use, but received extra emphasis in writings on sustainable development. Sustainability became a major concern not only in earth science but also in other fields such as engineering, health science, management, social science and operations management (Linton, Klassen & Jayaraman 2007). Linton et al. (2007) pointed out that the use of sustainability concepts in management, economics and business research has increased considerably since the 1990s.

Sustainability is an important concept where it has a significant impact on the overall performance and benefits to the triple-bottom-line (Carter & Rogers 2008; McCue 2010), which involves the dependency between society, the economy and the environment (Elkington 1998). Elkington (1998) equated the triple-bottom-line with “continental plates” that move independently, often forgetting their dependency on each other. As a result, various issues in social, economic and ecological areas emerge where these “plates” move under, over or against each other (similar to where earthquakes develop when continental plates moves against each other). Carter and Rogers (2008) also contributed to this concept, arguing that sustainability can be achieved only when social, economic and environmental aspects move together to achieve long-term economic performance and benefits (Figure 2-7). Efforts toward sustainability should consider the interconnectivity of these three aspects.

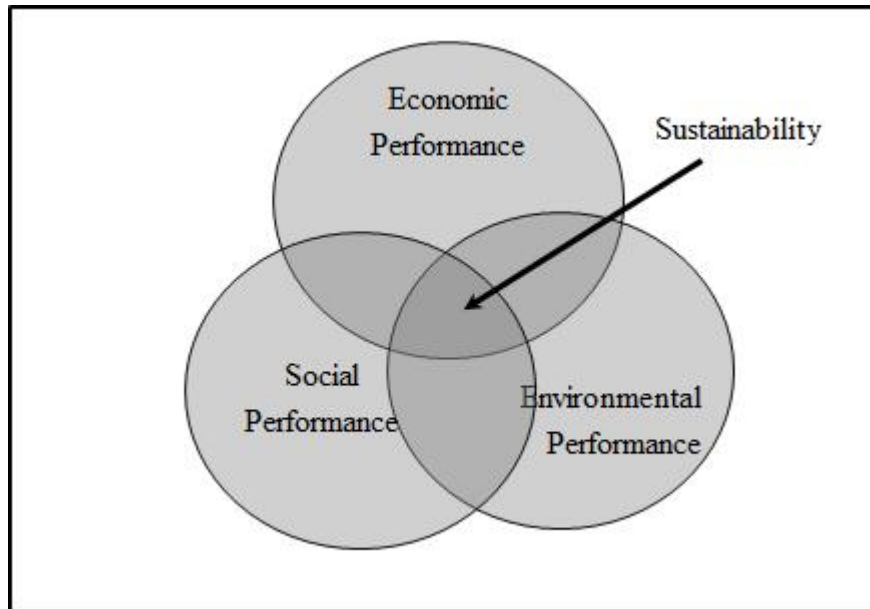


Figure 2-7: Organisational Sustainability and the Triple-Bottom-Line

Source: Carter and Rogers (2008)

Dyllick and Hockerts (2002) identified these three aspects as the business case (economic), the natural case (environmental) and the societal case (social). They suggested six criteria to achieve corporate sustainability: eco-efficiency, eco-effectiveness, sufficiency, ecological equity, socio-effectiveness and socio-efficiency. They highlighted that even though the firms must satisfy all six criteria to achieve sustainability, many companies only focus on the criteria related to the business case and natural case, ignoring the societal case.

As explained in Section 2.2.1, supply chains now focus on the overall performance along the extended supply chain or network, and the application of the concept of sustainability beyond the individual operations is essential. For example, Fiksel (2010) argues that the scope of sustainability has expanded beyond business processes and corporate boundaries. The sustainability of a product requires consideration not only of the firm's own operations but of the entire supply chain, from raw-material suppliers to consumers. It should also include reverse logistics for obsolete products (Fiksel 2010). By considering the concepts of sustainability and triple-bottom-line, many authors have tried to develop a unified definition for sustainable supply chain management. For example, Seuring and Müller (2008b) defined it as

“... the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e. economic, environmental and social, into account which are derived from customer and stakeholder requirements” (Seuring & Müller 2008b, p. 1700).

According to Carter and Rogers (2008), sustainable supply chain management is defined as

“..... the strategic, transparent integration and achievement of an organization’s social, environmental, and economic goals in the systemic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual company and its supply chains” (Carter & Rogers 2008, p. 368)

All these definitions consider sustainability and the triple-bottom-line and integrate them with SCM concepts. With increasing the awareness of sustainability concepts, the business world has started to pay serious attention and apply the concept in their business operations. For example, even though a decade ago, the slogans among supply chain practitioners were “just-in-time”, efficient consumer response and customer relationship management, today the critical concept is sustainable supply chain management. Supply chain managers tend to look at more-tangible benefits related to the economic, environmental and social aspects of the supply chain management field, and focus on increasing overall efficiency (McCue 2010). Increasing efficiency and benefits is not a new concept; indeed, organisations have been trying for many years to improve their efficiency through various strategies. However, the current focus is typically on increasing performance while achieving long-term sustainability.

Research shows that having a sustainable supply chain that focuses on the triple-bottom-line (economic, social and environmental) is the best way to improve efficiency (Miller 2008). Sub-themes such as purchasing, supply management, environmental issues in logistics and operational issues that have an impact on sustainability from the supply

chain perspective have been studied individually by many researchers (Seuring & Müller 2008a).

Miller (2008) pointed out that efficiency and environmental friendliness work together to facilitate improvement. He focused on five areas of supply chain management where there is a link between efficiency and environmental considerations:

- Streamlining the processes
- Increasing the use of better technology
- Reducing the use of packaging materials and using only recyclable materials
- Optimising the distribution network
- Consolidating unnecessary facilities and services.

Patrick (2007) highlighted that sustainability challenges responses in three aspects of the supply chain:

- Designing and manufacturing sustainable product
- Managing tangible resources sustainably
- Producing sustainable finished goods.

Uncertainty has become a common feature for the manufacturing sector, including the food industry. With globalisation the complexity, as well as the vulnerability to risk, in supply chains has increased (Pai, Kallepalli, Caudill & Zhou 2003). The uncertainty in the agricultural sector is critical because there are additional sustainability challenges due to various factors such as climate change, farm capacity, production lags, volatile markets and price fluctuations (Ameseder, Canavari & Cantore 2009).

Pai et al. (2003) further added that risks such as terrorist activities and widespread diseases also cause serious interruptions to supply chains. Therefore, addressing the risks in the environmental, social and economic contexts is a major challenge. Nidumolu et al. (2009) described five stages that a company needs to consider to pursue sustainability:

- Consider compliance with law as an opportunity.
- Develop a sustainable supply chain.

- Redesign and produce eco-friendly products and services.
- Change the business model to find new ways to deliver and capture value that would give a competitive advantage.
- Evaluate the existing model and keep on updating to avoid pitfalls.

Compliance to law and regulations aid the progress towards sustainability. However, as Nidumolu, Prahalad and Rangaswami (2009), stated environmental laws vary from country to country, making compliance complex in a globalised economy. They further stressed that innovation in technology, production processes and raw materials can offer more opportunities to increase sustainability and integration in the value chain. Integration between channel members can be enhanced with the use of information technology, and will result in performance improvements (Hill 2000).

A sustainable supply chain will depend on the relationship between all partners involved in the business, downstream as well as upstream (Van der Vorst, Beulens & Van Beek 2000). Research indicates that proactive companies consider sustainability more than just complying with environmental laws or “being green”; instead they stress that a sustainable supply chain helps to increase the business value (Darmanata, Somohano, Saad & Perera 2010).

Hutchins and Sutherland (2008) studied the issues related to social sustainability on companies’ supply chain decisions. They evaluated the metrics and indicators on selecting suppliers with respect to the social sustainability and corporate social responsibilities in the supply chain. They suggested four quantifiable social indicators – labour equity, healthcare, injury and philanthropy – as important in the social sustainability of the supply chain.

Until recently most research has focused on these areas individually, without considering the interrelationship among them. Carter and Rogers (2008) pointed out that authors like Craig and Marianne (2004) have studied these issues as standalone issues in areas such as logistics social responsibility and purchasing social responsibility, and although they have linked them with the social and environmental aspects, they have not linked them with economic responsibility at the same time. According to Darmanata et al. (2010), a company must face many challenges when handling sustainability issues:

- Finding out the possible ways to integrate environmental issues such as legislation, their impacts and relevant costs under one umbrella, aligning them with the company's strategic objectives and goals.
- Finding out how sustainability would enhance the value and increase the growth rate of the business, promote product differentiation and create new markets.
- Determining ways to align operations with strategy to achieve high return on investment while implementing sustainable initiatives.
- Finding out which resources and tools would require the implementation of sustainable practices and how to measure and analyse their performance.

2.2.4 Identifying Theories' Influence on Supply Chain Management Thinking

As explained earlier in this section, a supply chain interacts with many entities, and involves the strategic integration of processes and business units along the supply chain to meet the needs of the stakeholders including customers. Giannakis, Croom and Slack (2004, p. 1) wrote:

Any organization, whether a large corporation, public body, or small business aims to meet the needs of its various customers and stakeholders, will need resources in order to do this, and will acquire many of its materials, equipment, facilities, and supplies from other organizations. The performance of an organization is thus influenced to a greater or lesser degree by the actions of the organizations that make up the supply chain

This indicates that supply chain management research uses various theories, particularly as it is an emerging discipline, borrowing widely from established disciplines such as economics, psychology, management and sociology (Stock 1997).

Mentzer and Kahn (1995) stressed that transaction-cost theories an economic theory, has become heavily used in logistics research because optimising cost and profit benefits has been the main focus in supply chain management. Transaction-cost theory has been widely used to determine supply chain design or governance structures (Garfamy 2012; Wever, Wognum, Trienekens & Omta 2010). Research based on

transaction-cost theory indicates that governance structure forms as a continuum: from market structure to hierarchical structure, where supply chain managers use transaction-cost as the main factor to decide whether to have a market structure (for example, a spot market) or a hierarchy structure (for example, a vertical integration) to minimise the supply chain cost (Wever et al. 2010). However, the use of transaction-cost theory in recent research expands into areas such as supplier-buyer relationships or partnerships, (Christy & Grout 1994; Hoyt & Huq 2000) and out-sourcing (McIvor 2009; Wacker & Yang 2012; Williamson 2008), as these strategies support optimisation of cost-based principles on a win-win philosophy (Hoyt & Huq 2000).

According to Giannakis, Croom and Slack (2004) game theory (derived from economics theory) is now widely used in decision-making in areas such as inventory management (Fiestras-Janeiro, García-Jurado, Meca & Mosquera 2011; Wang & Parlar 1994), pricing (Lan & Ting Ting 2011; Lezama, Contreras & Feltrin 2012; Li, Nukala & Mohebbi 2013; Mozafari & Karimi 2011), facility location selection (Demirbag & Tatoglu 2010; McIvor 2013; Wood & Parr 2005) and developing strategic alliances (Esmaeili, Aryanezhad & Zeephongsekul 2009; Huang & Li 2001; Lutz, Vang & Raffield 2012). Recent research on analysing economic implications of traceability on governance structure and quality management has used game-theory as the theoretical foundation (Wu, Wu & Liu 2013) while Esmaeili et al. (2009) used game-theory to study supplier-buyer relationships.

Agency theory, another economic theory that examines the relationships between an agent and a principle (for example a firm), is also now being applied in supply chain management (Fayezi, O'Loughlin & Zutshi 2012). Stock (1997) showed that if both the agent and the principle work on self-interest, they might not work for the interest of the other party. Agency theory tries to overcome this issue using different methods such as providing incentives to the agent for positive behaviours or restricting budgets for negative actions. Agency theory can be applied in areas such developing strategic partnerships with suppliers, service providers and retailers; managing and sharing supply chain risks; and supply chain integration. Agency theory is also used in areas such as managing collaboration, quality and risk (Belzer & Swan 2011; Kaynak & Zu 2012; Natour, Kiridena & Gibson 2011; Plambeck & Gibson 2010), Fayezi et al. (2012)

wrote that the use of agency theory in the supply chain management field is still limited due to issues such as overemphasis on economic aspects; flawless principal and imperfect agent relationships; and increased complexity of supply networks. They further stressed that these issues can be overcome by integrating other theories such as transaction-cost theory, game theory, resource-dependence and relational exchange.

Systems theory, which has been adapted from sociology is now widely used in supply chain management research to explain the behaviour of processes, firms and economies (Giannakis, Croom & Slack 2004). A supply chain is considered as a system because it comprises components such as human resources, infrastructure, information and product flow, firms and flow of intangible services; the supply chain is designed to improve the flow of goods and information from one organisation to another (Caddy & Helou 2007). Caddy and Helou (2007) divided supply chains into three categories: “information and communication technology dominant supply chains, or human factor (relationships) dominant supply chains or structure/strategy dominant supply chains” (Caddy & Helou 2007, p 323); depending on the category of complexity of the supply chain and its variety, applying systems theory principles can be difficult. For example, if the supply chain is complex, it is difficult to adapt to changes quickly as a system. Systems-theory research shows that the simpler the supply chain easier it is to manage and change according to environmental changes (Shi, Dong & Ruan 2009).

Strategic-management theories such as contingency theory, industrial-organisation theory and resource-based theory have contributed significantly to supply chain management (Fawcett, Ellram & Ogden 2007). Contingency theory, which is also known as situational theory, considers how managers can respond and adapt to internal and external changes. Managers need to understand changing environments, determine appropriate management strategies and employ the firm’s resources to respond to the changes effectively (Zhou & Liu 2013). According to Tosi and Slocum (1984), contingency theory focuses on three key dimensions: effectiveness, environment and congruency (fit). For example Stonebraker and Afifi (2004) explored how the changes in supply chain structures due to technological development affect the integration along supply chains, and showed that it depends on the level of differentiation of supply chain activities. Their study shows that higher differentiation levels require greater

integration. The resource-based view, another widely used theory in supply chain management focuses on establishing hard-to-imitate internal resources (such as unique skills and processes) that help to deliver a unique product or service (Fawcett, Ellram & Ogden 2007). According to Hart and Dowell (2011), resource-based theory stresses the role of resources and capability in developing competitive advantage. Olavarraieta and Ellinger (1997) showed that resource-based theory has been applied in various strategic issues such sustainable competitive advantage, corporate diversification, strategic alliances, environmental strategies and technological innovation.

2.3 AGRI-SUPPLY CHAIN MANAGEMENT

As explained earlier, since this study focuses on the Sri Lankan tea supply chain, which is an agri-supply, a literature review was carried out on this topic specifically focusing on supply chain management and sustainability aspects of agri-supply chains.

Agriculture has been a key factor in economic development in many Asian countries where a larger percentage of the population depends on the agriculture sector (Nee 2008). The sector interacts with the industrial and service sectors because it relates to various supporting activities that connect farming and non-farming activities in food production (Stamm et al. 2006). It includes a value-creation process with a full range of activities that help supply a product or a service from the original resources to the final consumer through various stages of growing and processing (Stamm et al. 2006). Therefore, the application of supply chain management concepts in the agricultural sector is essential to increase the performance of an agri-supply chain.

As illustrated in Figure 2-8, a generic agri-food supply chain consists of many partners such as producers (farmers and processors), distributors and marketers of the final product to consumers (Ahumada & Villalobos 2009). The agri-food supply chain has four functional areas: production, harvest, storage and distribution (Van der Vorst, Beulens & Van Beek 2005). Based on different characteristics of the product or the service, the logistics activities in the value chain vary considerably (Van der Vorst 2006).

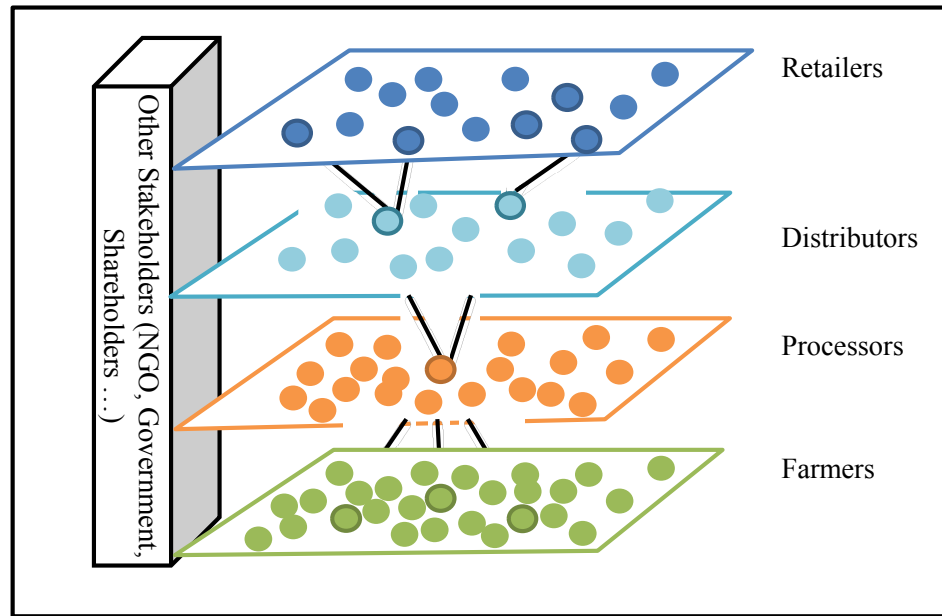


Figure 2-8: Schematic Diagram of the Agri-food Supply Chain

Source: Van der Vorst, Beulens & Van Beek (2000)

Salin (1998) noted that SCM practices used in agricultural products have gained more attention mainly due to increased awareness of issues of food quality, food safety and ethical concepts. The author stated that to achieve a competitive advantage in the global market, it is important to focus on supply chain operations and their performance. Blowfield (2003) argued that the social, environmental and economic aspects (i.e. the triple-bottom-line principle discussed in Section 2.2.3) of performance should all be improved, as they are particularly critical in the agri-food supply chain since the products are mostly perishable and have limited shelf lives. Hence, efficiency concerns have now shifted in the current competitive conditions from the individual node, such as a farmer to the overall efficiency of the whole supply chain (Ahumada & Villalobos 2009).

Globalisation has further increased opportunities and threats to businesses in the food industry. Competition has increased worldwide between suppliers, including food-processing industries (Viitaharju 2008). The increased competition has compelled producers to maximise their efficiency while improving customer service. As a result, as with other industries, the food industry is finding that managing the supply chain has become complicated (Van der Vorst 2006). Hence, the application of better strategies to manage the agri-food supply chain is vital (Van der Vorst, Beulens & Van Beek 2000).

Until recently, the agriculture sector mainly focused on growing and harvesting; this trend has changed since agricultural products are now considered as tradable products. The sector now focuses on a wider area of operations consisting of not only growing the products themselves but also managing activities such as obtaining farming inputs, adding value, packaging and distribution, which normally occurred after harvesting the crops, as well as research and development and logistics from providing resources to the farm to delivering the final crop to the consumer (France 2009).

According to Boehlje, Hofing and Schroeder (1999), the agriculture sector is increasingly following manufacturing industries in forming more tightly aligned value chains or supply chains. These changes, which have increased the pressure on agri-food supply chains, have appeared in a three-phase sequence (Boehlje, Hofing & Schroeder 1999):

- Capturing efficiencies and controlling costs
- Reducing risk (quality, quantity and safety)
- Responding to customer demands.

The agricultural industry is in the middle of major structural changes in areas such as product characteristics, worldwide production and geographically spread consumption, new technology, size of operation and location. The pace of change seems to be increasing. The need to control food quality and safety, uncertainty due to weather changes and sustainability of the sector are some of the key issues now gaining particular prominence (Salin 1998).

Husti (2006) emphasised that increased awareness of sustainability concepts has further increased the challenges in the agri-food sector. This is mainly because agriculture is primarily a part of natural resources, and it is interconnected with quality of life not only for the current generation but also for future generations. The human activities in food production and consumption also have a great impact on the environment, and sustainability is inherently embedded in the agri-food supply chain.

Recent research indicates that ethical and social aspects in the community and business environment in the agri-supply chain have a significant impact on long-term

sustainability. For example Blowfield (2003) expressed that ethical initiatives and partnerships in sourcing provide more benefits to primary producers, especially farmers with direct sourcing. According to the International Finance Corporation (IFC) Report (2013), due to rapid population growth, agricultural activities have overused natural resources, causing more damage to the natural environment. This report further highlighted that since agricultural operations are mainly carried out in developing countries, the populations of which continue on the whole to live far below the poverty line, they have very limited incentives to invest in sustainable practices, and thus very few sustainability initiatives truly exist.

Food safety is another area that has been explored by many studies in the SCM field (Manning 2013). According to the International Finance Corporation (IFC) Report (2013), increased food security in agricultural commodities is vital to maintaining a balanced use of a natural resources and alleviating poverty. Reganold, Papendick and Parr (1990) stressed that sustainability in agro-commodities should consider not only compliance with legal standards related to sustainability but also contribution to an inclusive growth. They noted that sustainability in agriculture is vital to farmers, who can achieve more profits and benefits through long-term sustainable agricultural practices. However, the agri-supply chains such as tea supply chains have still not been explored enough from a sustainability perspective, and current study's literature review highlights a need for more research in this field.

2.4 SUSTAINABLE SUPPLY

Traditionally, supply chain managers have mainly focused on the purchasing function: acquiring materials from external suppliers. Research also has been undertaken on materials management and supplier management (Baily & Farmer 1982). Material supply or supply management is critical, because an operation at the heart of a business needs supplies to function successfully. Manufacturers direct over 50% of total expenditure to purchasing or paying suppliers for materials (Monczka, Handfield, Guinipero, Patterson & Walters 2010). The physical movement of materials along the supply chain has been considered the major issue for many firms because a disruption in supply will be a bottleneck for the entire production process (Ballou 2004).

However, with increased knowledge of sustainable concepts and increased competition due to globalisation, focusing on other inputs such as infrastructure, information, innovation and knowledge, people and relationships in the supply chain can be considered as important as raw materials, because they play a major role in any business (Figure 2-9) (Waters 2009b). For example, growing infrastructure has dramatically improved performance and increased access to better-quality materials and scarce natural resources (Finch 2008; Swink, Melnyk, Bixby & Hartley 2011).

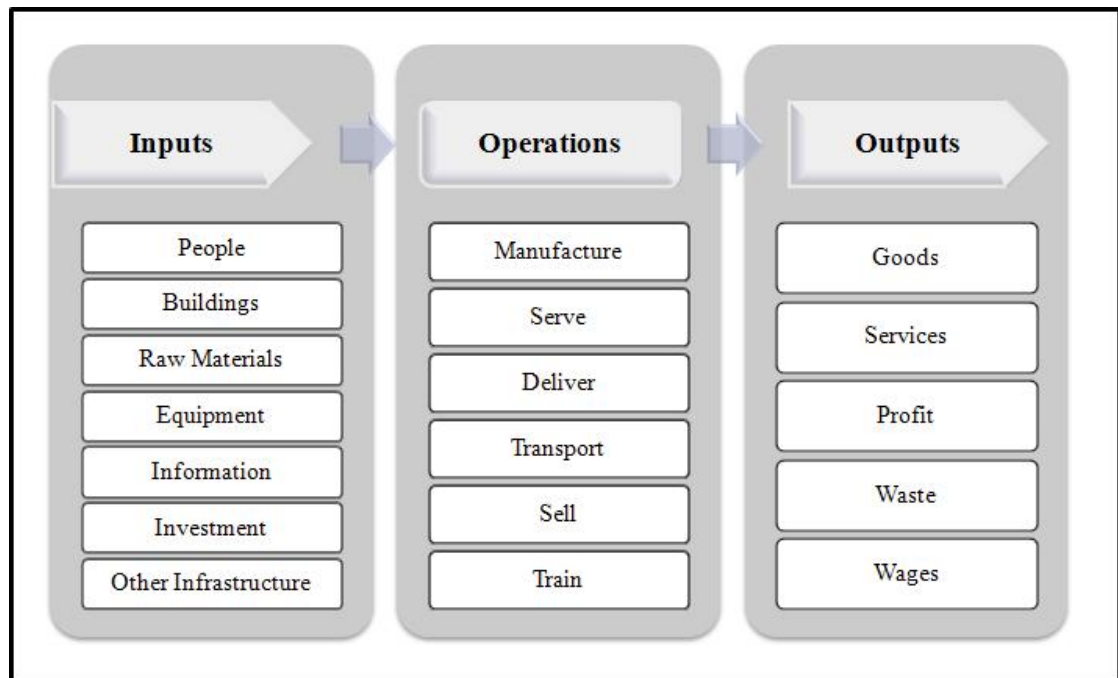


Figure 2-9: Supplies for Operations

Source: Adapted from Waters (2009b)

The focus on the supply and flow of cash, investments and monetary commitments in supply chain operations is essential in value creation and revenue generation along the supply chain (Barry 2006a). Styger (2010a) highlighted that in addition to facing the ongoing challenges in social and environmental areas in operations, companies must face challenges on the fiscal side to achieve long-term sustainability and to survive the world economic crisis. The main challenges in these areas have been not only providing ethical services with minimal environmental damage, but also achieving maximum returns from the business. Furthermore, to achieve efficiency, it is essential to increase investment on operations, as the implementation of any supply chain strategy increases the cost of the system.

Better technology can be an effective enabler of the success of any business (Hammant 1995; Siau & Tian 2004). It increases connectivity not only within the company but also with the supply chain partners. The advent of information systems and e-business have been a major factor in the improvement of business processes in a globalised context (Barry 2006b). Supplying timely and accurate information has become critical for many reasons:

- It provides better customer service.
- It substitutes inventory and other resources when dealing with uncertainty and takes costs out of the supply chain.
- It increases the flexibility of using resources and helps obtain a competitive advantage.
- Information-sharing refines the relationships between partners in the supply chain.

Furthermore, technology increases integration and innovation in the value chain and can help increase sustainability. The integration of functions within the order-to-cash cycle aims to sustainably reduce the delays in financial flows along the chain (Barry 2006a; Bovet & Martha 2000). Integration between channel members can be enhanced with the use of information technology, which in turn improves performance (Hill 2000). Nidumolu et al. (2009) emphasises that innovation in technology, production processes and raw materials provides more opportunities to increase the sustainability in the supply chain.

However, neither finance nor technology is the sole answer to maximise returns to stakeholders. Technology alone should not be viewed as a “silver bullet” to solve the issues in the supply chain. Implementing technology on a wrong process will only increase the efficiency and speed of doing the wrong process compared to a manual system. It does not add real value (Fawcett, Ellram & Ogden 2007). Identifying and supplying the right people with a better understanding of the operations is critical to implement better strategies.

Therefore, supplying other resources, such as people, plays an important role, as talented human resources and specialised capabilities are essential to realign the supply

chain; these resources will be the premium assets for any business implementing better strategies (John 2007). Supplying innovative ideas and knowledge is also essential for any business to be sustainable in the long term. Better relationships provide linkages between organisations, suppliers and customers to maximise benefits. However, none of these supplies will provide positive results to the organisation unless there is a supply of qualified, skilled human resources (Cavinato, Flynn & Kauffman 2006). Styger (2010a) indicated that the lack of qualified and motivated leaders is a great challenge that restricts companies from moving forward sustainably. Even if there are enough money, strategies and new ideas to increase efficiency, a firm needs skilled people to implement those strategies. Furthermore, the success of any business will depend on leaders who have a strategic vision, spirit, willingness and broad knowledge and skills (Rainey 2010).

With globalisation, the complexity as well as the vulnerability to risk in supply chains has increased (Pai et al. 2003). Addressing the risks in the environmental, social and economic contexts is a major challenge to obtain sustainable supply. Proactive companies consider sustainability as a strategy rather than just complying with environmental laws or “being green” (Darmanata et al. 2010). Managers and employers at all levels need to have a broader knowledge of every part of their business and its market, social and natural environments. They should be able to craft strategies, manage operations, lead changes and make effective decisions to achieve a competitive advantage (Barry 2006a; Bovet & Martha 2000).

Additionally, the sustainable performance of the supply chain will depend on the relationship between all partners (Van der Vorst, Beulens & Van Beek 2000). Technology can build connectivity, but it is the presence of a better understanding, trust and relationship between firms that enhances performance (Fawcett, Ellram & Ogden 2007). Furthermore, it has been highlighted that thinking of the supply chain as a 50/50 mix of infrastructure and information is no longer valid in the current business environment. It is time to consider the supply chain as a mix of 45/45/10 – people, technology and hard infrastructure – because, according to John (2007), the competition is not just between individual firms and their supply chains, but is now mainly between supply chain alliances and supply chains .

2.5 MAPPING THE SUPPLY CHAIN

2.5.1 Defining a Map

A map can be defined as a spatial representation of an actual environment, and a visual form of language to communicate information (Muehreke & Muehreke 2003). For example, a road map is a spatial representation of a certain geographical region, and passes information such as connectivity, proximity to different land uses and other resources. It gives the reality and captures the essence of the environment. A map goes beyond the individual's vision and boundary.

Therefore supply chain mapping can be defined as a map that shows the linkages between its suppliers and customers. It shows the reality of the supply chain, representing the connectivity of all partners from raw-material suppliers to end consumers, including the flow of goods, information, processes and money that pass both upstream and downstream (Yacher 2011). It goes beyond the individual's vision, helping communicate and implement firms' visions and strategies collectively. A good strategic supply chain map should consist of key characteristics such as (Farris II 2010):

- Easily interpretable
- Easily recognisable
- Easy to disseminate
- Use of standardised icons
- Capture multiple levels
- Information-rich but not overloaded with unnecessary information.

Gardener and Cooper (2003) say that focusing on strategic supply chain mapping enhances the connectivity across firms along the supply chain, including functional and corporate units, rather than focusing on high-level, detailed internal functional groups. They also stress that developing a supply chain map serves as a strong starting point to inform not only supply chain managers, but also CEOs, product developers and engineers, production managers, production and purchasing schedulers, suppliers and

customers, helping them understand the characteristics of their supply chain and manage it effectively.

2.5.2 Why Develop a Supply Chain Map?

There are several important reasons for a supply chain manager to consider a strategic supply chain map (Gardner & Cooper 2003):

- Enhance the strategic planning process.
- Support information distribution.
- Support supply chain design and configuration.
- Clearly show channel dynamics.
- Provide a common base or perspective for supply chain design.
- Improve communications.
- Enhance monitoring strategies
- Support supply chain analysis

This indicates that to achieve optimal supply chain performance, it is essential to map the supply chain to show the overall connectivity of every partner in the system. A clear and comprehensive understanding of the supply chain enhances the strategic planning process.

A performance measurement system helps managers to prioritise their resource distribution and facilitate communication, and fosters innovation. Nuthall (2003) claimed that in the absence of a systematically developed supply chain design, decisions are made with unsupported assumptions and create high failure risks. This is applicable not only to measuring performance but also managing the supply chain. It has been highlighted that if performance is not identifiable and measurable, it is difficult to manage (Wagner, Bolton & Nuthall 2003). A well-structured, systematically developed supply chain map facilitates the performance-measurement process. The literature indicates that in this complex business environment, managers should have a better understanding of their supply network to measure and manage business operations efficiently and effectively (Gardner & Cooper 2003). Developing a supply chain map

can also be advisable for many other reasons, such as identifying bottlenecks in the supply chain, managing the supply chain risk and measuring performance at each supply chain node. This would help reduce the total supply chain cost (Faisal, Banwet & Shankar 2006).

2.5.3 Supply Chain Design and Strategy

Bechtel and Jayaram (1997) argued that strategic planning is the most important component in supply chain management, as it is mainly based on core philosophies such as total quality management, system thinking, cost analysis and re-engineering. To design a cross-company supply chain and collaborative strategy, it is essential to understand the existing strategies and associated strategic objectives within the company and along the supply chain (Tang & Gattorna 2003). If a company's supply chain strategy is not aligned with its own corporate and sustainability strategy and with cross-company supply chain strategies, the supply chain will not be sustainable in the long-term (Cetinkaya et al. 2011).

If the supply chain design is similar to a “black- box”, where managers do not know what is happening along their supply chain, it is difficult to implement any improvement strategy to achieve effective long-term sustainability. Understanding the supply chain design helps bridge corporate strategy, supply chain strategy and sustainable strategy (Figure 2-10) (Cetinkaya et al. 2011).

Organisations need to implement supply chain strategies focusing on either cost or differentiation of products to meet a variety of customer demands (Hilletofth 2012). Table 2-2 shows the main characteristics of a supply chain for different strategies focusing on cost and product differentiation.

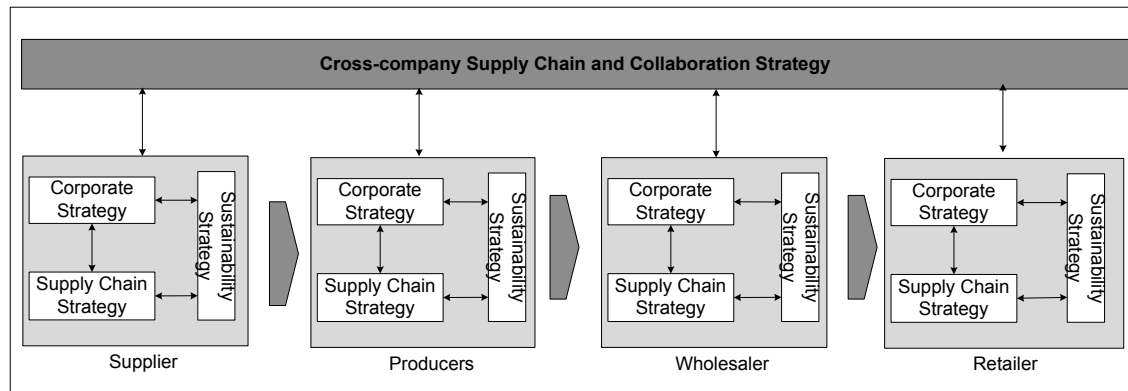


Figure 2-10: Strategies Along a Generic Supply Chain

Source: Cetinkaya et al. (2011)

Table 2-2: Strategies in SCM

Strategy	Focus: Cost	Focus: Differentiation
Competitive	Low-cost strategy	Differentiation strategy
Supply chain	LEAN driven by cost and efficiency	Agility, service and speed
Cross-company	Hierarchical control	Hierarchical control
Collaboration	Long-term partnerships	Short-term relationships
	Horizontally integrated networks	Vertically integrated networks
Sustainable	Defensive	Offensive

Source: Peng (2010)

For example, a company can implement different generic strategies, such as low cost, differentiation and focus, to achieve competitive advantage. Cost-leadership strategy focuses on low cost and prices when serving mass customers. Differentiation strategies focus on delivering on specific products to customers who have a high perception of the value and uniqueness of the product. Focus strategies serve a specific market segment or niche with either a unique product or a low-cost product as a specialised differentiator or cost leader (Peng 2010). Managers need to design and manage their supply chain operations to cater to the strategy selected (Hilletoft 2012). Therefore, it is important to

identify a specific supply chain; only then it is possible to effectively implement a strategy to achieve a competitive advantage. Gardner and Cooper (2003) said a well-developed supply chain map can be used as a tool to bridge supply chain strategy and corporate strategy.

Furthermore, with increasing supply chain complexity in a dynamic business environment, managers need to make quick decisions to overcome the uncertainties that occur along the supply chain. It is important to make the correct decision to establish a physical network and infrastructure to meet customer needs (Gattorna 2003). However, without knowing how a supply chain is designed and operates, managers face a greater challenge during the decision-making process and greater overall risk to operations and supply chain performance (Gardner & Cooper 2003).

2.5.4 Strategic Supply Chain Mapping vs. Process Mapping

Gardner and Cooper (2003) pointed out that there are three main differences between strategic supply chain mapping and process mapping; these have to do with the focus of the mapping, the level of detail and the level of strategy (Table 2-3). Supply chain mapping is mainly oriented on external entities, focusing on the connectivity of stakeholders involved in the supply network; this makes it usable in strategic-level decision-making. In contrast, process mapping mainly focuses on the internal operational level, with a high level of detailed information to make decisions. Gardner and Cooper (2003) stressed that it is important to understand the difference to avoid negative effects on the decision-making process and operations.

Table 2-3: Differences between SC Mapping and Process Mapping

	SC Mapping	Process Mapping
Orientation	External	Internal
Level of Detail	Low to Moderate	High
Purpose/Use	Strategic Level	Operational/Tactical Level

Source: Gardner & Cooper (2003)

2.6 MANAGING THE SUPPLY CHAIN

2.6.1 Supply Chain Structure and End-to-End Configuration

Before deciding on a supply chain configuration, it is vital to understand whether the product is a functional or innovation product, since the supply chain structure varies depending on the product type. For example, a functional product – one that people buy directly from a retail store – satisfies basic needs; the demand is predictable and constant over time. Product availability and price are the main deciding factors for customers, since most functional products are considered staple goods. In contrast, an innovation product – specialised product such as high-tech equipment and industrial equipment that is made or engineered to order – has an unpredictable demand and includes a greater variance of products, while making a larger contribution to profit (Fisher 1997). For example, as shown in Figure 2-11, functional products require an efficient supply chain structure because the main focus is on reducing the total logistics costs while increasing performance; in contrast, innovative products require a responsive supply chain that focuses on quick respond to market demand, flexibility and quality. Hence, supply chain structure depends on the product type and product characteristics.

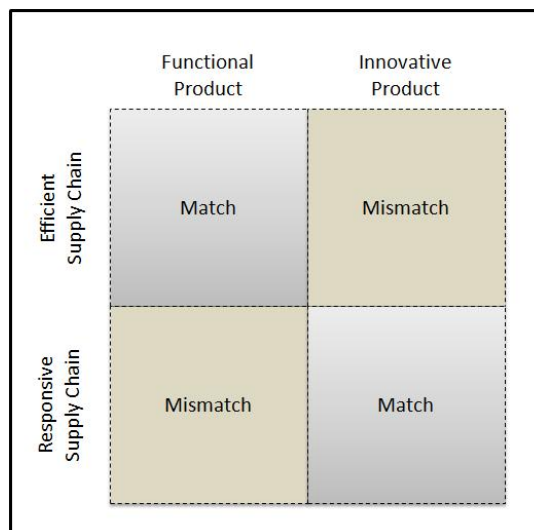


Figure 2-11: Supply Chain Structure and Product Type

Source: Fisher (1997)

On the other hand, Payne and Peters (2004) pointed out that supply chain structure also depends on the customer segment. For example, customers who consider the quality of the product as an important factor are willing to wait longer and pay a higher price to get the best-quality product, while for others product price might be an important factor (Fisher 1997). Hence it is important to identify the customer's exact needs, so that the supply chain structure can be designed to match those needs. End-to-end visibility of the supply chain is critical because without proper visibility it is not possible to design the correct supply structure.

2.6.2 Customer Focus

The start and end points of an effective and efficient supply chain are the customer. A customer can be defined as a party that uses or consumes a product or service in a supply chain process. Currently leading business executives are looking at consumer-driven supply chain management to increase efficiency, and to identify the importance of consumer needs and added value to satisfy those needs (Rudberg, Klingenberg & Kronhamn 2002). Francis (2008) stressed that capturing and satisfying consumer needs in the value chain has been identified as a source of differentiation and competitive advantage. More recently, demand management and customer interface have been identified as being equally important as other logistics activities.

Rudberg, Klingenberg and Kronhamn (2002) highlighted that all business firms are members of a supply chain that begins with raw-material suppliers and ends with consumers. Business processes are dynamic, but they enable firm productivity if they are designed to cater to customer needs, because they then increase the performance. Hence, to manage a supply chain effectively, a manager needs to understand the customers at the end of the supply chain, and their requirements.

Anderson, Britt and Favre (1997) argued that the fundamental policy in supply chain management involves segmenting customers based on their needs; adapting the supply chain to serve these segments profitably; listening to market signals and aligning demand planning across the supply chain to maximise resource usage; differentiating the product close to customers across the supply chain; managing sources of supply strategically to reduce the total cost along the supply chain; developing a supply chain-

wide technology that supports multiple levels of the supply chain; and, finally, adopting channel-spanning performance measures to gauge collective success in reaching the end consumer effectively and efficiently. Torres and Miller (1998) also highlighted that the “one-size-fits-all” concept does not improve the efficiency and effectiveness of the supply chain. This indicates that having end-to-end visibility is crucial for a high-performance supply chain and for achieving a competitive advantage in any business sector.

In business operations a firm deals with multiple customers who have different desires and needs that change continuously (Rudberg, Klingenberg & Kronhamn 2002). Therefore, to increase efficiency it is essential to identify and keep track of changing needs, and to identify which customers are important and which should be ignored. Identifying critical customers is an important element in an operations strategy (Figure 2-12). Lee (2010) argued that identifying their critical customers and designing the supply chain to meet their needs using the firm’s capabilities is important for long-term business success.

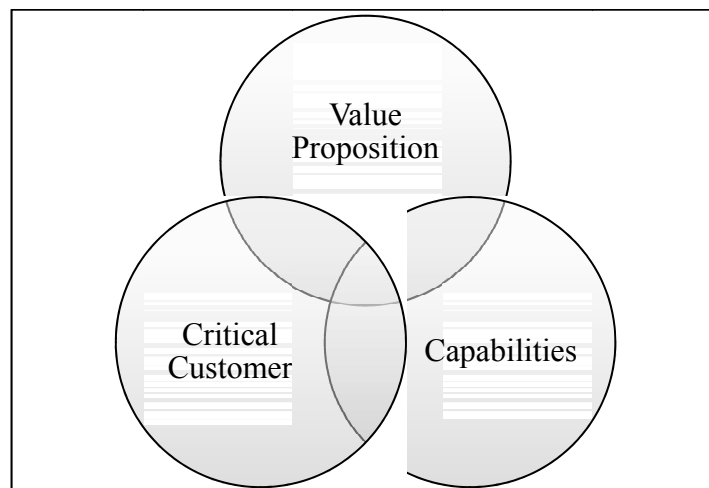


Figure 2-12: Critical Elements of Operations Strategy

Source: Lee (2010)

Al-Mudimigh, Zairi and Ahmed (2004) further added to this argument by saying that the consumer is the ultimate decider of whether a product is worth buying. They pointed out that value is based on customers’ perceptions rather than the objective price determined by the seller, and is a trade-off between customers’ expectations of the

product (such as quality, benefit and worth) and the sacrifice they are willing to make to acquire the product or service. Therefore, as a producer and a seller in the supply chain, it is essential to identify customers' perceived value and expectations to manage a supply chain profitably.

Fawcett and Magnan (2004) also argued that in any supply chain, customers are the most important stakeholders, as they are the only ones who bring new cash into the supply chain, whereas all the other partners are simply moving cash from point to point. Therefore, to achieve a long-lasting competitive supply chain, it is necessary to identify the customers and make them the focal point of the entire supply chain.

Hertz, Johansson and Jager (2001) stressed that the basic objective of supply chain management is to create distinctive value-added processes to meet customer requirements more efficiently and effectively than their competitors. However, this is not an easy task due to the dynamic nature of the business environment. A breakdown in any links in the supply chain would increase the total supply chain cost and reduce the ability to create customer value (Lehrer 2003).

Al-Mudimigh, Zairi and Ahmed (2004) explained that to manage a supply chain effectively and create value for customers, management should focus on a process-oriented organisation that delivers quality products faster at low cost with high flexibility. According to these authors, to implement real value chain management perspectives it is vital to re-engineer the supply chain capability to perform the necessary operations. In other words, value chain management should look at each step from raw materials to final consumer as well as returns (such as packaging and obsolete products). The main objective is to provide the maximum value to the customer at each step.

2.6.3 Collaboration and Supply Chain Integration

A collaborative supply chain is a combination of two or more individual firms working together on planning and executing supply chain operations to achieve shared objectives and benefits (Simatupang & Sridharan 2002). The supply chain encompasses all activities associated with the flow and transformation of goods from the raw-materials stage (extraction) through to the end user, as well as the associated information flows

both up and down the supply chain. Supply chain management is the integration of these activities through improved supply chain relationships, to achieve a sustainable competitive advantage. With increased competition, businesses managers have recognised that the ultimate success of an organisation is no longer built around the capabilities of independent functional groups or an individual company's capability and capacity. Instead, the success of any company will depend on how it integrates the capability and capacity of the whole supply chain.

However, due to the complex nature of the supply chain, managers are facing a huge challenge in learning how to select the best supply chain partners regardless of geographical distribution and channel position. The challenges are apparent in areas such as defining and managing relationships with partners upstream and downstream, selecting the right partner to have the right collaboration and forming a collaborative supply chain (Stank, Keller & Daugherty 2011).

A collaborative, team-based supply chain management structure represents the span of involvement, influence and authority in a supply chain management organisation, and enables multi-dimensional, cross-functional authority. Research suggests that there are different types of collaboration based on the intensity of the information exchanges, and the nature of the relationship. These types are transactional, cooperative (coordinative) and collaborative (McCormack 2003).

Operational excellence, supply chain integration and collaboration and virtual supply chains are three major waves of supply chain management in current economic conditions. They require not only intra-functional but also inter-functional and inter-organisational coordination (Bolstorff & Rosenbaum 2007). Collaborative relationships increase the speed of delivering a product to the customer while reducing the total supply chain cost by strengthening the supply chain and increasing its agility. Focusing on the agility and strength of the whole supply chain increases the competitive power along the supply chain (Fawcett, Ellram & Ogden 2007).

Porter (1998) argued that time-based SCM strategies have been the key to achieving a competitive advantage. Such strategies require extensive collaboration to integrate logistics activities not only within the company but also across the whole supply chain.

Ballou (2004) used the term “integrated business logistics management” to reflect coordination of the management of both product supply and distribution. SCM practices that were once purely price-driven are now shifting from an adversarial relationship to strategic alliances to work cooperatively in providing improved customer service, technological innovation and product design while having collaborative profits. Modern SCM philosophies have enhanced the evolution of supply chain collaboration between the partners in the supply chain (Maloni & Benton 1997).

In the early stages of SCM research the vertical integration between “in-house” operations (purchasing, sourcing, warehousing, sales and logistics functions) was considered as collaboration or coordination of the supply chain. This encouraged efficiencies in the transaction activities between buyers and suppliers (Apaiah, Linnemann & van der Kooi 2006). Hence, there was more focus on controlling the logistics activities among the partners in the supply chain to improve the information flow and reduce information asymmetry and inventory levels along it. Internet and electronic data interchange technologies were mainly used to automate transactions such as purchase orders, invoices and shipping notices. With increasing knowledge of SCM concepts and increasing the business-to-business exchanges, attention was diverted towards external integration to minimise supply chain issues. One such issue is the “bullwhip effect”: an amplification of demand due to uncertainty in demand forecasting, lead times and second guessing. This results in increasing the inventory levels at each node along the supply chain to protect against stock-outs. Research shows that information sharing greatly helps to reduce the bullwhip effect. Therefore, partnerships were established to share information such as order statuses and forecasts, product designs and inventory data.

McLaren, Head and Yuan (2002) also stressed that merely sharing information on demand and inventory levels among immediate supply chain partners was not enough to increase supply chain efficiency and performance. Supply chain collaboration goes beyond exchanging information. A collaborative supply chain means a partnership between two or more individual companies with joint planning and execution strategies on operations to achieve greater success. Mahadevan, Samaranayake and Matawie (2010) asserted that collaborative success is greater than the success achieved by

operating individually. They pointed out that there are more benefits, such as synchronised production schedules, collaborative product improvement, new product development and collaborative demand planning, from strategic partnerships between partners both downstream and upstream (Figure 2-13).

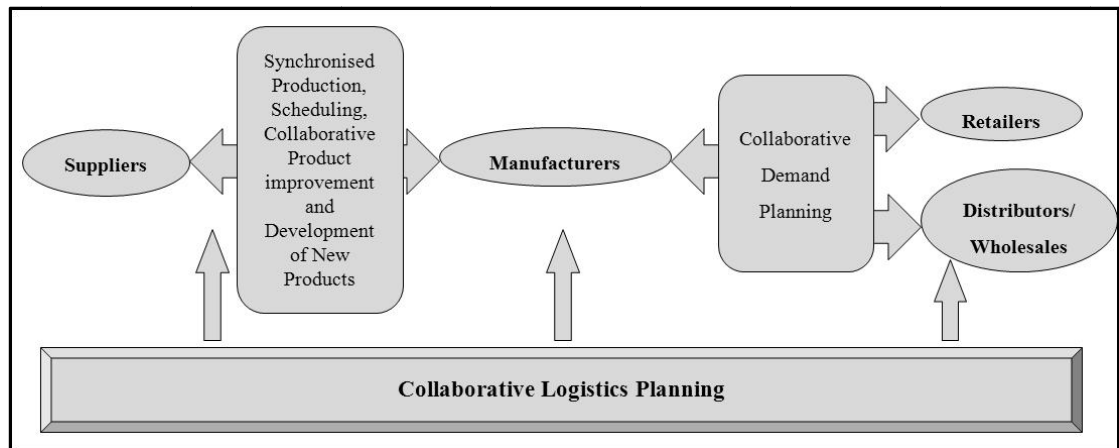


Figure 2-13: Collaborative Opportunities

Source: McLaren, Head & Yuan (2002)

To further strengthen collaboration, buyers and suppliers move towards collaborative relationships to forecast and plan together to understand future demand changes. They use different kinds of strategies and technologies to enhance their collaboration in forecasting and inventory management (Figure 2-14). The key feature in SCM management in this scenario is to partner with a few selected suppliers to work more closely and effectively over a long period of time (Walters & Lancaster 2000).

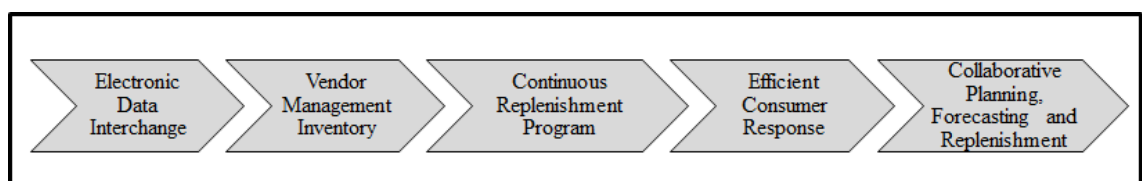


Figure 2-14: Collaboration on Inventory and Demand Management

Source: Walters & Lancaster (2000)

However, recent SCM literature shows that there are more opportunities to improve supply chain performance than just focusing on improving demand management and inventory management. The literature shows that the basis for improving performance in the supply chain is now shifting from operational collaboration to relational

collaboration with both suppliers and customers (Ellram & Cooper 1990; Maloni & Benton 1997; Walters & Lancaster 1999). Wilding and Humphries (2006) highlighted that collaboration involves joint strategic decision-making and planning of the operations undertaken by the supply chain partners, including collaborative planning and execution on logistics, transportation, strategic alliances, industrial marketing, purchasing, economics and organisational behaviour.

According to Fawcett, Ellram and Ogden (2007), there is a wide variety in the intensity of business relationships in SCM (Figure 2-15); they presented this variety as a relationship continuum, one end of which is purely involved in transactional relationships where the firms work independently to reduce individual costs, and keep the partners at arm's length. The other extreme is more focused on long term relationships in which trust increases with increased commitment and sharing resources to deal with issues. In between are basic, operational and business alliances. Basic alliances involve tactical relationships to establish basic trust and open communication. Operational alliances are more open and have frequent communication on capacity and demand, with collaborative solving of supply chain issues. With business alliances the partners increasingly depend on each other with increased participation in processes and product development.

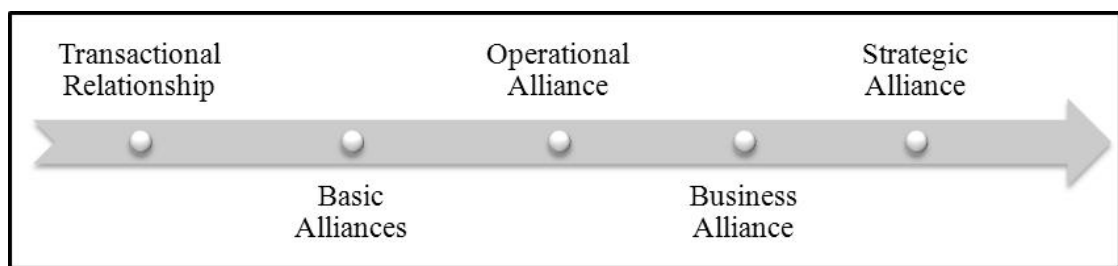


Figure 2-15: Relationship Intensity

Source: Fawcett, Ellaram & Ogden (2007)

SCM collaboration is a continuum that consists of four primary processes: engagement, forward-looking planning, implementation and process evaluation (Figure 2-16). The engagement process is the most important step in collaborative SCM (Simatupang & Sridharan 2002), in which identifying the requirements for collaboration is crucial. At this level it is necessary to identify the type of collaboration initiative, and whether it is a transactional, basic, business or strategic alliance.

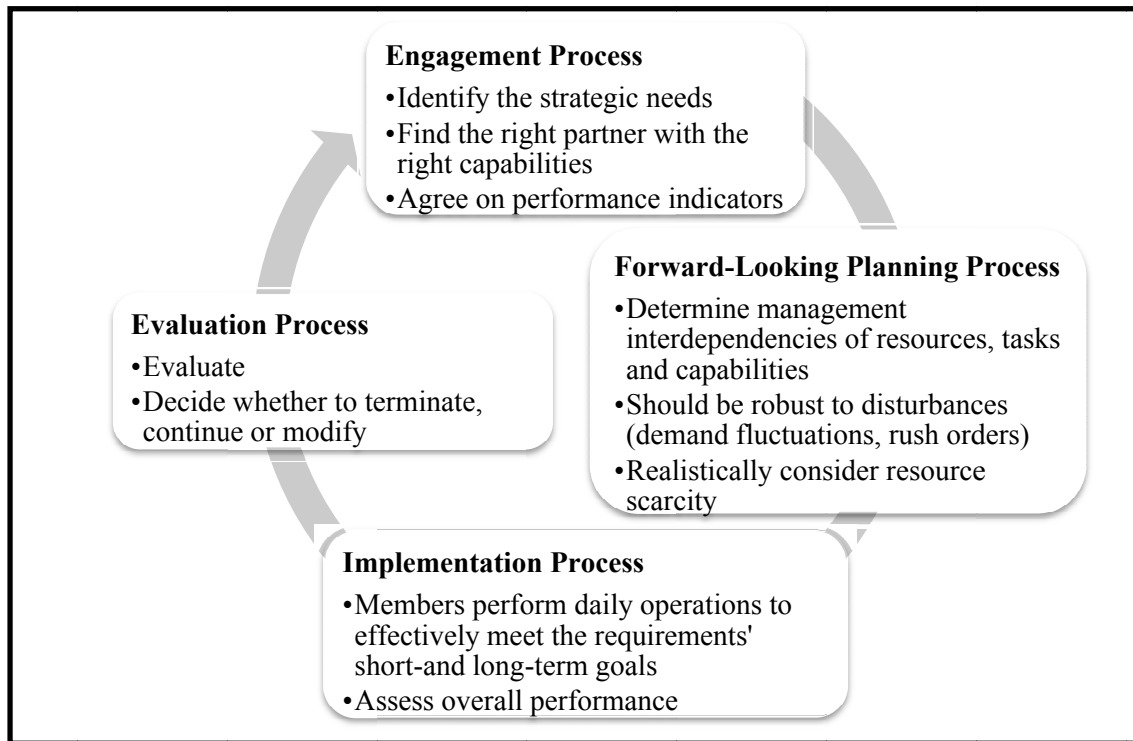


Figure 2-16: Primary Processes in Collaboration Life Cycle

Source: Simatupang & Sridharan (2002)

Once the strategic requirements are identified, selecting the right collaborative partner with the right capabilities and setting mutually agreed performance measures to evaluate the success of the collaboration are essential (Houghton, Casey, Shaw & Murphy 2010). Simatupang and Sridharan (2002) stressed that even though collaboration is mainly based on mutually agreed objectives, firms participate only if it contributes to their own individual survival. Supply chain managers have attempted to increase the efficiency of internal supply chain activities such as purchasing, manufacturing and inventory by integrating them with internal operations. However, research shows that just focusing on internal integration would merely move the cost to another node along the supply chain. On the other hand, some authors suggest that very few organisations have achieved high efficiency through implementing internal integration only within their activities (Fawcett, Ellram & Ogden 2007). Moreover, cooperative supply chain relationships result in collective benefits for all parties in the collaboration (Rudberg, Klingenberg & Kronhamn 2002).

The literature shows that full SCM integration has not yet been fully achieved, as supply chain partners are still focusing on short-term benefits due to the increased complexity

and uncertainty in the marketplace (Wilding & Humphries 2006). They have proposed the major drivers of a successful collaboration (Figure 2-17):

- Relationship quality: creating win-win relationships of which each side is delighted to be a part
- Relationship reliability: concentrating on service and product delivery, lowering joint costs and risks and building mutual trust
- Relationship creativity: promoting quality, innovation and long term approaches by encouraging high performance
- Relationship stability: synchronisation of objectives and confidence-building
- Relationship communication: frequent, open dialogue and information-sharing.

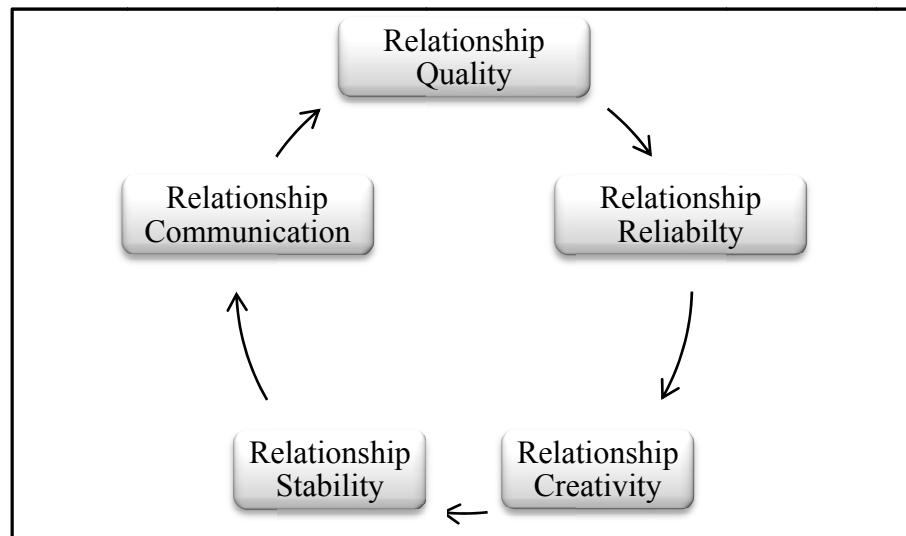


Figure 2-17: Collaborative Relationship Success Cycle

Source: Wilding and Humphries (2006)

A number of areas are likely to be relevant to most organisations in implementing collaborative strategies both internally and externally:

- Collaborative culture
- Internal and external trust
- Mutual understanding
- Sharing information
- Managing change
- Resource-sharing

- Mutual dependence
- Patience and perseverance
- Shared visions and objectives
- Collaborative creativity and innovation
- Flexibility and willingness to change

Wilding and Humphries (2006) stressed that a monopoly environment, bounded rationality, business myopia and information impactedness also form a cycle, but for collaboration failure, not success (Figure 2-18). They wrote that monopoly environments provide more opportunities for bounded rationality, where partners try to do the minimum to get maximum benefits. This results in business myopia where partners focus on short-term benefits and try to transfer risk to other partners rather than managing it collaboratively. This results in information impactedness, where one partner deliberately confuses another to gain an advantage over them.

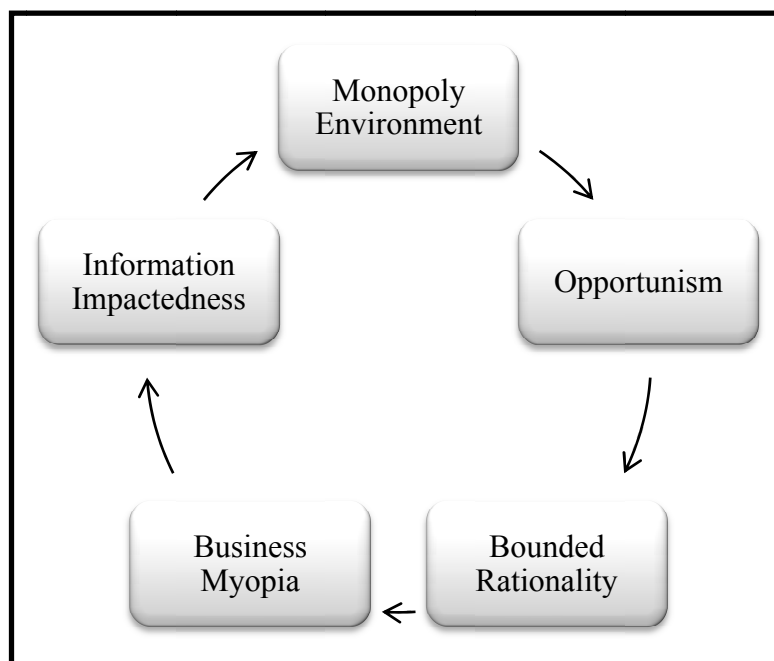


Figure 2-18: Collaborative Relationship Failure Cycle

Source: Wilding & Humphries (2006)

Nevertheless, supply chain collaboration is risky. Comprehensive integration along the supply chain can be impossible when there are adversarial business practices such as abuse of power, lack of trust and transparency, poor communications, reluctance to

adopt or implement changes and lack of flexibility (Fawcett, Ellram & Ogden 2007; Stratton 2012; Theuvsen 2007).

Attaran and Attaran (2007) argued that even though there is a risk involved, recognising the need for and implementing extensive integration with supply chain partners would create more opportunities. However, there is a lack of study in both end-to-end supply chain relationships and long term interactions between major partners.

2.6.4 Process Performance

Van der Vorst (2006, p 20) defined supply chain performance as “the degree to which a supply chain meet end-user and stakeholder requirements concerning the relevant performance indicators at any point in time”. The author argued that to increase supply chain performance it is essential to realign processes with performance matrices. The realignment of supply chain processes to meet unachieved or changing business objectives is accomplished through a combination of theories such as process re-engineering, LEAN manufacturing analysis and process changes, Six Sigma analysis of defective processes, theory-of-constraints analysis of systems of processes to explain root-cause issues, ISO-9000-style process capture and control, and balanced score cards and benchmarking.

Since supply chains are a compilation of several actors who have their own values and norms, it is crucial to have well-defined, shared objectives and shared key performance indices to benchmark performance (Van der Vorst 2006). Overall supply chain performance depends on the performance of individuals in the chain, and the weakest actor or partner in the chain is the key player in determining chain performance (Lehrer 2003; Van der Vorst 2006)

According to research, better organisational relationships between partners enhance the success of each firm in the supply chain. Therefore, better management of relationships along the supply chain gives opportunities to each partner in the chain to grasp the synergy of integration and collaboration (Lambert & Cooper 2000).

2.7 DEVELOPING RESEARCH QUESTIONS

Based on the literature examined in the previous sections, this section directs the overall research question. As explained in Section 1.5 and 1.6, this study focuses on the Sri Lankan tea supply chain and the overall research question – “What are the influencing factors for maintaining sustainable supply within the Sri Lankan tea industry?”– which was developed from the literature review. Based on the overall research question, the subsidiary research questions (Section 1.4) were developed. Table 2-4 shows the relevant literature for each subsidiary research question and research objective.

Bowersox et al. (2007) and Kaplinsky (2001) explained that the supply chains are more complex in nature where understanding the overall connectivity of the main supply chain partners is vital (Gattorna 2000) to improve the performance (Hill 2000). Accordingly, the first research objective which is the mapping the tea supply chain and identifying the issues of sustainable supply was identified as an important objective to answer the main research question.

Linton et al. (2007) stressed that sustainability has increasingly become important in operations management, mainly because increasing the awareness of sustainability concepts has increased the challenges in the agri-food sector (Chandra & Kumar 2000; Husti 2006) and the application of sustainable strategies are vital in agri-food supply chains (Van der Vorst, Beulens & Van Beek 2000). As illustrated in Table 2-4, the uncertainty in the agricultural sector has further increased the sustainability challenges (Ameseder, Canavari & Cantore 2009), which highlighted that there is a greater need to identify the factors that affect the sustainable supply chain management and how they affect the performance of the supply chain, specifically on the tea supply chain which is the case under study in this research.

Table 2-4 : Relevant Arguments Used to Develop Subsidiary Research Questions

Relevant Argument(s)	Research Objectives	Subsidiary Research Question
<ul style="list-style-type: none"> Integration on supply chain is used to improves performance – (Hill 2000) (Section 2.4) Understanding the overall connectivity of the supply chain is now extremely important (Gattorna 2000). (Section 2.2) Value chains are more complex and linked with more than one chain (Kaplinsky & Morris 2001). (Section 2.2) Supply chains are more complex than an ultimate supply chain (Bowersox, Closs & Cooper 2007). (Section 2.2) 	Map the tea supply chain in Sri Lanka and explore issues of sustainable supply.	RQ1 – What is sustainable supply in the context of the Sri Lankan tea Industry?
<ul style="list-style-type: none"> The application of better strategies to manage the agri-food supply chain is vital (Van der Vorst, Beulens & Van Beek 2000). (Section 2.3) Increased awareness of social and ethical concepts increases challenges (Chandra & Kumar 2000). (Section 2.2) With globalisation, the complexity and vulnerability to risk in supply chains has increased (Pai et al. 2003). (Section 2.4) Increased awareness of sustainability concepts has increased challenges in the agri-food sector (Husti 2006). (Section 2.3) Sustainability has become a major concern in operations management (Linton, Klassen & Jayaraman 2007). Sustainable issues have been studied as standalone issues, not linked with the triple-bottom-line principle (Carter & Rogers 2008). (Section 2.2) The uncertainty in the agricultural sector result in additional sustainability challenges (Ameseder, Canavari & Cantore 2009). (Section 2.3) There are many challenges when handling sustainability issues (Darmanata et al. 2010). (Section 2.3) 	Pinpoint the factors that affect the sustainability of the tea industry.	RQ2 – What are the influencing factors on sustainable tea supply chain management in Sri Lanka?
<ul style="list-style-type: none"> Sustainability in agro-commodities needs compliance with legal standards and contribute to an inclusive growth (Reganold, Papendick & Parr 1990). (Section 2.3) The “one-size-fits-all” concept does not improve the efficiency and effectiveness of the supply chain. (Torres & Miller 1998) (Section 2.6) Globalisation increases the complexity and vulnerability of supply chains (Pai et al. 2003). (Section 2.4) Increased competition and efficiency complicate the food supply chain (Van der Vorst 2006). (Section 2.3) Efficiency concerns a shift in focus from the individual node to the whole supply chain (Ahumada & Villalobos 2009). (Section 2.3) A company has to face many challenges when handling sustainability issues (Darmanata et al. 2010). (Section 2.3) 	Explore, when and how the factors identified from RQ2 affect sustainable supply.	RQ3 – How do these factors affect the tea supply chain?
	Establish the factors that have an impact on the future sustainability of the Sri Lankan tea industry.	RQ4 – In what capacity do they affect the future sustainability of the tea supply chain and its performance within Sri Lanka?

2.8 SUMMARY

This chapter reviewed supply chain management concepts and their application. Although supply chain management concepts have been widely discussed by many researchers, there is no one single definition for the supply chain or for supply chain management. Initially more focus was placed on managing internal logistics; this shifted to focusing on integrating the functional operations within companies, and then on business-to-business operations. More recently, the concepts of integrating all stakeholders along the supply network and maintaining sustainability have also been introduced to the definition of supply chain management.

The chapter also illustrated that to achieve competitive advantage in a globalised business environment, it is essential that supply chain integration expand beyond the firm's boundaries to become end-to-end integration. Especially with the increasing awareness and application of sustainability concept in operations, end-to-end integration is vital, as it helps to increase the visibility and traceability along the supply chain.

It was found that these concepts are important not only in the manufacturing sector but also in other sectors such as agriculture, since these sectors increasingly demonstrate the characteristics of the manufacturing sector. It was highlighted that sustainability concepts are salient features in agri-supply chains, mainly due to increased customer awareness not only of product quality but also of the social and ethical aspects of the production process. Hence an end-to-end supply chain configuration is becoming a must to manage supply chain operations effectively, efficiently and ethically.

This chapter further elaborated the importance of concepts such as customer focus, collaboration and supply chain integration, which are essential to increasing supply chain performance. It highlighted that the supply chain structure should be designed based on the type of the customer and level of customer satisfaction expected. The analysis stressed that the customer is the most important starting point in developing a supply chain strategy.

This chapter explored the importance of sustainable supply concepts. It indicated that supplying raw materials is not sufficient to have a sustainable supply; it also requires the supply of other components such as people, infrastructure, information and money.

This chapter discussed the importance of supply chain mapping to strategic decision-making in supply chain management. It highlighted that mapping the relevant supply chain is the most important first step before implementing any supply chain strategy. It stated that the mapping can be used in strategic decision-making and in improving production processes, and that the application of these concepts is increasingly essential in agri-supply chains. The chapter also presented an overview of the supply chain frameworks that have an impact on supply chain management and sustainability.

The literature review revealed that most supply chain management literature has focused on the manufacturing sector. Even though the agri-sector – including the tea industry – also now includes a manufacturing component, this shift has not yet been explored fully from supply chain management perspectives. This suggests a need to carry out a study in this area, not only because it helps to fill the gap in the literature, but because it will help to improve an industry that plays an important role in the economic development of many developing countries, including Sri Lanka. Therefore, this research aims to identify the factors that influence the development and management of a sustainable tea-supply chain.

Before introducing the research methodology chapter, the next chapter provides an introduction to the Sri Lankan tea industry, since this study used it as the case study for this work. It provides a brief history of the tea industry and explores the tea industry in Sri Lanka. It then provides an industry analysis to understand the dynamics in the industry compared to the global tea industry. Finally, it explores current literature to identify existing challenges faced by the industry.

CHAPTER 3

OVERVIEW OF THE SRI LANKAN TEA INDUSTRY AND ITS GLOBAL CONTEXT

3.1 INTRODUCTION

The previous chapter presented the literature review and theoretical concepts relevant to the research area of this thesis. It discussed the importance of the supply chain management (SCM) and sustainability concepts, and demonstrated that the application of SCM is a critical activity to achieve competitive advantage in the globalised business environment. It also highlighted that sustainability concepts further increase the challenges to successful SCM due to increased focus on social and ethical concerns in the business processes. The literature review also highlighted that the application of SCM theories is as important in the agriculture sector as it is in the manufacturing sector, because agri-supply chains increasingly display the characteristics of manufacturing supply chains. Sustainability is also a vital concept in managing agri-supply chains due to customers' increased awareness not only of the quality of the food they consume but also whether products have been made ethically and in ways that fulfil corporate social responsibility. The literature review also highlighted that mapping the supply chain is an important first step in implementing SCM concepts and sustainability initiatives. It pointed out the need for better understanding of overall operations to increase performance in a relevant supply chain. The literature review further pointed out that even though much research has been carried out in the manufacturing sector, there is a gap in the literature in the field of sustainable supply chain management, especially regarding agri-supply chains for products such as tea. Therefore, this research tries to identify the influencing factors on a sustainable tea supply chain and to map the chain from end-to-end.

To further highlight and to provide a better understanding of the importance of the study area, this chapter aims to give a general introduction to the trends in the tea industry, and presents the dynamics of the global tea trade, focusing specifically on the Sri Lankan tea industry. This chapter consists of five sections (including introduction).

Section 3.2 provides a brief history of the Sri Lankan tea industry, recounts how the tea industry was introduced to Sri Lanka and briefly explains the science of tea, as it has a significant affect on the characteristics of the final products (for example produced tea). Section 3.3 explores the Sri Lankan tea industry and its characteristics, focusing on the local context. It provides some insights on the types of tea growers, geographical distribution of producers within Sri Lanka, local production, export volumes and earnings and tea production costs in the country. Section 3.4 explores the global trends of the tea industry, specifically analysing the global position of the Sri Lankan tea industry. It provides an analysis of global tea production, exports, imports, export earnings and productivity for the main tea-producing countries in the world. Section 3.5 explores through current literature the critical issues that the Sri Lankan tea industry currently faces, and demonstrates that various social and environmental issues have been studied as standalone issues. Finally, Section 3.6 provides a summary of the chapter.

3.2 HISTORY OF THE TEA INDUSTRY

3.2.1 The Beginning of the Tea Industry

Tea, one of the world's best-known drinks (Balentine, Wiseman & Bouwens 1997) can be defined as a beverage made from steeping the leaves and buds of *Camellia sinensis* (an evergreen, perennial crop) in boiling water (Tipton, Yokoyama, Wanitprapha & Nakamoto 1990).

As a beverage, tea is typically popular with all ages and amongst all social groups around the world (Tipton et al. 1990). More than three billion cups of tea are consumed per day globally. Furthermore, the consumption of tea is growing every year (Hicks 2001). Tea competes in the global beverage market with other drinks such as coffee, cocoas and alcoholic drinks, as well as formulated soft drinks such as Coca-Cola, Pepsi and Sprite (Acharya & Kumar 2005; Tipton et al. 1990).

Tea grows best in tropical and semi-tropical countries (Sing, Vries, Hulley & Yeubng 1977). It requires around 60 inches (around 152 cm) annual rainfall, and a relatively

acidic soil (a pH of around 4-6). Extensive dry weather and high pH values for the soil adversely affect the yield (Tipton et al. 1990).

The tea industry is one of the oldest industries in the world, with a history of over 2,000 years. During ancient times, tea was popular as a medicinal and health-giving drink (Balentine, Wiseman & Bouwens 1997; McKay & Blumberg 2002). Even today tea is popular as a medicinal plant around the world (McKay & Blumberg 2002; Yang & Landau 2000).

The tea plant has been used as a drink since the second emperor of China, Shen Nung, found it accidentally in 2737 B.C. (Fernando 2000; McCoy & John 1998). He promoted the cultivation of tea plants as a beverage in China for the benefit of the nation, encouraging the people to identify proper infusion and preparation steps to prepare good-quality drinking tea. Drinking tea rapidly became very popular all around China (Fernando 2000; Willson & Clifford 1992). After a few decades tea cultivation was expanded to countries such as Japan, when Japanese priests who were studying Buddhism in China took some tea seeds and leaves with them back to their country in 593 AD, planting them in Buddhist temple gardens (McCoy & John 1998).

Tea was regularly traded across the border with Mongolia during the Sung Dynasty between 960 and 1127 AD (Willson & Clifford 1992). Tea was first carried westwards by Turkish traders who had reached the Mongolian border to trade with the Chinese (McCoy & John 1998). Tea was also exported to Tibet. China also started supplying small quantities of tea to Russia by caravans over land (which took nearly three years to complete a return journey during the 17th century). Since the commercial potential for tea was increasing considerably, the Chinese government introduced a tax on tea exports in 780 AD (Willson & Clifford 1992).

During this period, tea growing expanded to the south Asian region, beginning with India, where growers realised in 1823 that tea had been growing wild and used as a beverage by the indigenous population (Willson & Clifford 1992). However, growing tea on commercial plantations was initiated only after India received a consignment of 80,000 tea seeds from China in 1835. The first tea crop was exported from Calcutta to London in May, 1838, and took almost six months to reach its destination. Tea

plantations expanded to many areas such as Upper Assam, Darjeeling, Terai and Western Dooars, and India soon became the world's largest tea-producing country (Willson & Clifford 1992).

Sri Lanka (which was called "Ceylon" during British colonial rule during the 1800s) was the next country in which tea cultivation became an industry. The first tea seeds arrived in Sri Lanka from Assam, India in 1839 and were sent to the botanical garden in Kandy to germinate. The resulted plants were sent to hilly areas for experimental planting. However, planters were generally not interested, because at this time coffee was the main agricultural product in Sri Lanka, and it was in high demand around the world. However, by the 1860s the coffee plantations were facing a serious problem with the spread of a leaf disease (coffee rust), and the coffee plants were completely destroyed within a very short time period. The established planters were compelled to search for an alternative crop. By then experimental tea plantations had been identified as a success, and the planters started to grow tea on the lands they had formerly used for coffee. The first commercial tea planting was started by Taylor in 1872. Tea plantations soon boomed in the country, and Sri Lanka quickly became famous for its quality tea. The planters found that the tea industry was extremely profitable, particularly as demand for tea was also increasing markedly. Spurred by this increase in demand, the growers expanded to other colonies such as Kenya, Indonesia and Vietnam (Willson & Clifford 1992).

Currently, according to the FAOSTAT database (2013a)¹, around 50 countries are producing tea globally. However, as shown in Figure 3-1, China, India, Kenya, Sri Lanka, Turkey, Vietnam, Indonesia, Bangladesh, Japan and Argentina together account for almost 90% of the global tea production. According to the FAOSTAT database (2013a), the balance is produced by the remaining tea-producing countries, although the individual production share of each is less than 2%.

¹ At the time of the analysis FAOSTAT database was updated only until 2011.

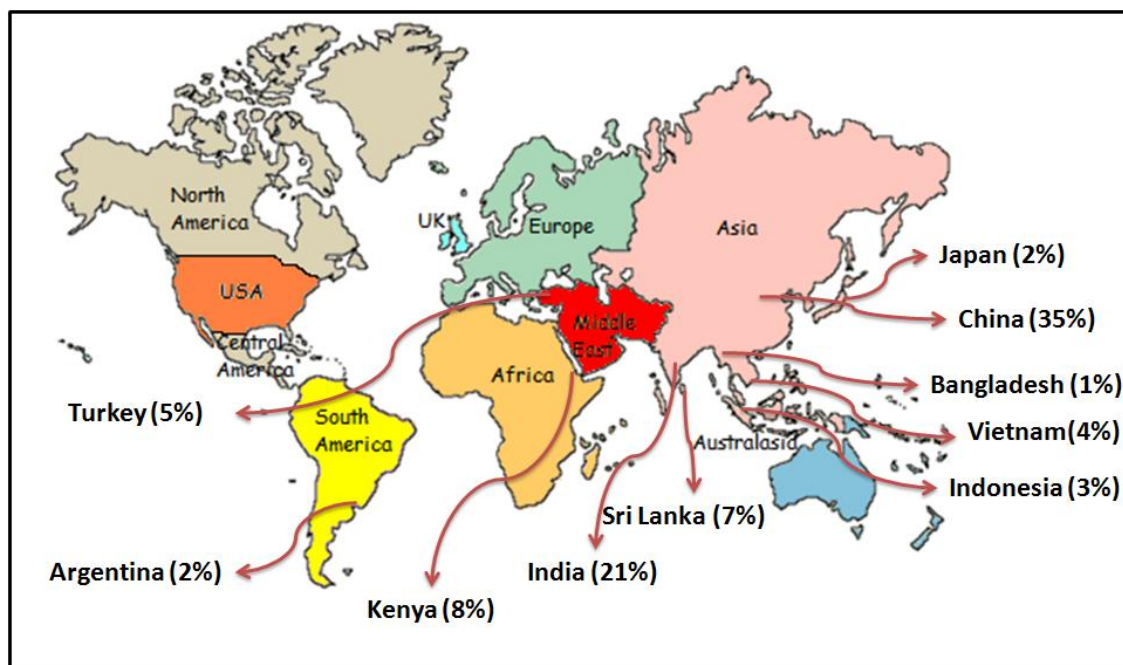


Figure 3-1: Top Ten Tea-Growing Nations in the World and Their Production Share (2011)

Source: FAOSTAT (2013a)

3.2.2 The Science of Tea

Tea is made from *Camellia sinensis*, a medicinal plant (Balentine, Wiseman & Bouwens 1997; McKay & Blumberg 2002; Yang & Landau 2000). The unique colour, taste and smell of tea are a result of the chemical reactions that take place during leaf processing (Balentine, Wiseman & Bouwens 1997), and depend in large part on the processing method. Tea is classified into different types such as black, green, oolong and so on (Figure 3-2), based on the method use to process it, which differs slightly for each type (Tipton et al. 1990). Other than the difference in the oxidation process, black, green and oolong tea follow a similar production process.

Black tea is made by fermenting the leaves and then allowing auto-oxidation by polyphenol oxidase in the tea leaves. When preparing green tea, leaves are first steamed to inactivate the polyphenol oxidase. Oolong tea production process is an intermediate of black and green tea production, where there is a partial oxidation process before drying. When producing white tea, the green leaves are sorted, steamed and air dried. Green sencha tea is mainly produced in Japan, where the green leaves are sorted, steamed and dried (McKay & Blumberg 2002).

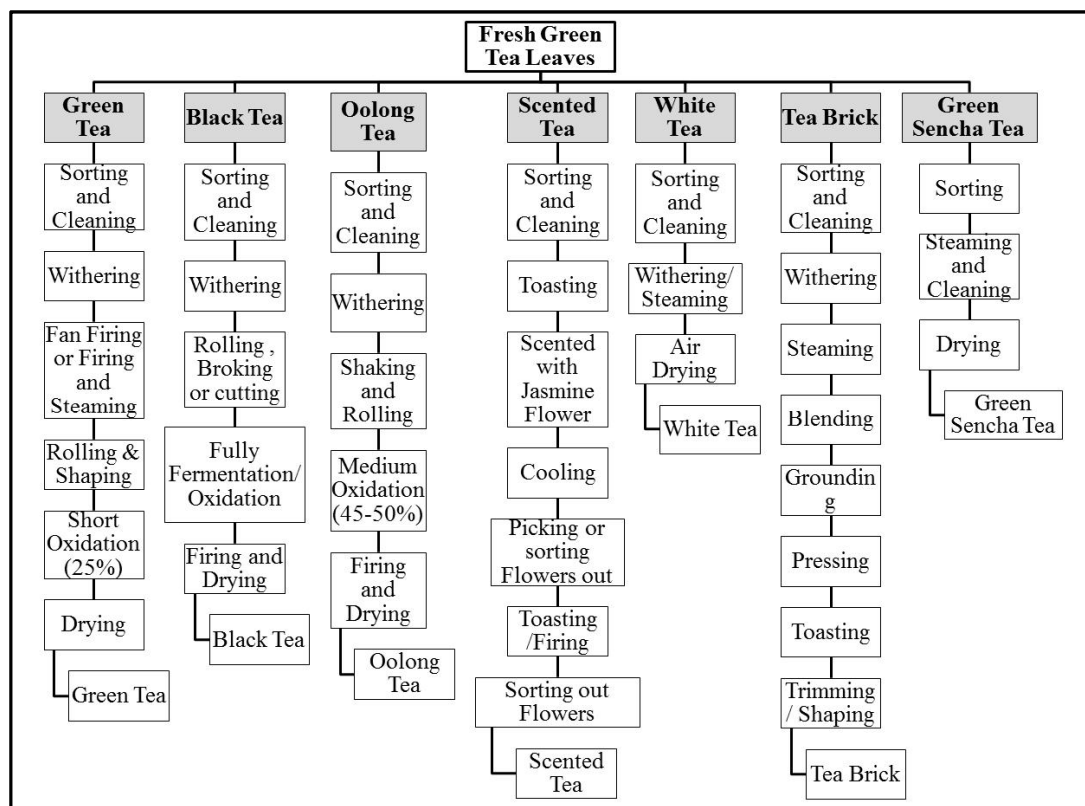


Figure 3-2: Production Processes for Different Tea Types

Source: McKay & Blumberg(2002)

Black tea accounts for 78% of worldwide tea production. Black tea is mainly consumed in India, Sri Lanka, Europe, North America and North Africa (Forster 1999). Approximately 20% of production and consumption is green tea. Oolong tea production is less than 2% (McKay & Blumberg 2002). Green tea is consumed throughout Asia, whereas the consumption of oolong tea is typically confined to China and Taiwan (McKay & Blumberg 2002; Willson & Clifford 1992).

3.3 THE TEA INDUSTRY IN SRI LANKA

3.3.1 Types of Growers

Tea growers are classified into the estate sector or the smallholding sector, depending on the extent of land under cultivation. As shown in Table 3-1, which gives the total land area under tea cultivation by sector in Sri Lanka, an agricultural land holding that has 50 or more acres of land under tea cultivation is considered an estate. Holdings that

have less than 50 acres are defined as smallholdings. The total land area under tea cultivation by sector as per 2002 census data is given in Table 3-1.

Table 3-1: Total Land Area (Hectares) under Tea Cultivation by Land Size in Sri Lanka – 2002²

Size Class of Tea Extent	Land Area by Status of Cultivation (Hectares)						Total Extent under Tea Cultivation
	Mature VP	Mature Seedling	Immature VP	Extent Abandoned	Prepared for Cultivation	Nurseries	
Small Holding Sector	70,585	9,146	7,218	2,427	4,247	139	93,761
Less than 1/4 acre	1,321	161	270	14	32	7	1,806
1/4 - 1/2 acre	5,606	650	805	74	203	10	7,348
1/2 - < 1 acre	15,866	1,881	1,696	359	795	27	20,623
1 - < 2 acres	21,270	2,755	2,036	705	1,320	33	28,119
2 - < 3 acres	10,932	1,341	1,012	414	667	17	14,383
3 - < 4 acres	4,440	525	414	162	296	6	5,843
4 - < 5 acres	2,633	402	257	117	193	10	3,612
5 - < 7 acres	2,916	428	268	143	236	8	3,999
7 - < 10 acres	1,883	324	156	110	140	4	2,616
10 - < 20 acres	2,855	446	234	238	245	9	4,027
20 - 50 acres	863	233	71	91	119	7	1,384
Estate Sector	50,959	50,721	3,425	11,311	2,218	321	118,955
Total Land Extent	121,544	59,867	10,643	13,737	6,465	460	212,716

Source: Sri Lanka Tea Board Annual Report (2010), Sri Lanka Tea Small Holdings Development Authority Annual Report (2010)

As demonstrates in Table 3-1 around 44% of the tea lands under cultivation are owned by tea smallholders (more than 80% of which are plots of less than four acres) with the balance being large-scale plantations.

3.3.2 Geographical Distribution of Producers

According to the Sri Lanka Tea Board Annual Report (2011) tea-growing regions in Sri Lanka are classified into three elevation zones: high, middle and low³. Initially tea was grown only at high-elevation zones such as the Kandy and Nuwara Eliya Districts in Sri Lanka. Tea production has now widely dispersed into middle and low elevations (Table 3-2). As shown in Figure 3-3 and Table 3-2, tea is grown in 14 of the 25 administrative districts in Sri Lanka.

² The latest information on land area by status of cultivation and land size is only as recent as 2002. Even though a census was carried out in 2012, the data had not been published at the time of this research.

³ Elevation Categories: Low – 0 to 610 meters above Mean Sea Level (MSL); Medium – 610 to 1,220 meters above MSL and High – over 1,220 meters above MSL

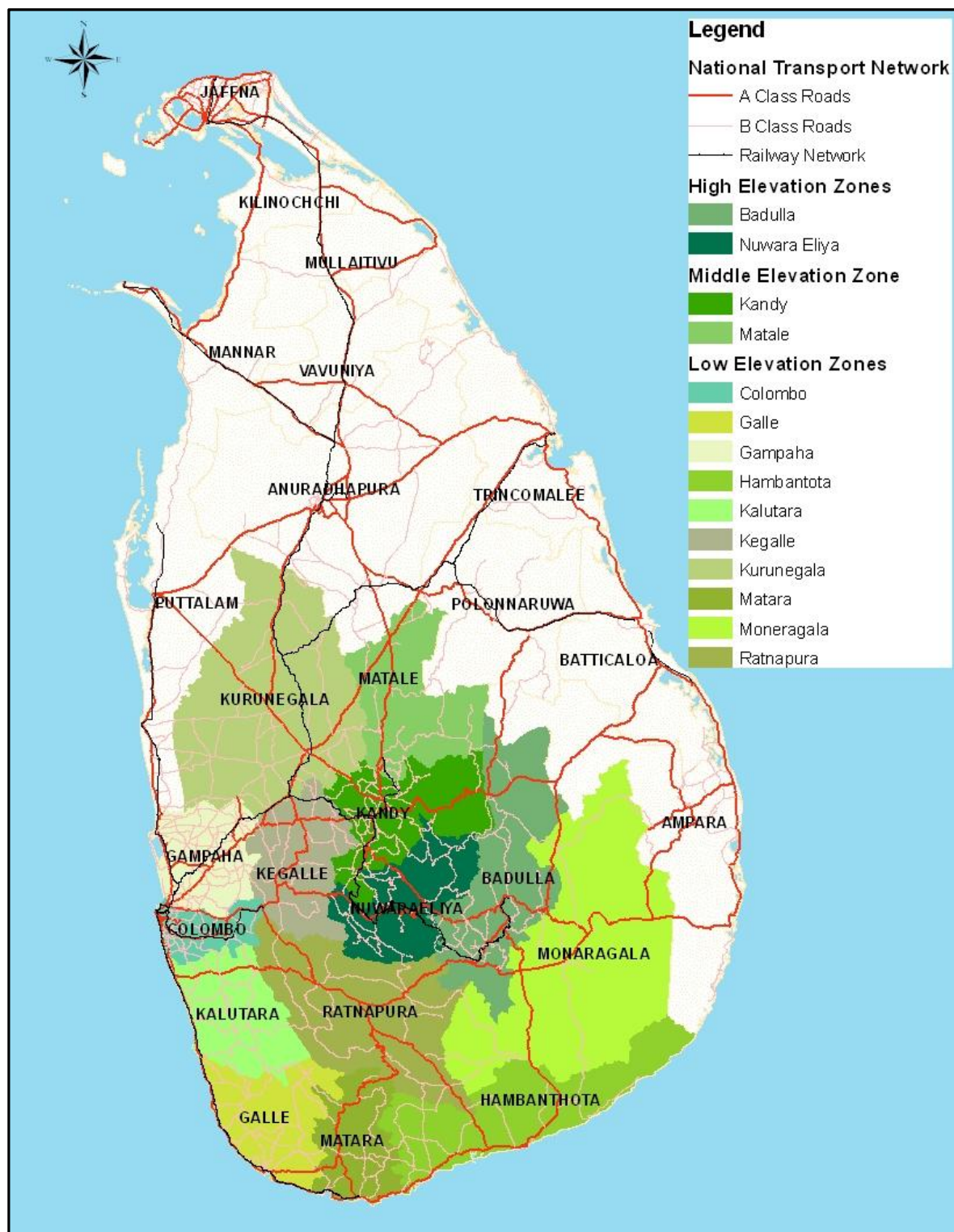


Figure 3-3: Map of Tea-Growing Districts in Sri Lanka

Source: Map Prepared by the Author using the TransPlan Database, University of Moratuwa, Sri Lanka (Kumarage, Bandara & Jayaratne 2008)

According to the census and statistics of 2002, the total land under tea cultivation is around 212,700 hectares. As shown in Table 3-2, the total land area in the estate sector

has declined considerably, down 30% in 2002 from the 1982 figure of 168,600 hectares. Meanwhile, the land in the smallholder sector has increased considerably.

Table 3-2: Extent of Tea Cultivation in Sri Lanka, 1982 and 2002 (Hectares)⁴

District by Elevation Zone	Extent in 1982			Extent in 2002		
	Smallholdings	Estates	Total	Smallholdings	Estates	Total
High Elevation	6,308	91,255	97,563	9,661	71,246	80,905
Badulla	3,196	31,545	34,741	5,616	25,024	30,639
Nuwara Eliya	3,112	59,710	62,822	4,045	46,222	50,266
Middle Elevation	8,607	33,580	42,187	7,965	19,764	27,729
Matale	660	6,445	7,105	356	4,774	5,130
Kandy	7,947	27,135	35,082	7,609	14,990	22,599
Low Elevation	23,604	43,791	67,395	76,135	27,947	104,082
Colombo	89	161	250	93	60	154
Gampaha	0	0	0	12	0	12
Kalutara	539	3,047	3,586	6,117	1,054	7,171
Galle	8,213	6,396	14,609	22,062	3,568	25,629
Matara	8,025	7,515	15,540	17,326	6,378	23,704
Hambantota	142	0	142	440	0	440
Kurunegala	134	286	420	31	10	41
Moneragala	11	786	797	70	852	922
Ratnapura	4,881	19,183	24,064	25,433	12,918	38,352
Kegalle	1,570	6,417	7,987	4,551	3,107	7,658
Total	38,519	168,626	207,145	93,761	118,955	212,718

Source: Department of Census and Statistics (2010)

Figure 3-4 shows the annual growth of lands under tea cultivation between 1982 and 2002 by district. This graph also highlights that there has been a remarkable increase in the smallholder sector over the last 20 years. Furthermore, this graph shows that the smallholder sector has grown considerably in districts such as Kalutara, Moneragala, Ratnapura, Hambantota, Kegalle, Galle and Matara, which are in the low-elevation zones.

Furthermore, there is a remarkable decrease in land area under tea cultivation in the both estate and the smallholder sectors in districts such as Kandy and Matale, in the middle-elevation zones. It should be also noted that, despite the fact that they were the first areas put under tea cultivation during the colonial period (Ali, Ghourdhery & Lister 1997). Tea cultivation at high elevations shows a negative growth in the estate sector,

⁴Even though a Census was conducted in 2012, the report has not been released at the time of submission of this thesis. Hence 1982 and 2002 census data has been used in this table. According to the Central Bank Annual Report (2010), the total land area under tea cultivation in 2012 is *estimated to be* around 220,000 hectares.

but a positive annual growth in the smallholding sector, between 1982 and 2002 (Figure 3-4).

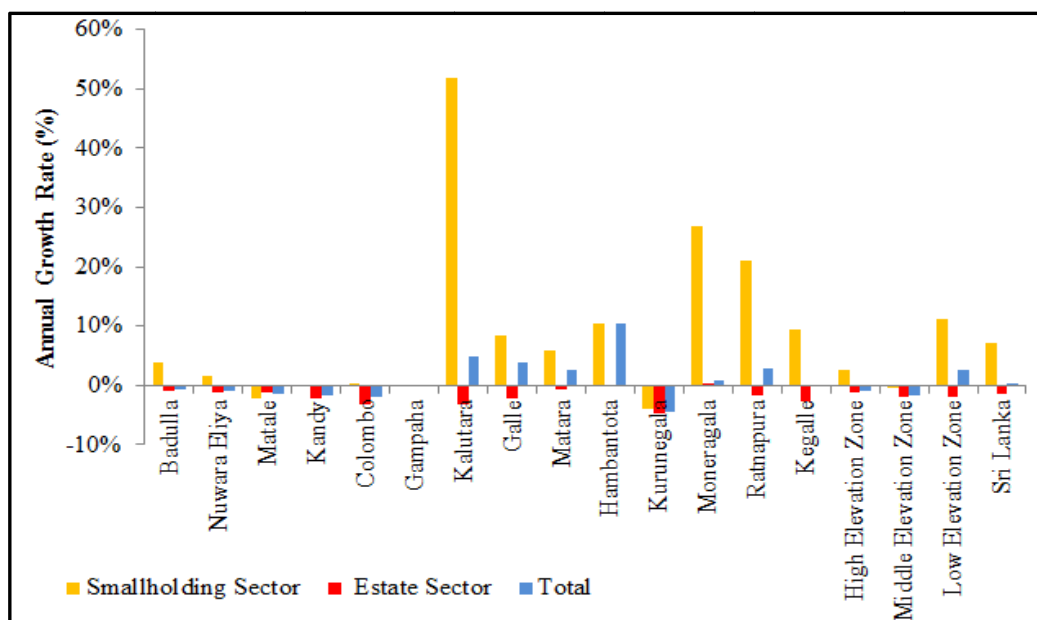


Figure 3-4: Average Annual Growth Rate of Land under Tea Cultivation (between 1982 and 2002)

Source: Calculated by the Author from data obtained from Department of Census and Statistics (2002)

Department of Census and Statistics (2002) reported that while in 1982 the smallholding sector accounted for around 19% of the total tea lands, by 2002 the total land area in the smallholding sector had increased considerably – by almost 150%. By 2002 the percentage distribution of tea lands was 44% in the smallholding sector and 56% in the estate sector; by 2005 the ratio was 37:60 (Table 3-3).

Table 3-3: Tea Land Area (Hectares) and Percentage by Management Type

	1982		2002		2005	
Private Sector	38,520	19%	93,763	44%	132,329	60%
Corporate Sector	168,551	81%	118,960	56%	81,592	37%
State Sector					8,048	4%
Total	207,071		212,722		221,969	

Source: Sri Lanka Tea Board Annual Report (2010), Sri Lanka Tea Small Holdings Development Authority Annual Report (2010)

Figure 3-5 also demonstrates that the land area under tea cultivation at low-elevations has increased considerably. This shows that tea production has gradually migrated to

low-altitude areas. Table 3-4 demonstrates that the number of tea smallholders has increased considerably in all three producing zones, with a total increase between 2002 and 2005 of more than 50%. Table 3-4 also shows an increase of around 60% in the number of tea smallholders in high-elevation districts such as Badulla and Nuwara Eliya.

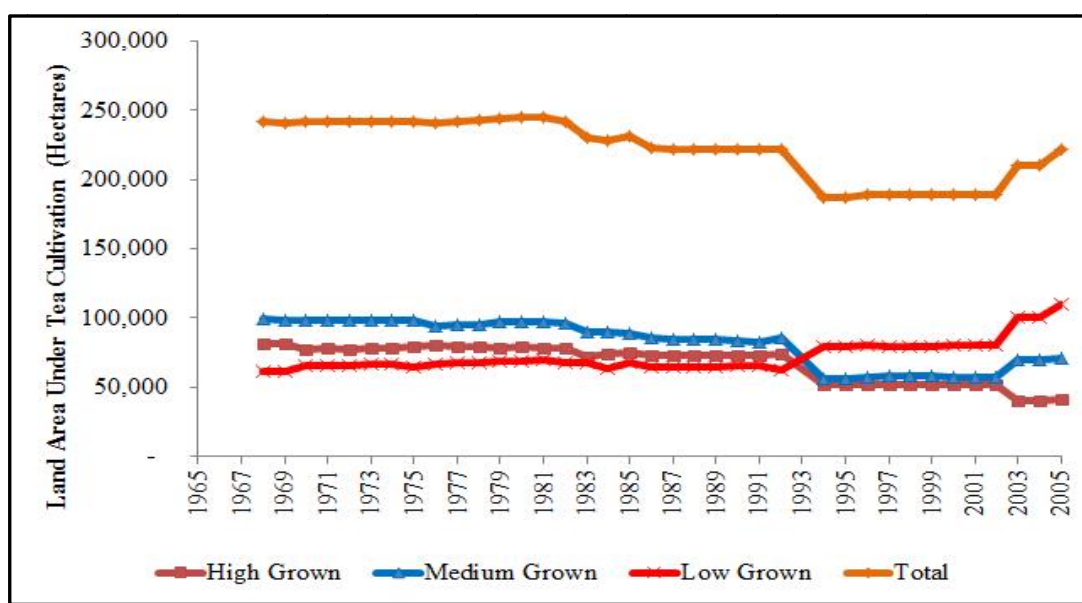


Figure 3-5: Land Area under Tea Cultivation (1965-2005)⁵
Sources: Various Annual Reports of the Central Bank of Sri Lanka

3.3.3 Tea Production

3.3.3.1 By Management Type

With increasing land area under tea cultivation, especially in the private sector, production volume has also increased considerably. As shown in Table 3-5, the private-sector contribution to national tea production has almost doubled during the last 15 years.

⁵Even though it had been a statutory requirement that owners register lands under tea cultivation with the Tea Commissioner's Division at the Sri Lanka Tea Board, the policy was abolished at the end of 1992. Therefore there is no continuous data available after 1993. Data for 1994/1995 was obtained from the Land Use Survey conducted by the Census & Statistics Department. The data for 1996-2002 is estimated values from Sri Lanka Tea Board Bulletins. Values for 2003 and 2004 are based on the Census of Agriculture – 2002. Data for 2005 was from the Agriculture Profile – 2003 (Tea Research Institute) and the Census of Tea Small Holdings in Sri Lanka (TSHDA). No data was found from after 2005.

Table 3-4: Number of Tea Smallholders in Sri Lanka

District	2002	2005
High-Elevation Zone	29,489	47,226
Badulla	17,553	29,679
Nuwara Eliya	11,936	17,547
Middle-Elevation Zone	19,179	32,155
Matale	747	1,408
Kandy	18,432	30,747
Low-Elevation Zone	214,350	317,842
Colombo	366	491
Gampaha	38	9
Kalutara	22,967	38,263
Galle	58,314	90,524
Matara	45,863	67,613
Hambantota	1,619	2,533
Kurunegala	95	151
Moneragala	247	637
Ratnapura	70,752	97,984
Kegalle	14,089	19,637
Sri Lanka	263,018	397,223

Source: Sri Lanka Tea Small Holdings Development Authority Annual Report (2010) and Department of Census and Statistics (2002)

Table 3-5: Total Tea Production in Sri Lanka (1996-2011) [Metric Tonnes]

	JEDB	SLSPC	Regional Plantation Companies	Other Estate Agencies	Private	Total
1996	3,800	2,900	129,600	10,800	111,300	258,400
1997	4,100	4,000	146,500	10,800	111,300	276,700
1998	3,500	4,000	136,900	11,600	124,000	280,000
1999	3,700	4,000	140,700	11,000	124,400	283,800
2000	4,200	4,400	147,800	6,900	143,500	306,800
2001	3,900	4,300	140,000	9,200	137,700	295,100
2002	3,800	4,300	149,700	8,600	143,600	310,000
2003	2,500	3,300	143,900	13,000	138,500	301,200
2004	4,900		131,100	15,100	155,300	306,400
2005	5,300		139,800	5,600	166,500	317,200
2006	5,300		128,300	14,200	163,000	310,800
2007	3,400		76,400	N/A	224,800	304,600
2008	3,800		79,100	N/A	230,600	313,500
2009	4,300		115,400	7,000	164,400	291,100
2010	4,300		136,200	7,900	183,000	331,400
2011	4,400		122,900	1,500	198,700	327,500

Source: Economic and Social Statistics in Sri Lanka (2006) and Economic and Social Statistics in Sri Lanka (2013)

3.3.3.2 By Elevation

Figure 3-6 shows production volumes by elevation for the last three decades. The production volumes have fluctuated slightly over that time. Total tea production has been over 300,000 tonnes per annum since 2000 (except in 2001 and 2009). In 2012 around 62% of Sri Lankan tea was produced in low elevations, while high- and mid-elevation zones accounted for around 22% and 16% respectively.

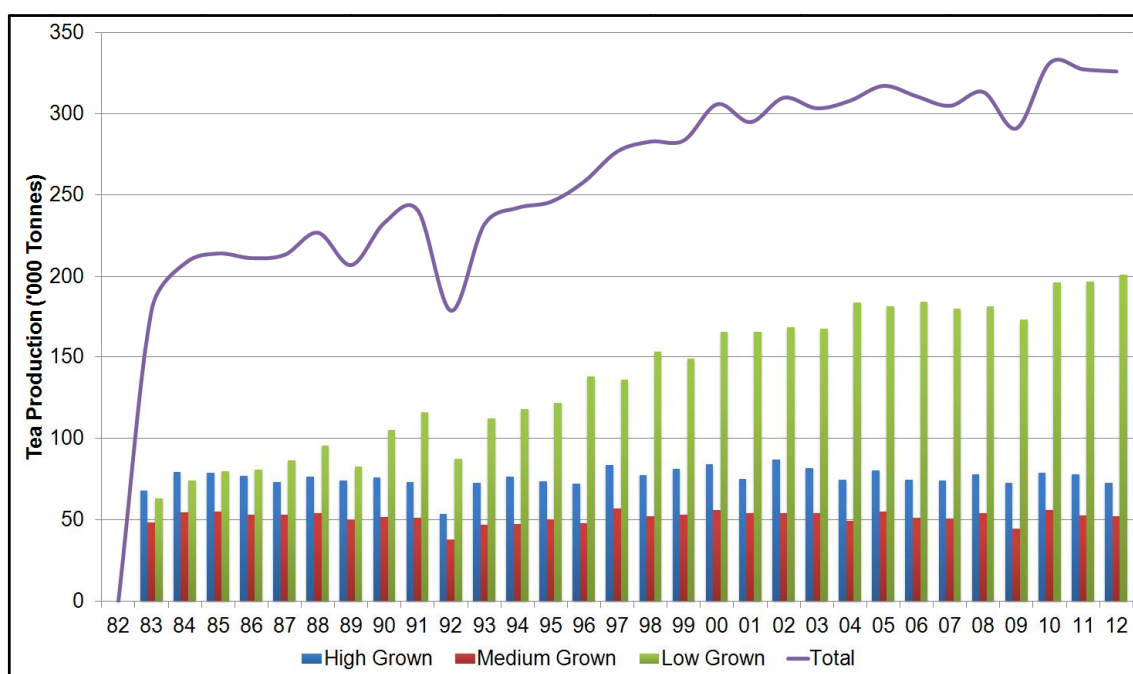


Figure 3-6: Tea Production in Sri Lanka by Elevation Zone – 1982 to 2012 ('000 tonnes)

Source: Economic and Social Statistics in Sri Lanka, Sri Lanka Central Bank (2006) and (2013); Central Bank of Sri Lanka annual reports (various years)

The production growth rate was comparatively high for the low-elevation zone: around 3%, compared to 0.04% in the high zone and 0.56% in the middle zone, far below the national annual growth rate of around 1.6%.

3.3.3.3 By Production Method

Tea produced at different elevations has different liquoring properties and leaf appearance. Tea produced in high-elevation zones has a high-quality flavour and gets higher prices at auction. The quality of the tea depends not only on the elevation, but on the production method. There are two popular methods used in tea production: orthodox

manufacturing and the cut-tear-curl (CTC) type of manufacture (Kasturiratne 2008). In Sri Lanka the orthodox method accounts for around 93% of production; although the CTC method is very popular in African countries, it is limited to around 7% of Sri Lankan tea production (Table 3-6).

Table 3-6: Tea Production by Production Method – Metric Tonnes (2007 to 2012)

	2007	2008	2009	2010	2011	2012
Orthodox	254,306	299,210	271,879	309,730	302,854	300,087
High-elevation	58,550	77,332	66,859	74,518	74,290	68,687
Medium-elevation	41,368	40,736	36,016	44,684	39,960	39,562
Low-elevation	154,387	181,141	169,004	190,528	188,605	191,837
CTC	15,102	16,168	15,593	18,386	22,528	23,242
High-elevation	4,798	6,330	4,961	3,869	4,131	3,233
Medium-elevation	6,580	6,288	6,770	9,377	11,193	11,132
Low-elevation	3,724	3,550	3,863	5,140	7,203	8,878
Total Black Tea Production	269,408	315,378	287,472	328,116	325,382	323,329
High-elevation	63,349	83,662	71,820	78,388	78,421	71,920
Medium-elevation	47,947	47,024	42,786	54,060	51,154	50,694
Low-elevation	158,112	184,691	172,867	195,668	195,808	200,715
Green Tea	3,179	3,093	2,306	3,310	2,988	2,949
High-elevation	1,032	606	483	741	788	820
Medium-elevation	1,326	1,968	1,531	2,071	1,381	1,599
Low-elevation	820	520	291	499	819	531
Total (Including Green Tea)	272,587	318,471	289,778	331,426	328,370	326,278
High-elevation	64,381	84,268	72,304	79,129	79,209	72,740
Medium-elevation	49,274	48,992	44,317	56,131	52,534	52,293
Low-elevation	158,932	185,211	173,158	196,167	196,627	201,246

Source: John Keels Tea Statistics Database (<http://www.tea.keells.lk/teastats.htm>)

Orthodox manufacturing uses maceration and processing methods that are very gentle on the tea leaf; this helps protect and enhance the natural flavour of the tea. In contrast, the CTC method is harsh, breaking the tea leaves into smaller particles and damaging the natural flavour. The CTC method takes only around two hours, and the resulting tea gives a quicker brew or infusion than tea produced using the orthodox method (Kasturiratne 2008). Hence CTC tea is very popular in the value-added-tea industry. In contrast, the orthodox method, which takes around 24 hours, preserves the natural flavours.

3.3.4 Tea Export and Export Earnings

As shown in Figure 3-7, over 50% tea exported from Sri Lanka was in bulk. Although there has been a recent increase in exports of packeted teas which includes private-label brands, around 41% is still exported as bulk tea.

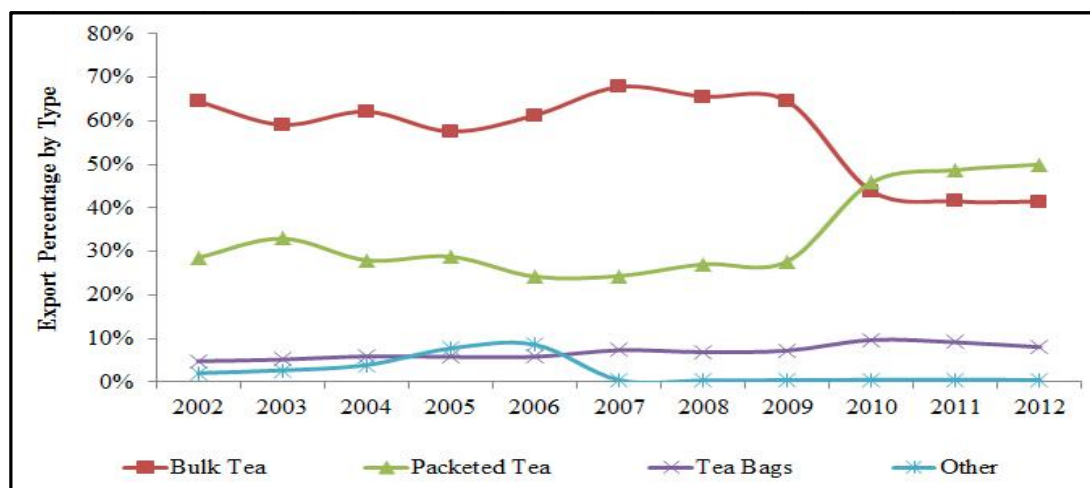


Figure 3-7: Export Volume and Value by Tea Type

Source: Annual Reports of the Central Bank of Sri Lanka (2002 to 2012)

Table 3-7 shows variations in Sri Lanka's exports by destination (a complete list of countries that import Sri Lankan tea is given in Appendix 1). Exports to the European Union and CIS countries have been declining markedly, whereas exports to countries in Middle East have increased considerably from 2003 to 2012, along with export earnings (Table 3-8). This suggests that Sri Lanka is moving towards selling to the markets that pay well for its tea.

Table 3-7: Sri Lankan Tea Export ('000 Tonnes) by Destination

Regional Destination	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Middle East countries	126	143	148	154	149	164	148	164	152	148
CIS countries	73	75	71	80	71	69	61	77	84	75
European Union	35	33	30	28	31	29	25	27	26	24
Other industrialised countries	18	18	17	20	19	19	18	20	20	18
Other countries	47	32	42	45	41	38	38	40	41	55
Total	298	300	309	327	312	320	290	328	323	320

Source: Annual Reports of the Central Bank of Sri Lanka (2003-2012)

Table 3-8: Sri Lankan Tea Export Earnings (Million US\$) by Destination

Regional Destination	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Middle East countries	275	325	360	370	479	620	592	688	659	604
CIS countries	173	177	187	215	244	289	251	342	395	350
European Union	82	83	90	91	117	135	117	134	145	128
Other industrialised countries	63	68	70	81	90	102	95	120	126	115
Other countries	88	63	94	94	115	126	130	156	169	214
Total	682	716	801	851	1,045	1,272	1,185	1,440	1,494	1,411

Source: Annual Reports of the Central Bank of Sri Lanka (2003-2012)

3.3.5 Tea Production Cost

Sri Lankan tea producers have experienced a continuous and drastic increase in production costs since 2005 (Figure 3-8) and subsequent declines in total profit.

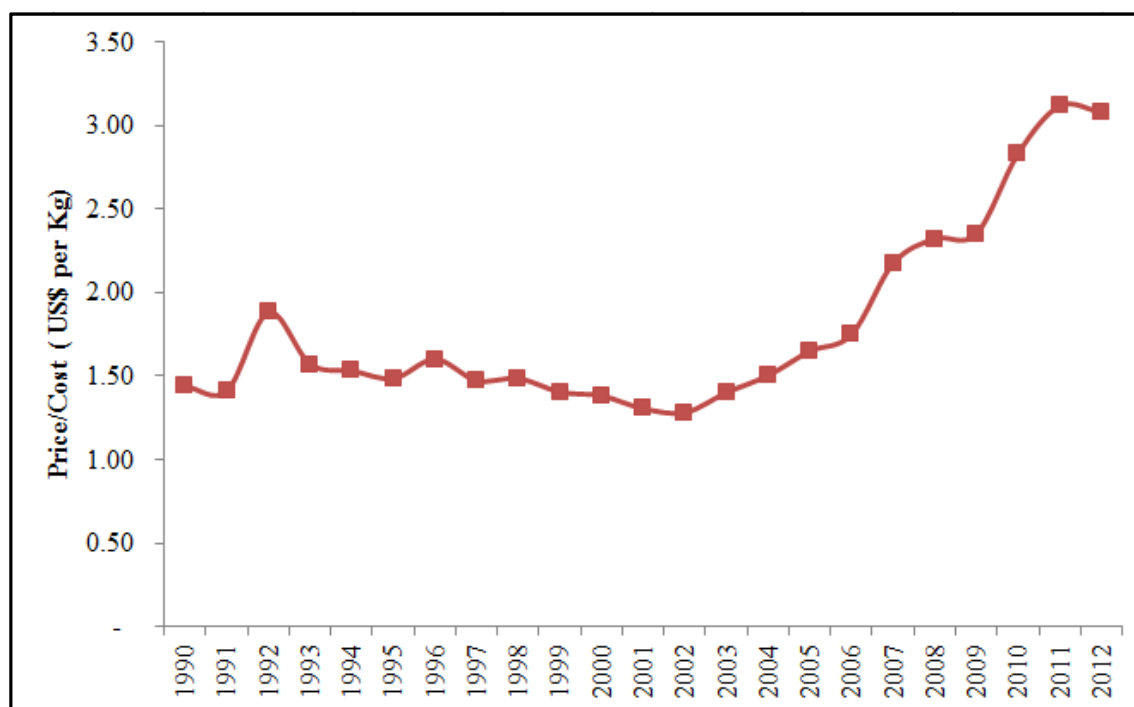


Figure 3-8: Cost of Tea Production (US\$ per Kilogram)

Source: Annual Reports of the Central Bank of Sri Lanka (1990-2012)

3.4 DYNAMICS OF GLOBAL TEA INDUSTRY: FOCUSING SRI LANKA

This section explores the dynamics of the Sri Lankan tea industry in the context of global production, export volume and export earnings.

3.4.1 Global Tea Production

According to the Food and Agriculture Organization of the United Nations (2013a), global tea production has continuously increased over the last five decades: from 983,785 tonnes to 4,668,968 tonnes between 1961 and 2011 (Figure 3-9). This is a 375% change, or a 3.2% average annual growth rate. In 1961, China, India and Sri Lanka were the largest tea producers in the world (Lamb 2010), accounting for around 70% of world tea production (Figure 3-9). India, the largest producer in the world at that time, was producing around 37.5% of global production. Sri Lanka was the second-largest tea producer, with a 21.9% share of the global output. Even though tea production had begun in China, its production share was lower than that of either India or Sri Lanka, at around 10%. China was followed by countries such as Japan (8.6%), Indonesia (8.2%), Bangladesh (2.81%) and Malawi (1.51%). Tea production in Kenya was insignificant, at around 1% of global output.

More recently, these countries' share in global tea production has changed considerably. There is sufficient evidence to suggest that, from fewer than 30 countries in 1961, tea is now grown in over 50 countries. India, China and Kenya have shown a significant growth in tea production over the last five decades. India was the leading tea producer in the world for more than four decades until 2004. Currently, Indian tea-production volume is almost three times more than it was five decades ago: 354,397 tonnes in 1961 to 966,733 tonnes in 2011. However, its global production share has reduced considerably over the same time: from 36% to 21%. Currently India is the second-largest tea producer in the world.

China, which was in third place in 1961, increased its capacity very quickly, exceeding Sri Lanka within a short time. By 1975, China had become the second-largest producer, with 16% of global tea production. Within another 30 years, China had become the world's largest tea producer, exceeding India in 2005. Since then, China has shown a

rapid growth in its production (Figure 3-10), and currently accounts for 35% of global tea production. Kenya has also shown a remarkable increase in tea production: in 1961 it was ranked eighth in the world, producing around 12,650 tonnes, or about 1% of global production; it is now third, producing 8%, and surpassed Sri Lanka in 2006.

Among the major tea-producing countries, Sri Lanka has shown considerably lower growth in tea production than other major producers. Sri Lanka, which was the second-largest tea producer in the world in 1961, has declined from 21% of global production to 7%, despite of an increase in production volume from 206,488 tonnes to 327,500 tonnes during last five decades (Figure 3-10). Sri Lanka's production volume now places it fourth among tea-producing nations.

The global tea output was amplified due to increased production in other countries such as Turkey, Vietnam and Indonesia (Figure 3-11). This data indicates that even though global tea production has increased remarkably overall, tea production in Sri Lanka has not grown compared to that of other tea-producing countries; in fact, it has stagnated at around 206,500 to 327,500 tonnes during last five decades. Despite a 7.5% average annual growth in global tea production between 1961 and 2011, the growth rate in Sri Lanka has been insignificant (1.2%). In comparison, Kenya's tea production grew around 58% during this period. Vietnam and China have also shown significant growth: 53% and 31% growth rates respectively (Table 3-9).

Table 3-9: Production Growth Rate

	1961- 1971	1971- 1981	1981- 1991	1991- 2001	2001- 2011	1961- 2011
China	8.54	10.46	5.29	2.82	12.73	31.80
India	2.29	2.85	2.87	1.76	1.41	3.46
Kenya	18.71	15.06	12.39	4.47	2.83	57.79
Sri Lanka	0.55	-0.35	1.46	2.26	1.10	1.17
Indonesia	-2.10	7.91	2.78	1.96	-1.47	1.69
Vietnam	10.67	3.66	5.63	12.87	17.29	53.09
Other countries	6.90	8.59	0.16	-4.26	-0.95	1.32
Global total	3.30	4.41	3.60	2.09	5.06	7.49

Source: Calculated by the Author using Data from FAOSTAT (2013a)

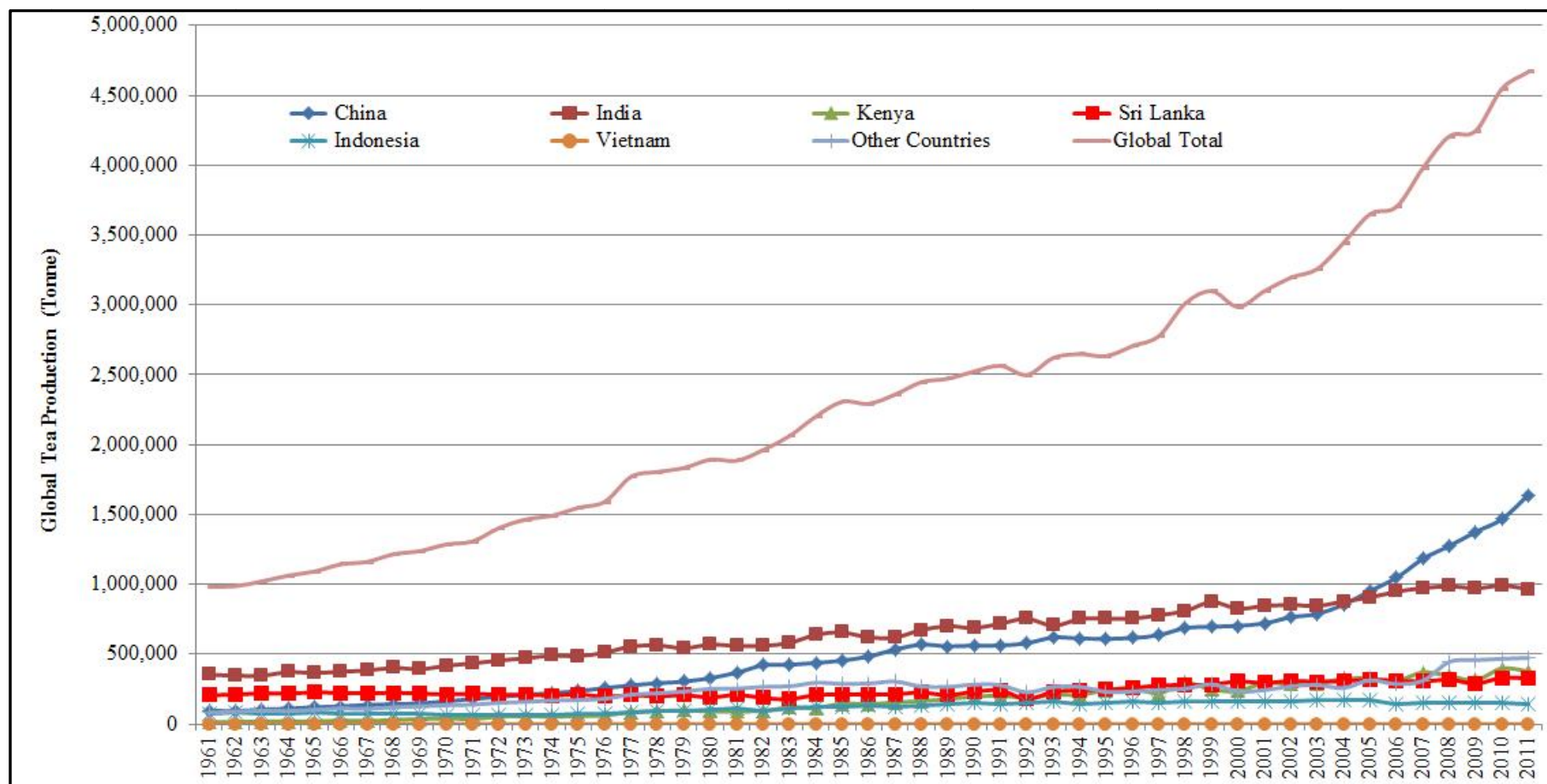


Figure 3-9: World Tea Production (1961-2011)

Source: FAOSTAT(2013a)

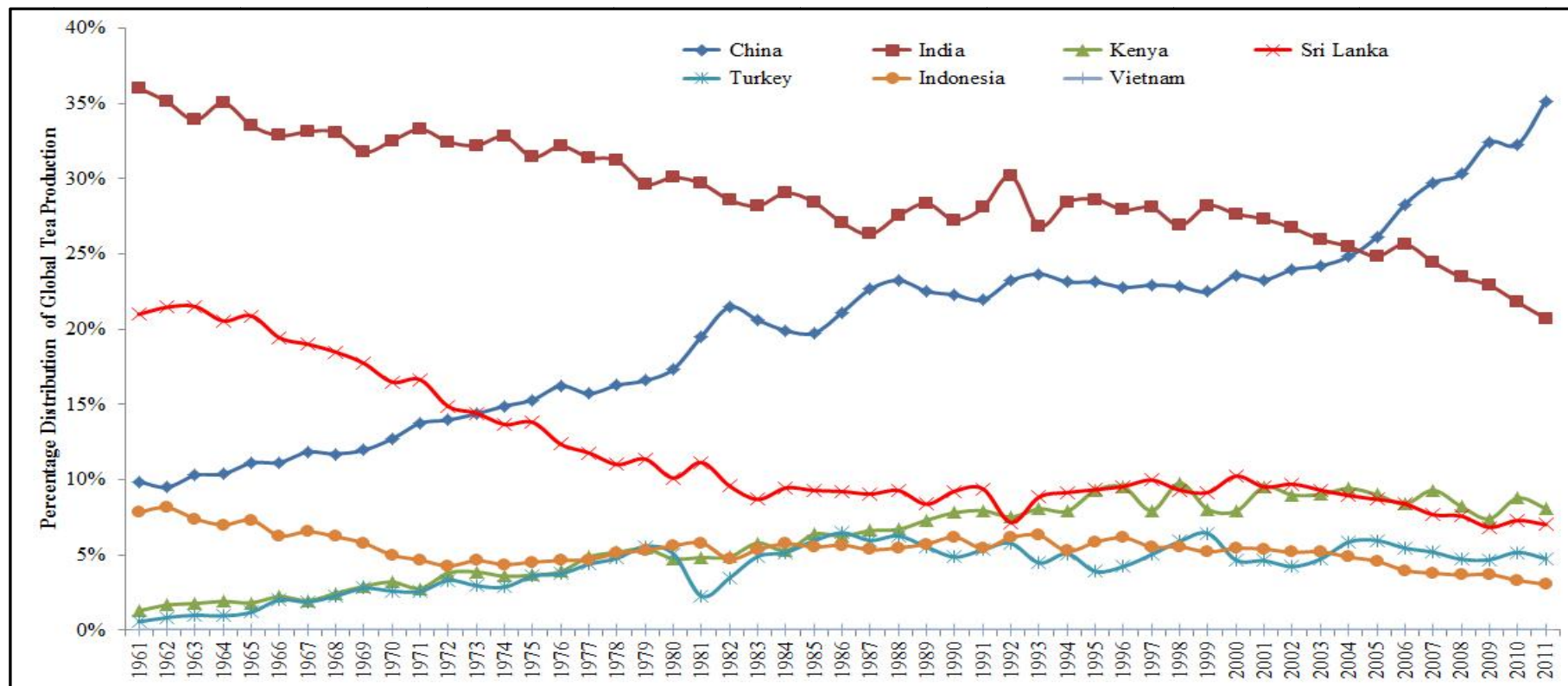


Figure 3-10: Percentage Production Share of Tea-Producing Countries (1961-2011)

Source: Calculated by the Author using data from FAOSTAT (2013a)

There are several reasons for the decline of Sri Lankan tea production and export during this period. Nationalisation of the plantation sector was a major reason, as it meant that foreign planters did not invest in the industry. The government also introduced various taxes, which further contributed to the reduction in export volumes. As shown in Figure 3-12, the export shares for Kenya, China and Indonesia were increasing considerably while those of both Sri Lanka and India were falling.

The Sri Lankan government had expected significant benefits from the nationalisation of the plantation sector. However, since nationalisation the sector's performance has deteriorated, creating more issues in the industry. The post-nationalisation structure was highly bureaucratic, since there was political interference that weakened the administration system, less involvement of technical personnel such as superintendents in monitoring and supervising production activities, less investment in replanting programs, a shortage of working capital and low yields (Kelegama 1993). As Kelegama (1993) pointed out, all these issues were a result of centralised decision-making, lack of accountability of management, no inclusion of operating units in corporate planning and a lack of policy guidelines. However, after implementing open-economy policies in 1978, exports of Sri Lankan tea began to grow. This was further supported with a 1981 relaxation of policies regarding tea imports for blending, initiatives to produce and export green tea beginning in 1982 and the promotion of CTC tea production beginning in 1983. This helped to increase the export volume, as shown in Figure 3-11. However, global share continued to fall (Figure 3-12).

To address this issue, the privatisation of the plantation sector was initiated in 1990 (Kelegama 1993). This was carried out over two stages. In 1993 only the plantation management was handed over to the private sector, while the government retained ownership of the plantations. Then in 1995, the government sold 51% of the shares of all estate tea companies to the private sector. Furthermore, the government abolished export and ad-valorem taxes on tea exports to encourage tea producers to increase export volumes. These changes accelerated the development of the tea industry, with increases in production as well as export share; in 1997 Sri Lanka overtook Kenya to become the top tea exporter.

3.4.2 Global Tea Exports

In 1961 India was the top tea-exporting country, accounting for 35% of global exports, while Sri Lanka was the second-largest-exporter. Sri Lanka surpassed India in 1965 accounting for 38% of global exports. In 1972, Sri Lanka was the leading tea exporter (Figure 3-11). However, neither Sri Lanka nor India could maintain the leading position, as exports from China and Kenya increased significantly. Sri Lanka was ranked as the second-largest tea exporter in the world until the 1990s; however, export share declined from 33% to 15% between 1961 and 2011. China doubled its export share during this time (Figure 3-12). By 2010, Kenya had become the world's top tea exporter, increasing its export share from 2% to 15% between 1961 and 2010. However, more recently, Kenya has considerably reduced its export volume and global export share compared to the other three major producers. Today India, China, Sri Lanka, Kenya and Vietnam are the top five tea-exporting countries.

Meanwhile, even though China and India are the largest tea producers in the world, their export volume as a percentage of production is very low compared to Kenya and Sri Lanka (Figure 3-11). This is mainly due to high domestic demand for tea in China and India. India is the largest consumer of black tea in the world, while China is the largest consumer of green tea (Kadavil 2007). Local consumption of tea in China was around 80% of the country's total tea production in 2011, and that in India was around 66%. Furthermore, Turkey the fifth-largest tea producer in 2011, also mainly serves its domestic market (Alkan, Koprulu & Alkan 2009). As shown in Figure 3-12, Kenya exported around 81% of its production in 2011, while Sri Lanka exported almost 99%. This indicates that local consumption is comparatively low in both Kenya and Sri Lanka.

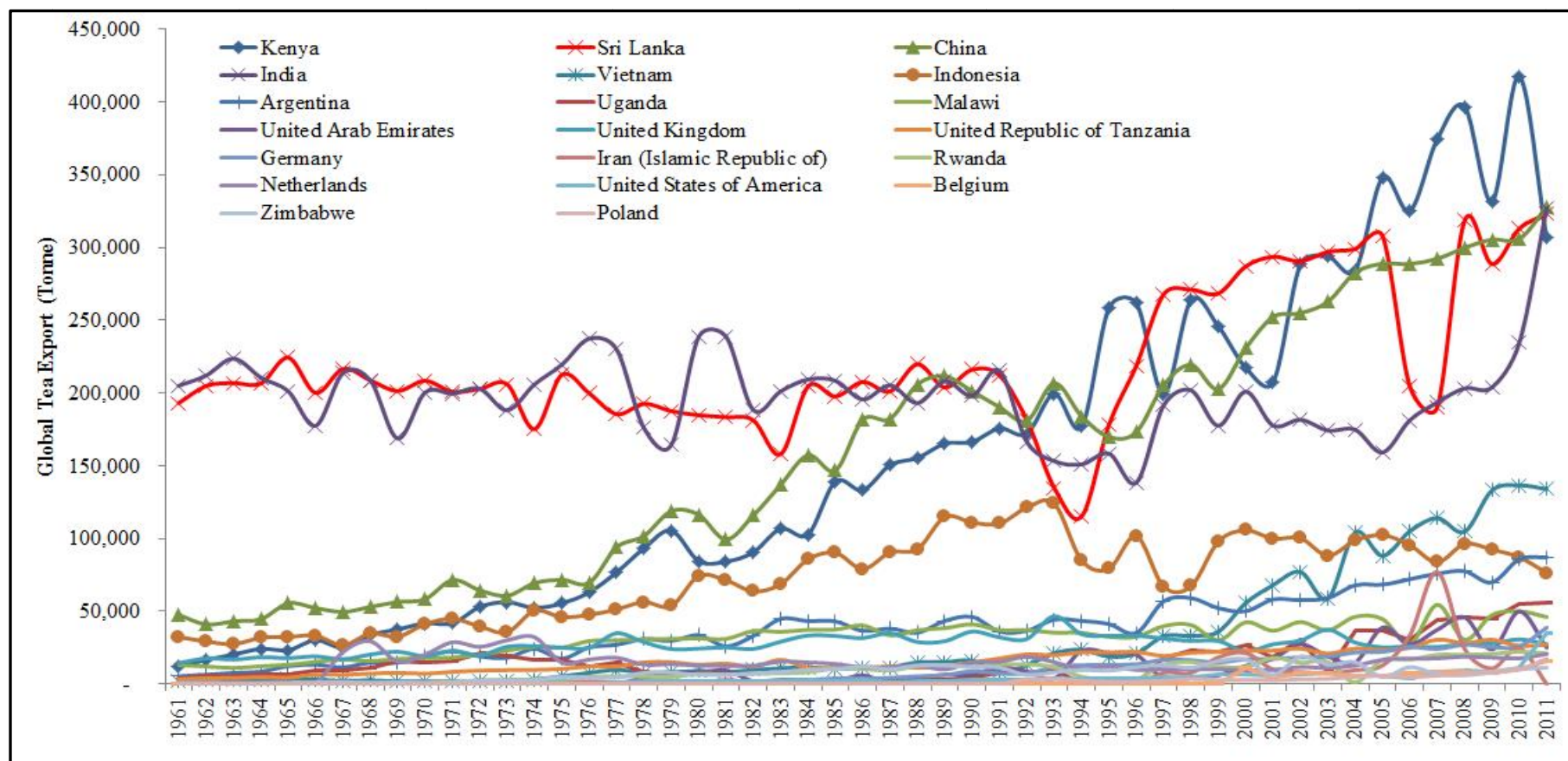


Figure 3-11: Major Tea-Exporting Countries (1961-2011)

Source: FAOSTAT (2013a)

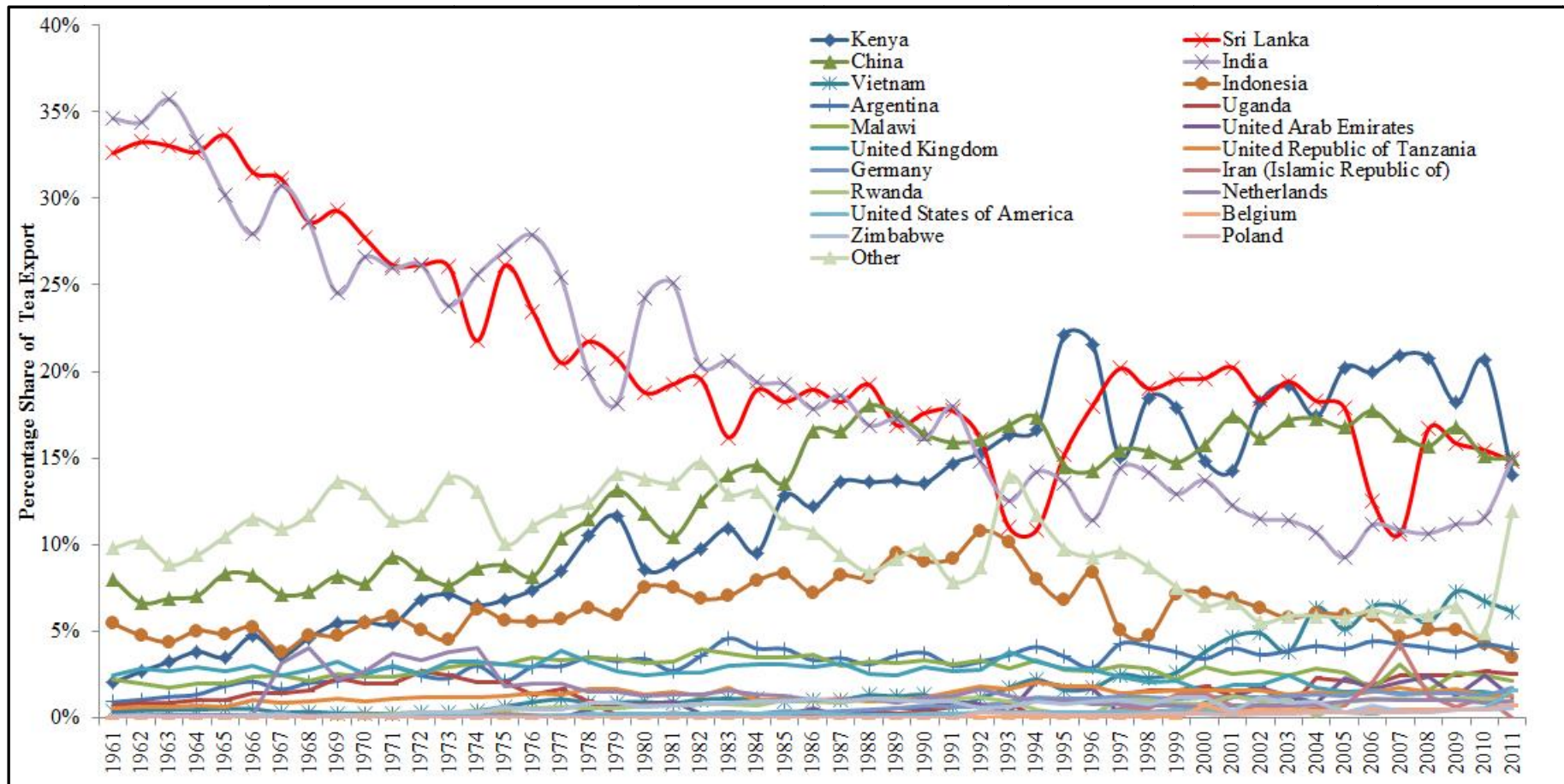


Figure 3-12: Percentage Export Share of Top Tea-Exporting Countries (1961–2011)

Source: Calculated by the Author using data from FAOSTAT (2013a)

3.4.3 Global Tea Imports

The US is the largest tea-importing country in the world, importing nearly 10% of global exports, followed by the Russian Federation (Figure 3-13). The third-largest tea importer is the UK, followed by Pakistan and Egypt. Kenya (the third-largest tea producer) is the fifth-largest tea importer in the world, is the only tea-producing country in the top ten tea importers. This is mainly because the relaxation of import policies in the tea industry has encouraged value-added tea production in Kenya.

3.4.4 Global Export Earnings

Interestingly, the export earnings from the tea industry in Sri Lanka have increased. The total export earnings of the Sri Lankan tea sector were around US\$ 234 million in 1961, or about 35% of the total global export earnings of tea sector. In 2008 Sri Lanka earned around US\$ 1,259 million from exporting tea, a 510% increase compared to 1961. Nevertheless, the global tea export earnings, share of Sri Lanka declined from 35% to 23% during this period as shown in Figure 3-15. Sri Lanka is followed by Kenya, China and India, with 17%, 13% and 11% of the world total tea export earnings, respectively. Interestingly even though the UK is not a tea growing country, it is ranked as the fifth-largest export earning country in the global tea market (Appendix 2), since UK imports tea from the main tea-producing countries and is heavily involved in value-added tea production to re-export around the world.

3.4.5 Productivity

The Sri Lankan tea industry has experienced comparatively low productivity and increasing production costs, which has resulted in declines in total profit. Lack of efficiency in the industry has also contributed to increased production costs. The productivity of the tea industry shows an increasing trend in each country, but to different degrees (Figure 3-16). The productivity of Kenya as measured by the highest annual average yield is higher than that of the other top three producers. The success behind the growth of the Kenyan tea industry has mainly been due to the government's policy since independence of promoting smallholders in the tea industry (Gesimba, Langat, Liu & Wolukau 2005). They further pointed out that the establishment of an efficient estate sector under British management helped to increase productivity drastically; moreover, the use of high-yield varieties and improved cultivation methods played a dramatic role in increasing productivity. However, the decline of productivity between 1995 and 2000 was mainly due to a severe drought and the political instability of the country (Gesimba et al. 2005; Kabir 2009).

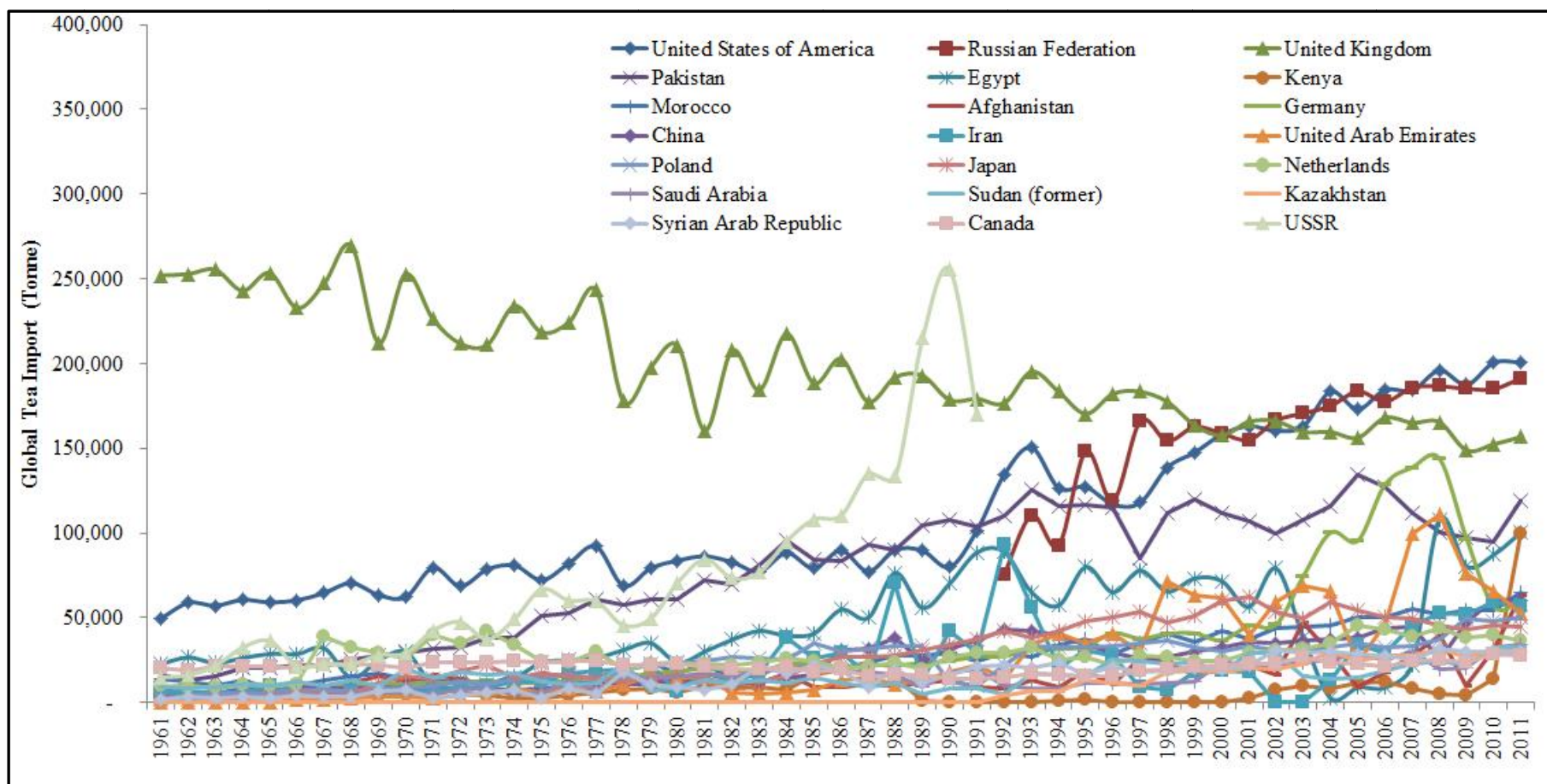


Figure 3-13: Top Twenty Tea Importers in the World (1961-2011)

Source: Calculated by the Author using data from FAOSTAT (2013a)

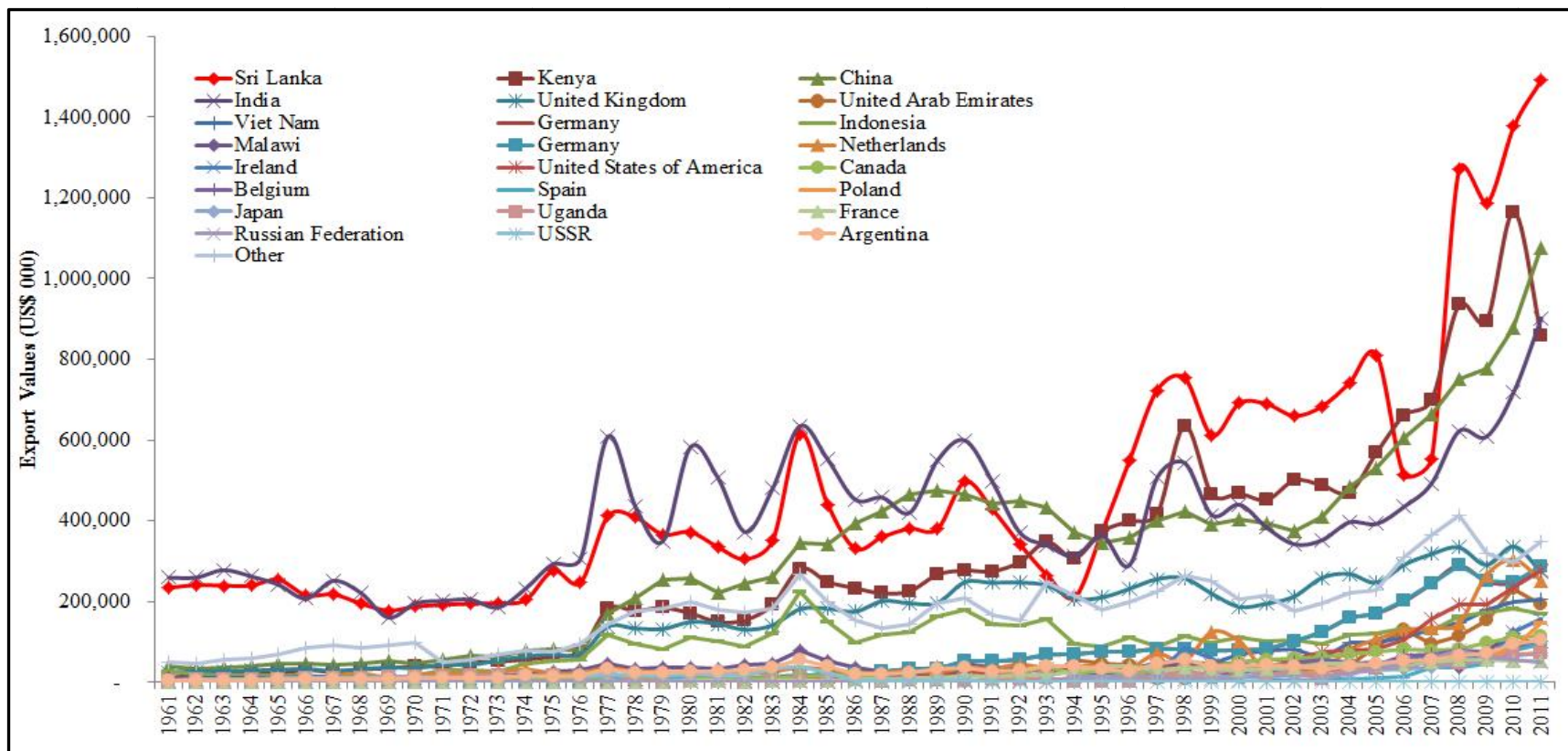


Figure 3-14: Export Earnings of Top Tea-Exporting Countries (1961-2011)

Source: FAOSTAT (2013a)

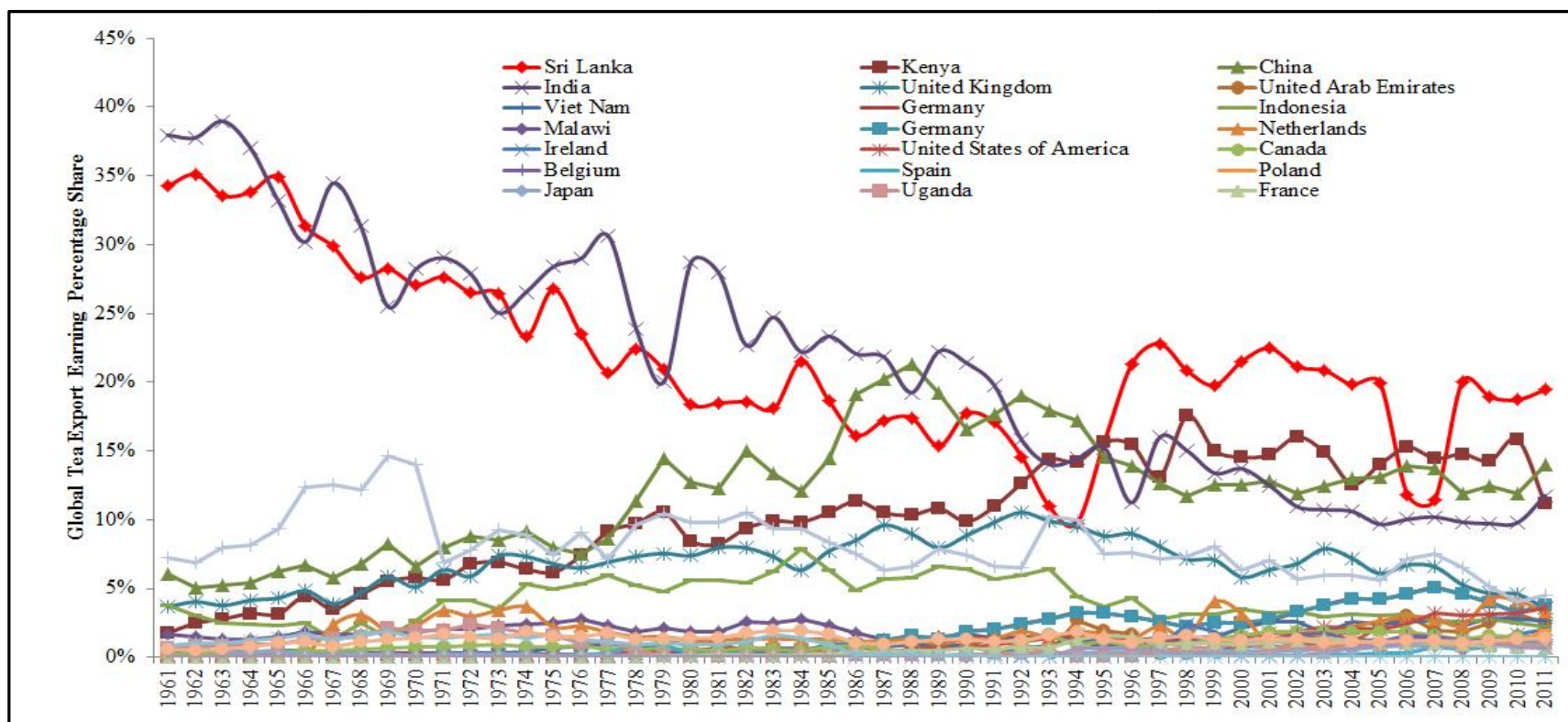


Figure 3-15: Percentage Export Earnings of Tea-Exporting Countries (1961-2011)

Source: Calculated by the Author using data from FAOSTAT (2013a)

On the other, hand India has shown a steady growth in productivity. In 1961 its productivity was around 1.1 tonnes per hectare; this increased to 1.7 tonnes per hectare by 2008. However, productivity fell during 1985-1990 and 1995-2000. Kadavil (2007) pointed out that this was mainly due to the poor performance of the smallholding tea sector. He explained that yield declined in smallholdings due to lack of fertiliser, poor management and poor husbandry practices. He further pointed out that productivity increased with the introduction a new management system, known as participatory tea management, where the workers and all employers were considered as a part of the system. For example, Kannan Devan Hills Plantations Company Private Limited in Munnar, owned by Tata Tea Estates, increased its productivity from 0.687 tonnes per hectare to 3.743 tonnes per hectare after introducing a participatory management system. Furthermore, Indian tea farms have also modernised farming operations and production (Kumar, Badal, Singh & Singh 2008).

In contrast, the productivity of the Chinese tea industry seems to have been increasing gradually, even though it is lower than that of other producers such as Sri Lanka, India and Kenya. The annual average productivity of China was around 0.27 tonnes per hectare in 1961; this increased to 0.95 tonnes per hectare in 2008 (Figure 3-16). China's remarkable increase in productivity is due to many reasons (Forster 1999):

- Tea production spread from coastal provinces to inland provinces where more resources were available;
- New regulations were announced and policies were strengthened to control illegal tea production and exports across the country's border;
- Special inspections were introduced to guarantee the use of proper fertiliser and pesticides to increase the yield and, as a result worldwide acceptance for Chinese tea; and
- Mechanical harvesting methods were introduced in provinces such as Zhejiang, where labour costs are high.

In contrast, even though less land area is under tea plantation in Sri Lanka than in China, productivity is much higher, although lower than in India and Kenya (Figure 3-16). Productivity declined in Sri Lanka from 0.95 tonnes per hectare in 1965 to 0.78

tonnes per hectare in 1980. Since then productivity has increased considerably until 2001. According to the Department of Census and Statistics (2010a), this is mainly because the amount of land in the smallholder sector expanded rapidly during this period. Furthermore, many old, large plantations have been replanted with newer vegetative-propagate (VP) tea since 1989 (Ali, Ghourdherly & Lister 1997), and the privatisation of estate plantations in 1995 has also caused increases in the tea yield (Ali, Ghourdherly & Lister 1997). Moreover, there is a significant difference in the capacity of value-added activities in tea factories in different regions. The lower-elevation factories are much more efficient than those at the middle and high elevations, mainly because most have newly constructed factories with modern technology, and are completely owned by the private sector. However, after 2001 productivity has decreased considerably. The following section describes these phenomena.

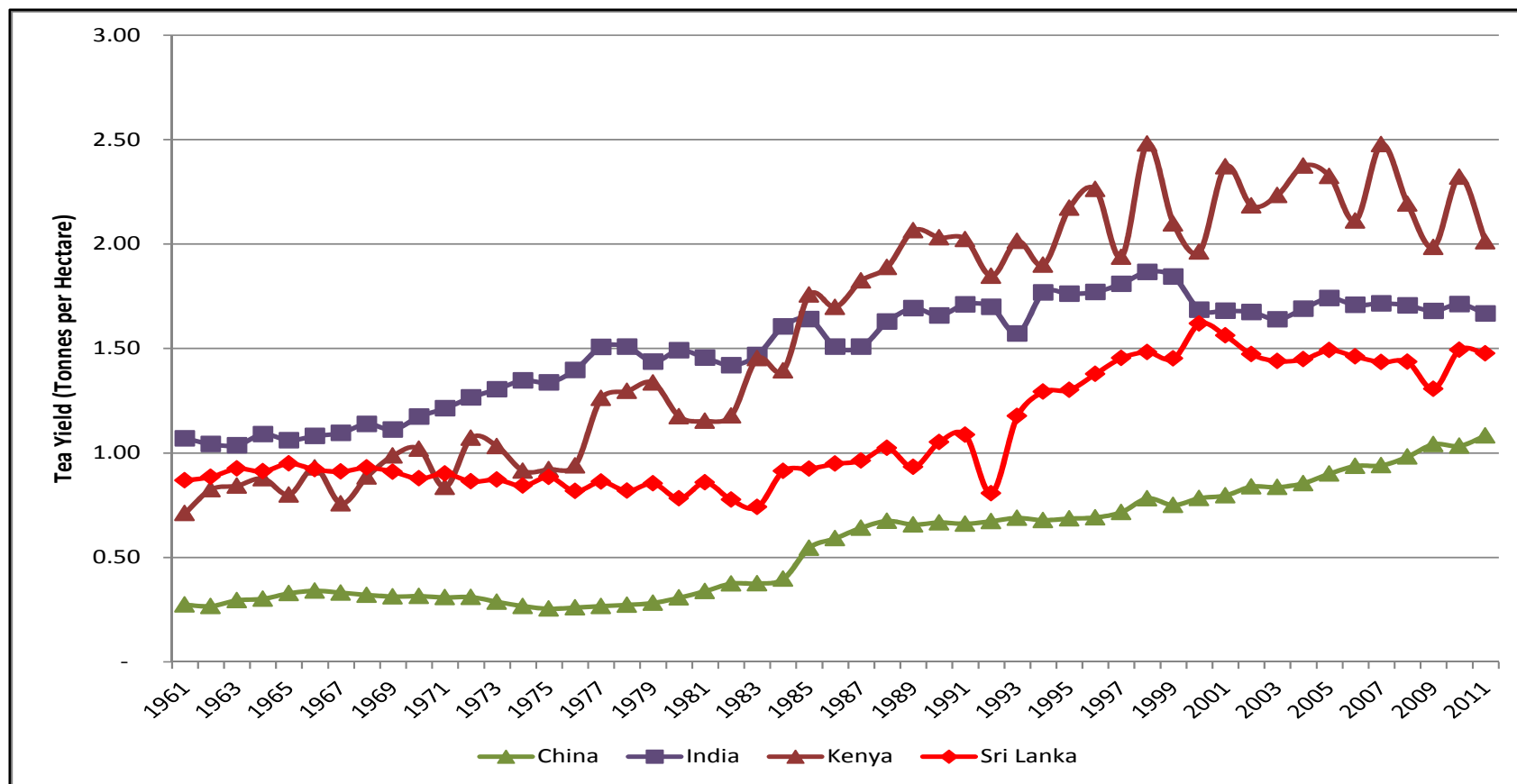


Figure 3-16: Productivity of Major Tea-Producing Countries

Source: Calculated by the Author using data from FAOSTAT (2013a)

3.5 ISSUES IN THE TEA INDUSTRY

The Sri Lanka tea industry has been facing major issues during the last five decades. The government has adopted several strategies to face these challenges. First, it privatised the state-owned tea estates and restructured the sector in 1992/93. However, the government approved only five-year contracts with private companies, and the private firms did not invest in new strategies due to the short-term focus. This resulted in further inefficiencies. After a few years, the government transferred full ownership to the private companies on long-term contracts. The primary objective of this was to stimulate the private companies to invest in increasing productivity and efficiency. However, the Sri Lanka tea industry still faced many challenges; for example, increasing global tea production, increasing tea production costs and reduced tea export-earnings and share in the world market. The literature related to the tea industry indicates that most of these issues were due to increased competition resulting from changes in supply and demand, as well as to external factors related to the tea industry in Sri Lanka.

3.5.1 Increased Competition

Kasturiratne and Poole (2006) pointed out that increased competition from the entry of new producers such as Kenya and Indonesia and increased production of tea in countries like India have markedly reduced Sri Lanka's share in the world tea market. Moreover, when British planters left Sri Lanka after independence, they took their British contacts in the tea industry, such as brokers, buyers, brands and customers with them to new tea-producing countries such as Kenya (Kasturiratne 2008). Furthermore, the entry of new producers resulted in reductions in the world tea price, which adversely affected many tea-producing countries. However, it should be noted that according to the Central Bank (2012a), the Colombo Tea Auction has been able to record the highest price of 2012, Rs.407 per kg (US\$ 3.69), despite the challenges to the industry.

Tea consumption is obviously very different to tea production. The tea consumption of tea-producing countries is very low compared to that of non-producing countries. For example, tea is mostly produced in the developing nations in the southern hemisphere of

the world, while consumption is highest in developed western countries like the UK, Ireland, the Netherlands, the US, Canada and the European countries. This geographical separation of production and consumption has created more opportunities for potential future business in the tea sector. Furthermore, some countries, such as the UK and the Netherlands, import bulk tea from various countries and re-export it as value-added tea (Ali, Ghourdherly & Lister 1997).

While tea consumption in many tea-producing countries is very low compared to that in non-producing countries, the local consumption is very high in India and China, particularly as compared to Sri Lanka and Kenya. For example, Sri Lanka exports almost 95% of its national production, while India exports only 20%.

Apart from the high competition, Sri Lanka is facing the loss of its main international tea customers. The UK has been one of the largest customers for Sri Lankan tea for many years. Sri Lanka exports tea mostly either in bulk form or as private-label brands. Bulk black tea, called commodity tea, has been the main form of tea exports. Most of the value-added activities, such as blending, flavouring, packaging, distribution and promotion, have been undertaken in the UK or by multinational companies based in the UK or other foreign countries, and re-exported as value-added tea. The UK has made tea part of British culture, which has spread all over the world, even though the UK is not a tea-producing country. Furthermore, the UK is heavily involved in value-added tea production, and is far more likely to import tea as a commodity than as value-added tea (Kasturiratne 2008).

Moreover, there is a significant difference in the capacity for value-added activities in tea factories in different regions in Sri Lanka. The low-elevation factories are far more efficient than the factories at the middle and high elevations, mainly because of the most the factories in the lower areas have newly constructed factories with modern technology, and most are completely owned by private-sector firms.

3.5.2 External Factors

The tea industry is very labour-intensive because tea harvesting is primarily done manually. Even though countries like Japan have attempted to mechanise tea harvesting, this has not been successful, mainly because machines cannot discriminate sufficiently

to select the two leaves and the bud considered ideal for quality tea. Furthermore, the topography in Sri Lanka is not amenable to the use of mechanical harvesters. Therefore, tea-producing countries like Sri Lanka mainly depend on labourers.

According to Majumdar (1973), the supply of quality tea depends on many environmental factors. First, the variety determines the overall or basic quality of the tea bush. Second, environmental conditions such as rainfall, temperature and soil conditions determine the quality of the tea from different “flushes” produced by the same bush or the same variety of bush. Tea is normally plucked from a bush at an interval of seven to 15 days throughout a tea season; after each picking new flushes appear, and the quality of the tea picked from the same bush varies from flush to flush. Third, the size of the tea leaves also affects the quality of tea; leaves can be sorted by size into different-quality grades produced from the same flush.

Soil erosion is one of the key factors that can reduce tea-production volume. Tea is pruned periodically and can be categorised as a perennial crop. The degree of soil erosion in tea-growing areas varies due to many reasons, such as planting density, planting types, pruning methods and degree of manual weeding using scrapers. Intense rainfall, especially on steeply sloped areas, can exacerbate the erosion of fertile top soil. Soil loss on tea plantations in Sri Lanka is around 100-200 meters/hectare/year (Jayanath, Herath & Chisholm 2001).

Furthermore, the political and economic conditions in destination countries also have an impact. Sri Lanka can command high prices for its tea when there are favourable demand conditions in destinations such as the Middle East/Gulf region countries. For example, rising oil prices have resulted in increases in demand in those countries, with a corresponding rise in the amount of tea they import. More than 75% of Sri Lankan tea is exported to the Middle East/Gulf region, North Africa and Russia (including CIC countries), resulting in high export earnings. Therefore, the popularity of Sri Lankan tea in oil-rich nations had been a good opportunity for Sri Lanka, even while it loses world production and export share to Kenya.

3.5.3 Changes in Supply and Demand

Chepkwony (2010) noted that global tea production has increased in most countries because of increased land area coming under tea cultivation, favourable weather conditions, high yields and enhanced processing capacity in countries like Kenya, India and China. He added that CTC tea production shows a remarkable increase compared to orthodox tea production. He further pointed out that world production continues to increase faster than consumption, with resulting oversupply. The tea output and consumption gap has doubled from 47 million kilograms in 2000/01 to 96 million kilograms in 2009/2010.

However, Sri Lankan tea production has not grown to the same extent as that of other tea-producing countries. According to Department of Census and Statistics (2010b) Total global production has increased from 1,297 million kilograms in 1970 to 4,669 million kilograms in 2011, an increase of 263%. However, Sri Lanka's production grew only 54% during this period; in contrast, India's grew 131%, China's 903% and Kenya's 820%. This shows that global demand and supply have both grown remarkably, even though production in Sri Lanka has stagnated at around 300 million kilograms during the last few decades.

As discussed above, Sri Lanka's share of world tea production declined from 16% in 1970 to 7% in 2011, and its export share declined from 28% to 15%. However, the export earnings from the tea industry grew markedly from US\$ 187 million to US\$ 1,492 million for the same period, a 694% increase. Nevertheless, the global share of export earnings declined from 27% to 19% during this period.

3.6 SUMMARY

The Sri Lankan tea industry continues to play an important role in the country's economic and social development. Until 1995, tea was the largest export-earning product. Even though currently it is the second-largest export-earning industry in the country, it adds more value to the economy due to the use of local resources during production. It also provides employment opportunities to around 20% of the population either directly or indirectly.

The Sri Lankan tea industry is comprised of large-scale plantations and tea smallholders. Large-scale plantations are owned by the state, and leased on 53-year long-lease contracts to the corporate sector, which manages them. Large-scale producers are also involved in value-added processes and tea exporting. In contrast, the tea smallholders solely grow and harvest teas that are sold to private tea factories. Sri Lanka was the largest tea exporter in the global tea market until around 2004. The statistics show that the global export share for Sri Lanka has declined during the last five decades. Some of the issues that the Sri Lankan tea industry has faced include increasing global tea production, increasing tea-production costs and falling tea-export earnings share and volume share in the world market.

The increased competition from the entry of new producers such as Kenya and Indonesia and the increase of production in countries like China and India have had a remarkable influence on the decline of Sri Lanka's market share in the world tea market. The increased global tea supply has resulted in falling world tea prices, which is adversely affecting many tea-producing countries, including Sri Lanka. Even though the Colombo Tea Auction Centre can still get the highest auction price among the world tea auction centres, the statistics show that Sri Lanka's tea production is not cost-effective compared to that of other tea-producing countries. Even though Sri Lanka is still on top of the list of the tea-exporting countries with respect to total tea-export earnings, primary producers are facing a huge challenge, as production costs have increased to where producers cannot even cover costs with the auction price they obtain. This poses a huge risk for the sustainability of the tea industry in the long term.

Even though Chapter 2 highlighted that agri-supply chains such as tea also follow the characteristics of manufacturing supply chains, this analysis shows there has been no attempt to explore supply chain management or sustainability aspects to enhance the performance in the industry. Rather, researchers have explored various social and environmental issues as standalone issues. This point further provides justification for this current research, as application of sustainable supply chain management practices could enhance the sustainability of Sri Lanka's tea industry.

The next chapter will describe the philosophical underpinnings of selecting the research methodology and explain the research methodology and the design employed to answer

the research questions. It provides a justification for using a qualitative approach, where the data was collected using focus-group discussions and interviews. It also explains data analysis process.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

The previous chapter presented an overview of the Sri Lankan tea industry. It also highlighted the dynamics of the global tea industry, particularly emphasising Sri Lanka, and described the context of the tea industry in the Sri Lankan economy.

This chapter presents the methodology employed to answer the research questions and achieve the research objectives. The overall objective of this research was to map the tea supply chain, identifying its main stakeholders and influencing factors on a sustainable tea supply chain, specifically focusing on the Sri Lankan tea industry. The main research question comprises four sub-questions:

RQ1 – What is sustainable supply in the context of the Sri Lankan tea industry?

RQ2 – What are the influencing factors on sustainable tea supply chain management in Sri Lanka?

RQ3 – How do these factors affect the tea supply chain?

RQ4 – In what capacity do they affect the future sustainability of the tea supply chain and its performance within Sri Lanka?

To answer these types of “what” and “how” questions, the research needs to be more explorative and descriptive by nature. This research required an inductive approach to explore the tea industry and its supply chain as it is necessary to have deep understanding of the tea supply chain of Sri Lanka and to interpret the findings. Hence a qualitative case study approach was used where the tea industry is selected as a case. As a first step, the research identified the main stakeholders in the network and their role in the tea supply chain. Based on the results, the researcher developed a map highlighting the relationships and connectivity of the stakeholders in the tea supply network. Further analysis was carried out to identify the main influencing factors in the sustainable tea

supply chain. The research also explored how and in what capacity these factors influence the sustainable tea supply chain; this contributed to an understanding of the concepts within the context of the tea supply chain.

The complete data-collection process is described in this chapter. Section 4.2 explores the philosophical underpinnings of the research methodology. It provides a background on research paradigm and briefly explains the research paradigm used in this research. Section 4.3 provides an insight into the research methodologies available in management research. The researcher explored the philosophical underpinnings of the different research methodologies before selecting the methodology for the current research. This section introduces the rationale behind different research paradigms, research approaches and methodological choices and research strategies. Section 4.4 provides a detailed description of the data-collection and analysis processes as well as the methods used in the current research. Section 4.5 describes the detailed research design applied in this research. This research used the Sri Lankan tea industry as a case study that applied a qualitative approach to answer the research question. This research used focus-group discussions and interviews as the main data-collection methods; secondary documents were also used to enrich the study. Section 4.6 briefly explains the analysis process was used to explore the data and the use of coding to identify the themes relevant to the research questions. Section 4.7 highlights the importance of managing the quality of research and highlights how the researcher maintained reliability and validity throughout the research. Section 4.8 focuses on the ethical considerations and the measures undertaken to avoid any ethical difficulties during the research process. Finally, the chapter concludes with a summary of the complete research methodology.

4.2 PHILOSOPHICAL ASSUMPTIONS OF THE CURRENT RESEARCH

As a first step, a deeper literature review was carried out on research methodologies to identify the best methodology to answer the research questions. This literature review showed that the research process is comprised of seven essential steps; the process is illustrated as a “research onion” in Figure 4-1. This includes understanding the research paradigms and philosophical assumptions, identifying the interpretative approach and theoretical approach, determining methodological choices, identifying the best research

strategy, understanding the data-collection time horizon and selecting a suitable data-collection method and analysis methods (Saunders, Lewis & Thornhill 2012).

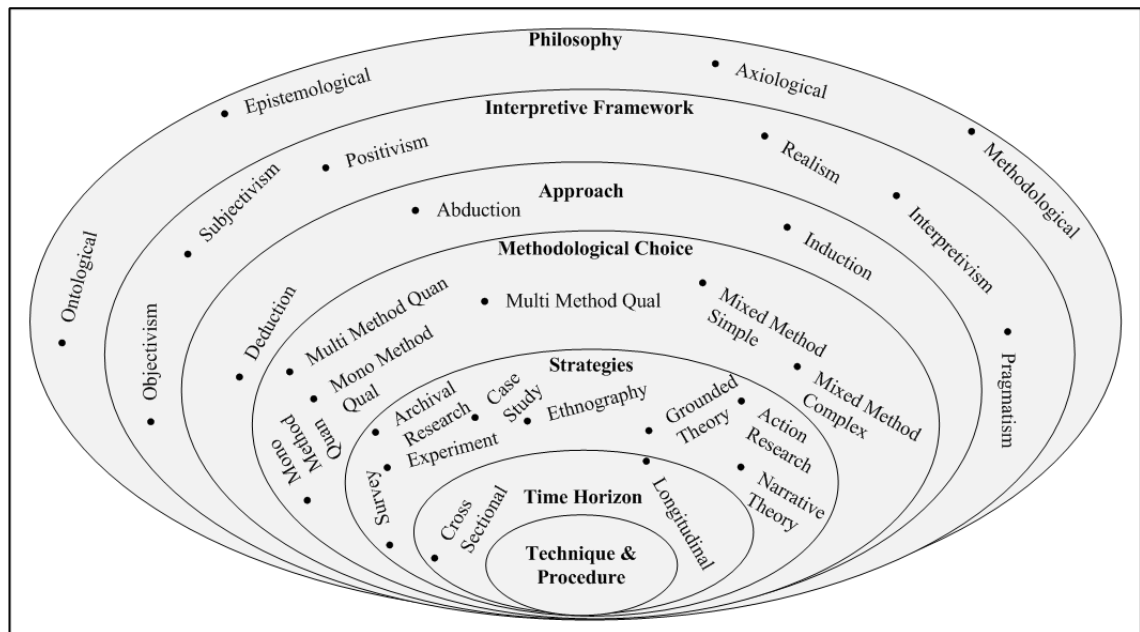


Figure 4-1: Research Process as an “Onion”

Source: Adapted from Creswell (2013) and Saunders, Lewis & Thornhill (2012)

4.2.1 Philosophy and Research Paradigm

Understanding the research paradigm was the most important first step of the research process, as it determined how the research would be conducted. It is a vital concept in all research, whether the research uses a qualitative, quantitative or a mixed research approach. Veal (2005) defined a paradigm as

[a] shared framework of assumptions held within a discipline, sub discipline or school of thought within a discipline. It reflects a basic set of philosophical beliefs about the nature of the world, the scientific problems which it presents and the types of solution which arise from research. It therefore provides guidelines and principles concerning the way research is conducted within the discipline... (Veal 2005, p 24).

The research paradigm has strong implications for the research process because the choice of research method and the research approach are strongly connected with paradigmatic preferences (Mangan, Lalwani & Gardner 2004). Naslund (2002) argues

that a paradigm is a “world view”. People view the world in different ways based on their individual beliefs and knowledge. Therefore, when conducting research it is essential to understand how the philosophical assumptions that underlie it are related to the real world. Understanding these philosophical assumptions is the starting point of any research process.

Philosophical assumptions are equated to the outermost layer of the “research onion”. The literature shows that identifying philosophical assumptions provides the foundation for the research. Researchers describe a philosophy as an abstract of ideas and beliefs that the researcher brings into the research, based on their own beliefs and prior experience (Saunders, Lewis & Thornhill 2012). Denzin and Lincoln (2000) argue that researchers approach the research world with pre-theoretical knowledge based on their own experiences. Creswell (2013) says that some researchers use terms such as ontological, epistemological, axiological and methodological to describe these philosophical assumptions.

Table 4-1: Philosophical Assumptions in Research

Assumption	Questions	Characteristics
Ontological	What is the nature of reality?	Reality is multiple as seen through many views.
Epistemological	What counts as knowledge? How are the knowledge claims justified? What is the relationship between the researcher and that being researched?	Subjective evidence from participants; researchers attempt to lessen distance between themselves and that being researched.
Axiological	What is the role of values?	Researchers acknowledge that research is value-laden and that biases are present.
Methodological	What is the process of research? What is the language of research?	Researchers use inductive logic, study the topic within its context and use an emerging design.

Source: Creswell (2013) and Denzin & Lincoln (2000)

As shown in Table 4-1, ontological assumptions attempt to answer the question “What is the nature of reality?” The basic assumption behind the ontological approaches is that there are multiple realities even in a single research topic, and they vary depending on the researcher or the participants. Different perspectives can be developed from the

findings depending on these external characteristics. This approach assumes that there is no one truth. Epistemological approaches try to understand what knowledge is, how it can be justified and what the relationship is between the known and unknown. Such approaches aim to lessen the distance between the researcher and the participants and to obtain subjective evidence from the participants. With axiological approaches, researchers openly discuss and interpret their own opinions and admit that there are biases in the research. With methodological approaches, researchers work with the detailed data collected. This approach describes the data collected within a certain context to gain knowledge of the research topic (Creswell 2013).

4.2.2 Interpretive Framework

Philosophical assumptions are embedded within the interpretive framework. Creswell (2013) emphasises that positivism, interpretivism, realism and pragmatism are the main interpretive frameworks used in business research. Table 4-2 shows the main differences in these approaches. Positivist researchers use existing theory to develop hypotheses and use objective methods such as surveys and mathematical analysis to test and verify them. This approach leads to the further development of existing theory. Another important feature in this approach is that the research is undertaken in a “value-free way” and the researchers are identified as “resource researchers”, as their interference in the research process is minimal (Saunders, Lewis & Thornhill 2012).

It is further argued that the information collected using a positivist approach is bias-free, as there is minimal interference from the researcher. Furthermore it is also assumed that data-collection through observations or surveys does not affect the participants even though they are observed (Healy & Perry 2000). The main objective of a positivist approach is to generate law-like generalisations through collecting measurable data using scientific methods such as surveys. This approach uses a highly structured research methodology, and it requires fairly large samples to generalise the findings (Saunders, Lewis & Thornhill 2012).

Realism is another interpretive approach widely used in business research. It is similar to a positivist approach in that it also uses a scientific approach to develop knowledge.

Realism uses either qualitative or quantitative research techniques (Bryman & Bell 2003).

Table 4-2: Main Research Paradigms and Methods

Philosophical Assumption	Pragmatism	Positivism/Post-positivism	Realism	Social Constructivism/ Interpretivism
Ontology: the researcher's view of the nature or reality of being.	External, multiple view chosen to best enable answering of research question.	External, objective and independent of social actors.	Is objective. Exists independently of human thoughts and beliefs or knowledge of their existence (reality), but is interpreted through social conditioning (critical realist).	Socially constructed, subjective, may change, multiple.
Epistemology: the researcher's view regarding what constitutes acceptable knowledge.	Either or both observable phenomena and subjective meanings can provide acceptable knowledge depending on the research question. Focus is on practical applied research integrating different perspectives to help interpret the data.	Only observable phenomena can provide credible data, facts. Focus is on causality and law-like generalisations, reducing phenomena to simplest elements.	Observable phenomena, provide credible data, facts. Insufficient data means inaccuracies in sensations (direct realism). Alternatively, phenomena create sensations that are open to misinterpretation (critical realism). Focus is on explaining within a context or contexts.	Subjective meaning and social phenomena. Focus is on the details of the situation, a reality behind these details, subjective meaning motivating actions.
Axiology: the researcher's view of the role of values in research.	Values play a large role in interpreting results, the researcher adopting both objective and subjective points of view.	Research is undertaken in a value-free way; the researcher is independent of the data and maintains an objective stance.	Research is value-laden; the researcher is biased by world views, cultural experiences and upbringing. These will affect the research.	Research is value-bound; the researcher is part of what is being researched, cannot be separated and so will be subjective.
Data-Collection Techniques	Mixed or multiple method designs, quantitative and qualitative.	Highly structured, large samples, measurement, quantitative but can use qualitative.	Methods chosen must fit the subject matter, quantitative or qualitative.	Small samples, in-depth investigations, qualitative.

Source: Saunders, Lewis & Thornhill (2012, p. 140)

In contrast, an interpretivist research approach assumes that people understand physical and social realities in different ways (Cavana, Delahaye & Sekaran 2001). Compared to

the positivist approach, interpretivist research uses a practical orientation, mainly applying qualitative research techniques (Neuman 2003). Mangan et al. (2004) pointed out that an interpretivist approach has been widely used in social-science research, and is becoming popular in business research (Sandberg 2005), where it is very useful because most business research tries to understand the human interactions involved in business processes, actions and decision-making. It is argued that such an approach is more appropriate in social-science and business research because it directly deals with the human actions and behaviour generated through human minds. Furthermore, there is a strong linkage between the researcher and the environment under study (Mangan, Lalwani & Gardner 2004). Qualitative research methods such as action research, case studies, ethnography, constructive elicitation, grounded-theory, hermeneutics and participative enquiry are widely used in this approach (Hussey & Hussey 1997). Furthermore, an interpretivist approach mainly focuses on small samples and undertakes in-depth investigations focusing on details. Data saturation is the main factor in deciding the sample size (Guest, Bunce & Johnson 2006).

Pragmatism is another interpretive approach widely used in business research. This approach assumes that there are many ways to interpret the world rather than using a single interpretive method. Pragmatism is mainly used in situations where one method does not explain the entire story. Especially when one approach does not explicitly help to answer the research question, the researcher can position the questions on a multidimensional set of continua; hence multiple methods are possible and appropriate for such studies (Saunders, Lewis & Thornhill 2012). Creswell (2013) supported this argument, saying that pragmatism does not bind to a single philosophy or a sole reality. The researcher, therefore, has the opportunity to use either quantitative, qualitative or multiple research methods for data collection and analysis depending on the research question.

4.2.3 The Research Paradigm of this Research

Naslund (2002) says that supply chain management issues are complex and messy real-world problems, research into which requires a holistic and systematic view. Narasimhan (2014) says that with increasing globalisation concepts, the supply chain management field broadens the scope of the field, and there is a significant blend of

ideas from interdisciplinary fields such as strategic management, organisation theory, management, economics and international business. This has further increased the complexity and challenges in supply chain management research. Narasimhan (2014) says that to meet these challenges, the research in supply chain management needs to heavily use qualitative empirical research that helps to interpret the operations from different perspectives. The author further highlights that epistemological approach is an essential tool in supply chain management research due to its interpretive and subjective nature.

Due to the nature of the research topic, the epistemology paradigm is an essential tool in this research, because there are multiple views: different people have different perspectives on the operations along the tea supply chain due to the complex nature of the tea supply chain. To understand the phenomenon under study, it is essential to grasp the knowledge from all perspectives and interpret them accordingly. Therefore, this research uses an interpretive approach because the intention of the research is to explore the tea supply chain and understand its holistic context and its practices, and then to interpret the various information provided by the research participants based on their experiences, feelings, values and beliefs about the research topic. This highlights that according to the subjectivist view, it is essential to have a multiple representations of the phenomenon. This in turn, lays the foundation to identify the appropriate research methodology to use in the research. The next section explores the methodological choices and research strategies that are relevant to this study.

4.3 RESEARCH METHODOLOGY

4.3.1 Research Approaches

A study can use different approaches to explain the outcomes of research (Figure 4-2): deductive, inductive and abductive reasoning approaches. A deductive approach is used to test theories that are already established with empirical data (Gill, Johnson & Clark 2010). The positivist researcher applies a deductive reasoning approach, where the research begin with theories and moves towards empirical evidence (Taylor 2005). The positivist approach ignores the involvement of humans and their real-life experiences (Cavana, Delahaye & Sekaran 2001).

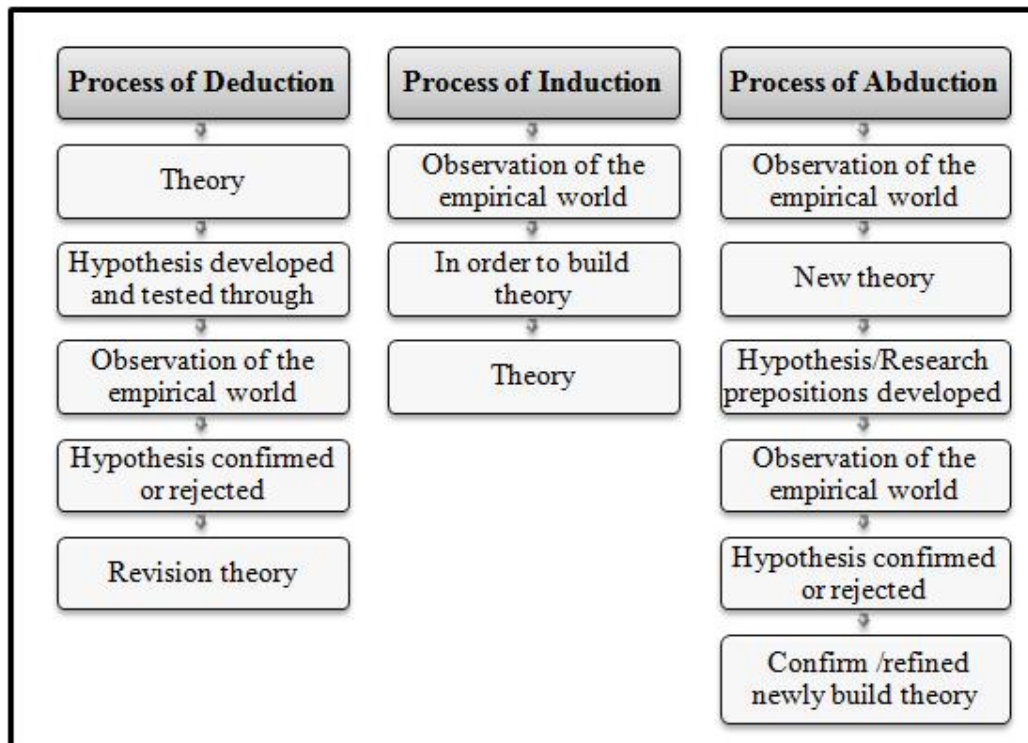


Figure 4-2: Deductive, Inductive and Abductive Methods

Source: Adapted from Gill, Johnson & Clark (2010)

In contrast, inductive research starts with observations and develops ideas through analysis. According to Neuman (2003), interpretive research mostly uses a inductive reasoning approach, where the research starts with observations and eventually ends up with new theories.

The literature also indicates that by introducing mixed- methodologies in social science, a third approach, called an abductive approach, is now widely used in social-science research. This is a combination of deductive and inductive approaches (Hussey & Hussey 1997; Kovács & Spens 2005). Similar to the pure inductive approach, abduction reasoning also starts with observations of the empirical world to identify new theories using an inductive approach (e.g. qualitative approach). Then hypotheses or research propositions are developed using the newly built theories; these are then tested using a deductive approach (quantitative approach) (Gill, Johnson & Clark 2010). Both inductive and abductive reasoning approaches aim to develop new theories. The difference between the two approaches is that the former merely tries to develop new theories whereas the latter tries to evaluate or test the newly built theories, as illustrated

in Figure 4-2 (Kovács & Spens 2005). The abductive approach is widely used in case studies and action research where the data collection and theory building occur simultaneously. However, the use of an abductive approach depends on the research objective and the research question (Dubois & Gadde 2002; Kovács & Spens 2005).

4.3.2 Methodological Choice: Qualitative Vs Quantitative

Once philosophical assumptions and interpretive frameworks are recognised, identifying the methodological choice is the next important element in the research process. It mainly focuses on the methods used for data-collection, analysis and interpretation (Creswell 2009; Saunders, Lewis & Thornhill 2012). Quantitative, qualitative and mixed methodologies are the distinctive methodological choices available for a researcher.

According to Johnson, McGowan and Turner (2010), many methodological choices are available for a researcher to consider; they present these choices as a “research continuum” (Figure 4-3). As shown in Figure 4-3, pure quantitative research is one extreme of the research continuum; it mainly uses an experimental approach that tests theories using hypotheses. Pure quantitative methods examine the relationship between different variables and focus on numerical or statistical analysis. These variables are measured and collected in an empirical way; the data is analysed using statistical procedures (Golafshani 2003). Quantitative research tests theories using a deductive approach, and the results are normally generalised. When using a quantitative approach it is assumed that the natural setting is not changed (Creswell 2003).

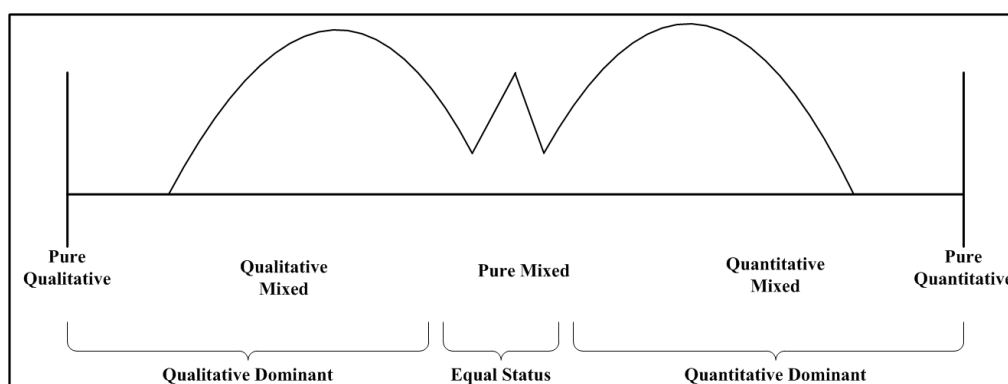


Figure 4-3: Research Continuum

Source: Johnson, McGowan & Turner (2010)

As shown in Figure 4-3, the other extreme of the “research continuum” is pure qualitative research. Qualitative methods have completely different characteristics to quantitative. Auerbach and Silverstein (2003, p 3) defined qualitative research as “research that involves analysing and interpreting texts and interviews in order to discover meaningful patterns descriptive of a particular phenomenon”. They further highlighted that qualitative research focuses on generating hypothesis, whereas quantitative research focuses on testing hypothesis. Merriam (2002) highlights that the main point to understand in qualitative research is that the findings or meanings are socially constructed based on individuals’ interactions and experiences in the real world relevant to the research area. Qualitative research is also called exploratory research, since it generally explores theoretical ideas or facts that related to the research area (Creswell 2003). As Merriam (2002, pp 3-4) explains:

The world or the reality, is not fixed, single, agreed upon, or measurable phenomenon that it is assumed to be in positivist, quantitative research. Instead there are multiple constructions and interpretations of reality that are flux and that change over time. Qualitative researchers are interested in understanding what those interpretations are at a particular point in time and in a particular context (Merriam 2002, pp 3-4).

This explanation indicates that there can be multiple truths, and that such truths can change over time. It also indicates that multiple truths are not measureable, as in quantitative research, since the facts vary from context to context and individual to individual. Denzin and Lincoln (2000) also support this argument, emphasising that qualitative studies attempt to understand or interpret the phenomena through exploring the experience or perceptions of individuals or groups. Furthermore, they explain that research should be conducted under its natural settings to understand the actual circumstances. Patton (1990) also pointed out that in qualitative research, the researcher does not try to influence the “real-world setting” during data collection and analysis even though the researcher is the primary instrument in qualitative research. Instead, the researcher tries to understand the situation under its unique conditions and interactions. Furthermore, Patton (1990) says that qualitative research does not predict what will

happen in the future, but tries to understand the current status, what it means to the participants and how the world reacts in a particular setting. Qualitative research attempts to achieve a deeper understanding of a particular setting (Patton 1990).

Merriam (2002) argues that a qualitative research approach is mainly used when there is a lack of theory, or when existing theories are not developed to explain a phenomenon. As shown in Figure 4-2, qualitative research generally uses an inductive approach, where the study starts with data collection, then analyses the data to build theories or hypotheses (Creswell 2013; Gill, Johnson & Clark 2010; Merriam 2002).

Qualitative research does not use statistical procedures as a means of analysis and explanations. Rather, it uses the systematic collection, organisation and interpretation of textual data collected through discussions, interviews and observations (Malterud 2001). Whereas quantitative research focuses on numbers to convey the findings, the final product of qualitative research is more descriptive, where the researcher uses lengthy writing to explain what was learned from the research.

Instead of using a pure qualitative or quantitative approach, many researchers use a combination of both approaches to collect and analyse data for a single study or a series of studies (Creswell 2003). Creswell (2009) pointed out that these approaches cannot be simply considered as three discrete approaches: “A study tends to be more qualitative than quantitative or vice versa. Mixed methods research resides in the middle of this continuum because it incorporates elements of both qualitative and quantitative approaches” (Creswell 2009, p 3).

As explained by Creswell and Clark (2011), mixed-method research incorporates a few important viewpoints: both qualitative and quantitative data is collected and analysed based on the research question, and either they are integrated concurrently or one builds on the other. Priority can go to either method or equal priority can be given to both. Mixed methods can be used in a single study or in multiple phases of the same study; the research can be placed within philosophical and theoretical frameworks; and the procedures can be combined to design a direct plan to conduct the research. Business research is now moving towards this middle position that bridges the two extreme ends of the research continuum (Mangan, Lalwani & Gardner 2004). Jick (1979) explained

that a mixed-method approach is now widely used in business research as a complement rather than a rival to more traditional approaches. Researchers have pointed out that different issues require different methods, and hence the use of a multi-method approach is sometimes unavoidable (Mangan, Lalwani & Gardner 2004). Explorative qualitative research can also be used to verify future quantitative research or vice-versa (Calder 1977). The specific methodological choice mainly depends on the research question and objectives.

4.3.3 Research Strategy

The research strategy is the methodological link between the research philosophy and the methodological choice (Denzin & Lincoln 2000). The research strategy is the plan for how to answer the research question. In addition to the research question and research objective, factors such as the existing knowledge in the research area, the time and resources available and finally, but most importantly access to the participants are crucial in choosing the research strategy (Saunders, Lewis & Thornhill 2012). Table 4-3 shows the main research strategies used in quantitative and qualitative research (Creswell 2003). Quantitative research primarily uses either experiments or surveys as a research strategy. Qualitative research mainly uses narrative research, phenomenology, ethnography, case studies and grounded-theory studies. The mixed method uses a combination of both qualitative and quantitative methods. It can be a sequential approach where a quantitative method follows a qualitative approach or vice-versa. (Creswell 2003).

Table 4-3: Alternative Research Strategies of Inquiry

Quantitative Method	Qualitative Method	Mixed Method
<ul style="list-style-type: none"> • Experimental designs • Non-experimental designs such as surveys 	<ul style="list-style-type: none"> • Narrative research • Phenomenology • Ethnography • Grounded-theory studies • Case studies 	<ul style="list-style-type: none"> • Sequential • Concurrent • Transformative

Source: Creswell (2003, p 12)

Saunders et al. (2012) says that compared to quantitative research strategies, qualitative strategies are more likely to cause confusion, as there are many more choices. They said identifying the most suitable research strategy is vital in any research. Table 4-4

demonstrates the main features of each research strategy widely used in qualitative research. As the table shows, each qualitative approach has a different research focus and different data-collection methods and analysis and report-writing strategies. For example, case studies mainly focus on developing in-depth description and understanding the phenomena under study using a single case or multiple-cases. This table shows that case-study research tries to study an event, program, activity, a firm or industry where data collects through interviews, observation and secondary documents and develop theories. Grounded- theory also tries to develop theories that are grounded in data. The final outcome is the generation of theories that illustrate a conceptual framework or can be expressed as a diagram.

4.3.3.1 Grounded-Theory

Grounded-theory was first introduced by Glaser and Strauss in 1967. Grounded-theory research tries to develop theoretical concepts that can be useful for practitioners, as it can provide some insights on developing and controlling their business operations (Locke 2001). The use of grounded- theory in qualitative research has contributed significantly to the social sciences, business studies, health sciences and law (Locke 2001). Furthermore, John and Daniel (2009) argue that since logistics research mainly involves complex behavioural dimensions, it requires deep exploration to understand the different perspectives and behaviours of the phenomena under study. Therefore, grounded- theory is considered as one of the major qualitative research strategies suitable in logistics research due to the complexity of the logistics or supply chain management area. The grounded- theory method provides systematic strategies to develop fresh ideas to collect, study and analyse qualitative data (Alasuutari, Bickman & Brannen 2008). John and Daniel (2009) stressed that based on Glasser's approach, a preconceived conceptual framework is not available. It encourages the emergence of themes and theories from the data collected. Once the theories are developed, the second literature reviews are generally used to link them with existing theory and to support the concepts and theories developed (McGhee, Marland & Atkinson 2007).

Table 4-4: Comparison of Main Qualitative Research Strategies

Research Strategy Characteristics	Narrative Research	Phenomenology	Grounded Theory	Ethnography	Case Study
Focus	Exploring the life of an individual	Understanding the essence of the experience	Developing a theory grounded in data from the field	Describing and interpreting a culture-sharing group	Developing an in-depth description and analysis of a case or multiple cases
Type of problems best suited for design	Needing to tell stories of individual experience	Needing to describe the essence of lived phenomenon	Grounding the theory in the views of a participants	Describing and interpreting the shared patterns of a group's culture	Providing an in-depth understanding of a case or cases
Discipline background	Drawing from humanities including anthropology, literature, history, psychology and sociology	Drawing from philosophy, psychology and education	Drawing from sociology	Drawing from anthropology and sociology	Drawing from psychology, law, political science and medicine
Unit of analysis	Studying one or more individuals	Studying several individuals who have a shared experience	Studying a process, action or interaction involving many individuals	Studying a group that shares the same culture	Studying an event, program, activity or more than one individual
Data-collection method	Using primarily interviews and documents	Using primarily interviews with individuals although documents, observations and art	Using primarily interviews with 20-60 individuals although documents, and observations are also used to understand the details	Using primarily observations and interviews but perhaps collecting other resources during an extended time in field	Using multiple sources such as interviews, observations, documents and artefacts'
Data-analysis strategies	Analysing data for stories, "restorying" stories; and developing themes, often using a chronology	Analysing data for significant statements, meanings units, textual and structural description and description of the "essence"	Analysing data through open coding, axial coding and selective coding	Analysing data through description of the culture-sharing group and themes about the group	Analysing data through description of the case and themes as well as cross-case themes
Written report	Developing a narrative about the stories of an individual's life	Describing the "essence" of the experience	Generating a theory illustrated in a figure	Describing how a culture-sharing group works	Developing detailed analysis of one or more cases
General structure of study	Introduction (problem, questions); research procedures (a narrative significant to an individual, data collection, analysis outcome); report stories; individuals theorise about their lives; narrative segments identified; patterns of meaning identified (events, processes, themes)	Introduction (problem, questions); research procedures (phenomenological and philosophical assumptions, data collection, analysis, outcome); significant statements; meaning of statements; themes of meanings	Introduction (problem, questions); research procedures (grounded theory, data collection, analysis, outcome); open coding; axial coding; selective coding and theoretical propositions and models; discussion of theory and contrasts with extant literature	Introduction (problem, questions); research procedures (ethnography, data collection, analysis, outcome); description of culture; analysis of cultural themes; interpretation of lessons learned and questions raised	Entry vignette; introduction (problem, questions, case study, data collection, analysis, outcome); description of the case/cases and its/their context; development of issues; detail about selected issues; assertions; closing vignette

Source: Creswell (2013, pp 104 -106)

4.3.3.2 Case-Studies

Case-study methodology focuses on studying the dynamics that exist within a case (Eisenhardt 1989) and tries to understand the holistic view of the operations of the particular case selected (Ellram 1996). It tries to explore a set of decisions made by individuals, firms and industry or processes; why these decisions have been taken; how they have been implemented; and what the outcomes of those decisions are (Yin 2009). However, there is criticism about case-study methodology as a research method (Harrison 2002). Some drawbacks of case-studies are (Meredith 1998):

- Difficulty in accessing the information
- Need of multiple methods and tools to triangulate data
- Lack of controls over the participants
- Lack of familiarity with operations.

However, case studies are commonly used in social and management research, as they also have several benefits (Ellram 1996). For example, case studies are widely used in explorative research, as well as that which seeks to build, test, extend and refine theories (Voss, Tsikriktsis & Frohlich 2002). Additionally, Harrison (2002) shows that there are many advantages of using case studies in management research:

- They help to continuously update theoretical ideas, since it is possible to have a link with the selected case.
- There is a clear boundary of the case being studied (for example, this study is focused on the Sri Lankan tea industry and its supply chain).

Furthermore, Harrison (2002) pointed out that case-study research has a clear value when the environment of the population is more complex. It also allows the researcher to use multiple data sources during data collection which helps to increase the reliability and the validity of the data collected. The use of triangulation methods also increases the validity of the information collected and enhances an in-depth study by making sense of complex phenomenon (Meredith 1998; Yin 2009). Smith et al. (2002) and Hussey & Hussey (1997) stated that it helps the researcher to explore the research issue from different perspectives. It also helps to verify the reliability of the data collected

(Dubois & Gadde 2002) and helps to avoid likely favouritism in a single data-collection approach (Mangan, Lalwani & Gardner 2004).

Even though grounded- theory first appears to be a suitable strategy, a deeper exploration of other research strategies such as case studies shows that case-study approach is more appropriate to answer the research questions in this study. This is mainly because the objective of this research is essentially explorative, and the industry it examines is more complex; this requires a more-focused, deeper exploration. Hence, this research uses a single case study approach that considers the tea industry in Sri Lanka as a case. The following section provides a justification for selecting a qualitative approach and a case study to conduct this research.

4.3.4 Research Methodology Used in this Research

This research explores the influencing factors and how they affect the sustainability of the Sri Lankan tea supply. This research can be identified as exploratory and descriptive by nature, in that it tries to answer issues related to “what” and “how” questions. To answer the “what” and “how” questions, it is necessary to use qualitative research to explore the operations in the tea supply chain in depth (Ellram 1996).

As explained in Section 4.2, this research uses an interpretive approach that allows the researcher to understand physical and social realities in different ways. This approach also allows the researcher to understand the interactions involved in business processes, actions and decision-making and to develop theories. The research question is more explorative and descriptive; hence it needs a case-study approach, as explained in Section 4.3.3.

Therefore, an inductive approach, using a qualitative case-study approach, was used, with the Sri Lankan tea industry as its case. This allows the researcher to explore the tea supply chain deeply, and discover and understand the phenomena under study. The inductive qualitative approach allows the researcher to develop theories within the research area that are comparatively new. For example Golicic and Davis (2012) says that sustainable supply chain management concepts that are relatively new can be better explored using qualitative approaches.

4.4 RESEARCH METHODS AND TECHNIQUES

As explained in Section 4.3, qualitative research provides a way to understand the complex phenomena under study by allowing the collection of high-level information related to the study area. To achieve this objective, it is important to select participants effectively from the case in question and choose appropriate data-collection methods. This section explores these two important aspects.

4.4.1 Selecting Participants

The method of selecting the participants for the research is called sampling design (Veal 2005). The researcher used non-probabilistic sampling techniques due to the nature of the research. Sekaran (1992) pointed out that a judgement sampling technique is mainly used in qualitative research where participants are selected based on the judgemental knowledge of the researcher. The purposive sampling technique was used to start the data collection, as it helped identify the participants who could provide information on the subject matter.

The tea industry is fragmented by nature; a single company does not undertake all activities. There are many stakeholders involved in the tea supply chain, undertaking activities such as tea growing, manufacturing, brokering, value-added tea production, exporting and importing. Tea production and other important stakeholders or nodes in the tea supply chain are dispersed around the country (Figure 3.3). Farmers are categorised as large-scale (estate) and small-scale (smallholders) growers (Section 3.3). Their tea supply chain structure and operations vary depending on the size of the producers and the ownership level. For example, some large-scale farmers are involved in most of the activities along the chain (which includes farming, producing and exporting), while small-scale farmers are only involved in tea growing; whereas other operations are carried out by private producers and exporters. Therefore, to gain a holistic view, it is essential to select participants to represent all these stakeholders at the different stages in the tea supply chain.

Creswell (2003) pointed out that when selecting participants, it is necessary to select those who would provide in-depth and rich information. Therefore, for the purpose of

this study, two focus groups representing the supply chain of large-scale companies were selected (Table 4-5). Each focus group for large-scale plantations was comprised of higher-level managers in different functional areas such as administration, plantation, factory, production and operations, export, import and quality controllers, since they had a better understanding of their operations. The reasons for selecting each participant category are briefly explained in Table 4-5.

Table 4-5: Selective Sampling of Participants

Participant Category	No. of Participants/ Interviews	Reason for Selection
Focus-Group Discussions		
1. Sri Lanka Tea Board	one focus group with five participants	All stakeholders in the Sri Lankan tea supply chain are directly regulated by the Sri Lanka Tea Board. Hence it has a major influence on the tea supply chain. Its representatives have better insight into the operations in the tea supply chain. Participants from the tea-promotion division, research division, tea commissioners division and tea-tasting division were included, as they can provide a holistic view on the whole tea supply chain from their operational perspectives.
2. Large-Scale Plantation	two focus groups with five participants in each group	Since they are involved in tea growing, production, value-added tea production and export, their insight on these operations is important.
3. Tea Smallholders Development Authority	one focus group with five participants	Since they regulate the tea smallholder sector, their particular insights are valued in the industry. Participants were included from various divisions such as head office, administration, extension service provision division and quality maintenance division.
Individual Interviews		
4. Tea Brokers	two participants	Since all the teas produced in the country are sold through brokers, they serve as the middlemen between producers and buyers; and they also offer the management, warehousing and distribution of tea.
5. Tea Buyers/Exporters	five participants	They provide insight into local tea processing, value-added production and export.
6. Large-Scale Estate and Factory	five participants	They provide insight into the tea production and relevant operations.
7. Tea Smallholders	five participants	They provide insight into growing and producing tea.
8. Private Tea Factory (owner and manager)	four participants	They provide insight into growing and producing tea and marketing channels.
9. Colombo Tea Traders Association	one participant	As the association is involved in managing Colombo tea auctions, they provide insight into operations in auction house.
10. Private Tea Factory Owners Association	one participant	As the association is involved in managing private tea factories, they provide insight into operations in tea production and marketing channels.
11. Overseas Tea Importers	three participants	They can provide insight into the operations involved tea import, blending, distribution and customer requirements
Sub Total Participants (Focus Group Discussions)		20 Persons
Sub Total Participants (Individual Interviews)		26 Persons
Grand Total Participated in the Research		46 Persons

Source: Developed by the Author

Special attention was paid to select companies involved in major nodal activities such as production, processing, distribution and export, because rich information for qualitative

research can be obtained from the people who know about the sector and who actually face the issues in real situations.

In qualitative research, data saturation is more important than the number of participants (Sandelowski 1995). However, it is not possible to collect the relevant information on each supply chain node or stakeholder through a single respondent. In such situations, it is recommended to use multiple participants to increase the richness of the data collected (Voss, Tsikriktsis & Frohlich 2002). Voss et al. (2002) also pointed out that interviewing multiple respondents from each category not only enriches the quality of the data but also enhances its reliability. These authors stressed that asking the same question from different respondents would also provide much rich and reliable data. Therefore, multiple focus groups and interviews were conducted until data saturation appeared during the analysis. Section 4.4.2 describes the main data-collection strategies used in this research.

It should be noted that the consumers are an integral part of the tea supply chain, as the ultimate goal of the supply chain is to satisfy their requirements. The input suppliers, such as those for fertiliser suppliers, seed suppliers and tea plants also play an important role in the tea supply chain. They were not included in the study, as it was outside the scope of this research. However, whenever possible, measures were taken to capture the perceptions of consumers and resource suppliers through other participants' comments and secondary documents such as reports.

4.4.2 Data-Collection Method

As a first step in the data-collection process, a list of companies involved in the tea industry was obtained from the Chamber of Commerce Sri Lanka and Sri Lanka Tea Board websites. Due to the ethical requirements of the university, the researcher obtained prior approval to contact the potential participants and approval also was obtained for all corresponding documents and other relevant research documents such as the interview guide and letters. These approved corresponding documents are given in Appendices 3 to 9.

After identifying the main nodal points, or stakeholders in the tea supply chain, potential participants were initially approached by telephone to get their consent using a

script approved by the University Ethics Committee (Appendix 3). For those who could not be contacted over the phone, an official email (Appendix 4) was sent to obtain their consent. Once the potential participants had indicated their interest to participate in the research, an official email (Appendices 5 and 6) was sent with a copy of the consent form (Appendix 7), information sheet (Appendix 8) and interview kit (Appendix 9), which were approved by the Ethics Committee. Once the formal consent was obtained from the potential participants, the researcher organised the data-collection process, where the schedule for the interviews and focus-group discussions was prepared, negotiating on the time, place and date with the relevant participants accordingly.

Data was collected using several methods: focus-group discussions, semi-structured individual interviews, observations, secondary documents and follow-up interviews. Data collection was carried out in both Sri Lanka and Australia in three stages. The first set of data was collected in October and November 2011 in Sri Lanka. The second set of data was collected in December 2012, also in Sri Lanka, while last set of data was collected from January to February 2013 in Australia. Focus-group discussions (discussed in detail in the next section) were used as the main data-collection method. Additionally, individual interviews were conducted with the stakeholders who could not participate in the focus-group discussions.

4.4.2.1 Focus-Group Discussions

Group discussions and individual interviews are two major techniques used in qualitative research (Denzin & Lincoln 2000). Focus groups are used to collect data from a group of participants (Morgan 1996). A focus group can be defined as a session of in-depth discussion with a group of people from a targeted population identified by the researcher. Literature shows that the discussions need to be facilitated by a moderator or by the researcher (Khan, Anker, Patel, Barge, Sadhwani & Kohle 1991). The participants are physically gathered in one location and they have usually been given a set of questions in advance of the meeting (Flynn, Sakakibara, Schroeder, Bates & Flynn 1990). Interviewing a group of people is popular compared to individual interviews in social and business research (Veal 2005), as the participants can interact with each other in the group environment (Calder 1977; Flynn et al. 1990; Morgan 1996), and the researcher can pick up participants' differing views. The researcher can

explore deeply by asking prompt questions and can summarise the consensus based on the group participants' knowledge and their everyday experiences (Barbour 2007).

Focus groups have been used by many researchers in exploratory qualitative research (Barbour 2007). There are many advantages to using focus groups to collect qualitative data (Denzin & Lincoln 2000). For example, focus-group discussion creates a good environment for participants who are reluctant or afraid to provide information in face-to-face interviews. Denzin and Lincoln (2000) argued that focus groups stimulate the members to participate in discussion. However, Bryman and Bell (2003) stressed that there are limitations to focus groups:

- The researcher has less controlling power compared to individual interviews.
- Data analysis is comparatively difficult since a huge amount of data is collected within a short time period.
- It is difficult and costly to organise focus groups since the researcher has to provide facilities for the participants.
- Transcription is more time-consuming since many people talk and it is hard to recognise the person speaking compared to individual interviews.

Therefore, it is necessary to take precautions from the beginning to limit these drawbacks. The researcher should develop her own skills to control the group if the group is deviating from the objectives of the research (Barbour 2007). To minimise this issue, all focus-group discussions were conducted using the interview guideline given in Appendix 9. This interview guide was developed using a framework developed by Styger (2010b). It was revised to meet the requirements of this research and to match the Sri Lankan context. This was used as a guide, where some questions were skipped if they were not relevant to the participant group or if already addressed in advanced by the participants during the discussion. In this interview guide, in addition to the semi-structured questions, a mind-map was used for each question as it clearly showed the relevant areas and made it easy for the moderator to guide the discussion. This map was extended if any new concepts or themes surfaced during the discussions.

All focus-group interviews were conducted in October and November 2011. The author's supervisor who visited Sri Lanka during the data-collection process, served as

the moderator for focus-group discussions. The focus-group discussions were held at the board rooms of the respective firms/institute, as it was easy for the participants to attend. The groups consisted of higher-level executives involved in strategic-level decision-making, as well as operational-level managers from each company. Although all these executives were extremely busy, most of them willingly spent time actively expressing their views and opinions. This indicated their degree of interest in and passion for what they do. On average each focus-group discussion took around one to two hours, while one or two breaks were given during the session for refreshments to minimise the drawbacks of focus-group discussions such as pressure on the participants, as well as to provide a natural and flexible environment for participants to express their views. All the focus-group discussions were conducted in English. All focus-group discussions were audio-recorded with the consent of the participants. The researcher also made notes during the discussion. These strategies helped to increase the validity and reliability of the information because the researcher could use both sources to cross-check the data.

4.4.2.2 Individual Interviews

Interviews are one of the qualitative research approaches that provide data to a given problem based on experience (Basch 1987). Individual interviews were conducted with some stakeholders such as tea buyers/exporters, brokers, representatives of private factories and smallholders, as it was not possible to bring them in to participate in focus-group discussions due to the nature of their business operations, time restrictions and geographical dispersion. For example, most of the tea buyers/exporters and private tea factories are small and medium-sized enterprises (SMEs); their managers refused to travel away from their production plants, because they believed that it would disturb operations. Additionally, since the private tea factories are geographically dispersed, it was difficult to obtain their consent to join focus-group discussions conducted away from their premises. However, since these stakeholders play an important role in the tea supply chain, it was crucial to understand their operations and their effect on the sustainability of the Sri Lankan tea supply chain. Therefore, the researcher was compelled to use other research strategies such as individual interviews with those stakeholders who could not participate in focus-group discussions.

Individual interviews were conducted in three stages. The interviews in the first and second stages were conducted face-to-face in Sri Lanka using the same interview guidelines used in the focus-group discussions. During the first stage, 17 individual interviews were conducted in October/November 2011 in Sri Lanka, while another six individual interviews were conducted during the second stage in December 2012 to confirm data saturation and to verify the supply chain maps developed from the first stage. Out of 23 individual interviews only 21 were tape-recorded because two participants in Sri Lanka did not provide consent to record the interview due to official restrictions. In addition to recording the discussions, the researcher made notes during interviews. The interviews with small-scale farmers and representatives of private tea factories in Sri Lanka were conducted using the local language (which is Sinhalese), and translated by the researcher. All other interviews were conducted in English and transcribed by the researcher.

Even though it is outside the research scope to explore the tea supply chain outside of Sri Lanka, the analysis shows that there is a gap in linking the supply chain. Therefore, three interviews were conducted with tea importers in Australia who import tea from Sri Lanka, using a semi-structured interview guideline (Appendix 10). The researcher was able to understand the linkages between tea exporters and importers, and thus “close the loop” in this respect. The interviews with the tea importers and distributors in Australia were conducted over the telephone in May 2013; they were audio-recorded and transcribed by the researcher.

4.4.2.3 Other Documents

In addition to the focus-group discussions and interviews, secondary documents such as annual reports from different stakeholders in the tea supply, newspaper articles related to tea industry operations, other related reports and data from different websites and databases (such as the Department of Census and Statistics in Sri Lanka and the FAO online database) were used to add to the richness of the information collected.

4.4.2.4 Field Visits and Observations

Several field visits were carried out to observe the operations at different stakeholders in Sri Lankan tea supply chain:

- A large-scale plantation and a production plant in Nuwara-Eliya district which is in the high-elevation zone (Figure 3-3).
- The only tea auction house in Sri Lanka, which is located in Colombo, to observe its operations.
- Five tea smallholders and four private tea factories in the low-elevation and mid-elevation zones.
- Value-added tea production plants to gain more insights into value-added tea production processes.

These field visits helped the researcher to link the information collected through the focus-group discussions and interviews. Field notes were taken during each visit and linked with interview data.

4.4.2.5 Data Saturation

In qualitative research, data collection is stopped once data saturation occurs. According to Morse (1995), saturation occurs when there is a redundancy in the information that appears during data collection and analysis. The collection should be carried out until no new information emerges from the data. This can indicate either data saturation or theoretical saturation.

For the purpose of this research the researcher identified that data saturation was achieved in the first round of data collection. Four focus-group discussions and 17 individual interviews were conducted during the first round in October/November 2011. When analysing the data collected from the first round of the interviews in Sri Lanka, it was observed that no new themes or concepts emerged, which is an indication for data saturation. However, to confirm data saturation the researcher conducted another six individual interviews with the stakeholders in Sri Lanka in December 2012. The analysis of this data confirmed the saturation, as the same themes emerged from the new data set.

4.4.2.6 Research Triangulation

The use of more than one research method is described as the triangulation of research methodology (Jick 1979). Hussey and Hussey (1997) pointed out that the triangulation

of data collection can help the researcher explore the research issue from different perspectives. Data triangulation also helps verify the reliability of the data (Dubois & Gadde 2002) and reduce the likelihood of favouritism inherent in a single approach (Mangan, Lalwani & Gardner 2004).

As explained in Section 4.4.2, this research used several data-collection strategies; focus-group discussions and individual interviews were the main forms of data collection. Additionally, the researcher used several other strategies to increase the richness and validity of the data. These included several field visits to observe the actual operations of related activities in the tea industry. The researcher also used secondary data sources such as the annual reports of government agencies and companies related to the industry. Current news articles and papers and internet resources related to the industry were also used as a source of information to increase the reliability and validity of the information collected from interviews and discussions. The use of these different data-collection strategies helped to triangulate the information and enhance the validity and reliability of the research.

4.5 OVERALL RESEARCH DESIGN APPLIED

Answering the research questions requires the application of an appropriate research design. The research design is described as a “blueprint” of the research (Yin 2009) that provides a framework for data collection and analysis (Bryman 2008). Figure 4-4 illustrates the overview of the methodological path undertaken in this research.

As discussed in Section 4.2 and shown in Figure 4-4, this research used a qualitative interpretive approach to induct theories through empirical research, due to the explorative nature of the research question: “What are the influencing factors for maintaining sustainable supply within the Sri Lankan tea industry?” As explained in Section 4.3.4, this research uses a case-study approach with the Sri Lankan tea industry as a case, since it is essential to explore the tea supply chain within the boundary of the research question. The literature highlighted that a deeper understanding of the operations of the all stakeholders or nodes in the Sri Lankan tea supply chain is required to achieve the research objectives. This includes not only tea producers, but also the other nodes such as farmers, brokers, tea buyers, tea importers, value-added tea

producers and tea exporters. Therefore, to identify the important nodal points in tea supply chains and develop the supply chain maps for the tea industry, as well as to find out the influencing factors for each supply chain model, it was essential to use a qualitative research approach.

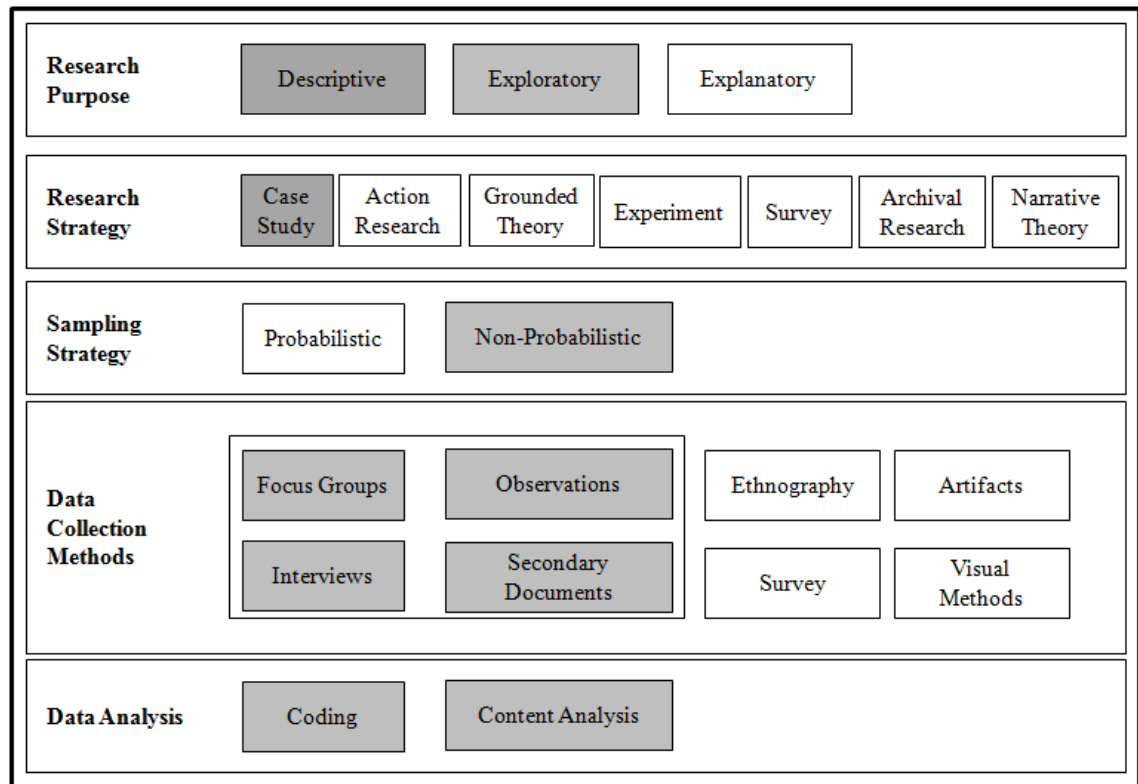


Figure 4-4: Overview of Research Methodological Path Employed
Adapted from Creswell (2013) and Saunders, Lewis & Thornhill (2012)

It should be noted that a qualitative research approach is more suitable for answering this study's research questions (Section 4.1), as a quantitative approach does not provide rich data to understand the phenomena under study. For example Creswell, Hanson, Clark and Morales (2007) stressed that an inductive qualitative research approach is used for analysing the rich contextual data collected through interviews, direct observations and secondary documents to answer this type of explorative research question. Figure 4-5 summarises the research design applied in this research. It first explored the data to identify the main stakeholders and understand the operations of each stakeholder in the tea supply chain. Once each stakeholder was explored, supply chain maps were developed. Analysis was then carried out to identify the influencing

factors on the tea supply chain using techniques such as coding and developing themes based on the codes identified. This process is explained in Section 4.6.

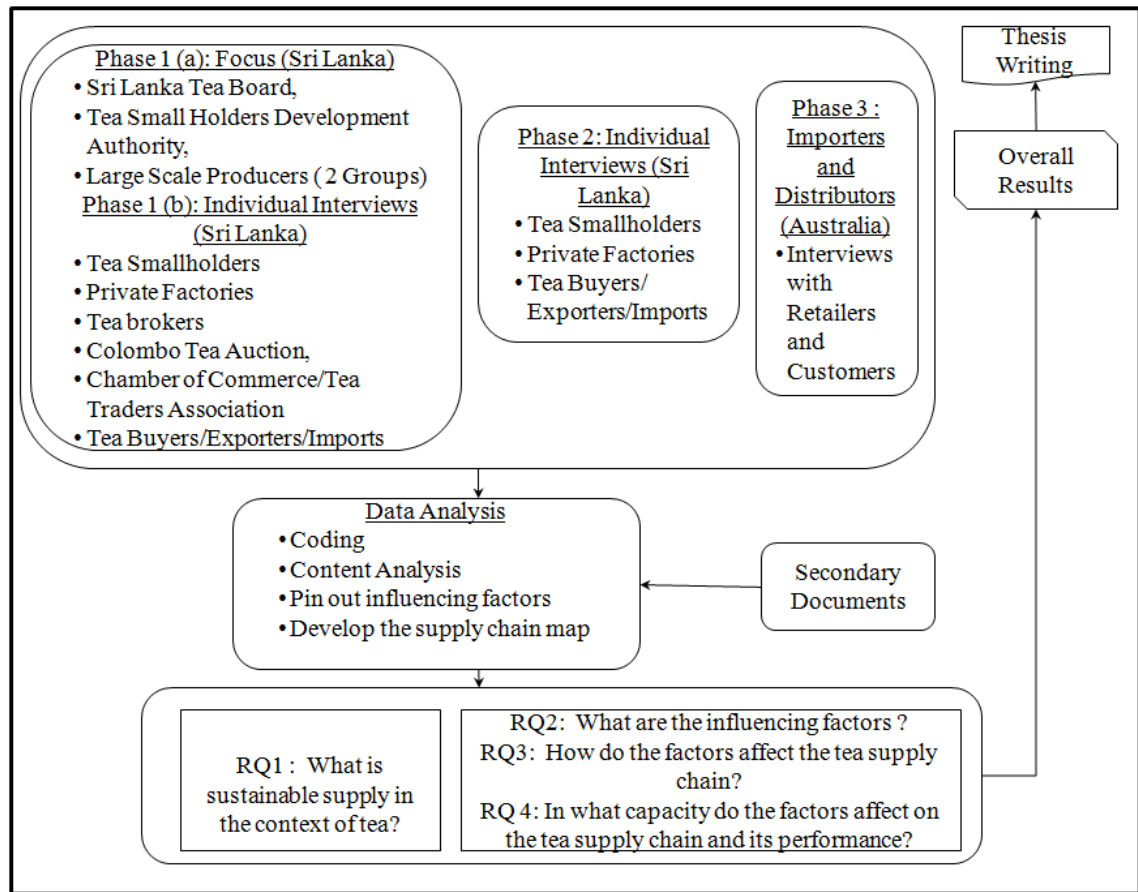


Figure 4-5: Research Design

Source: Developed by the Author

4.6 DATA ANALYSIS

This section describes the data-analysis process used in this study. Qualitative research results in a large amount of contextual, subjective and richly detailed data, particularly when gathered from interviews (Byrne 2001). Transformation of this information in a meaningful way is defined as data analysis (Liamputtong 2009). LeCompte (2000) defined data analysis as a process of transforming the data into research results. It includes transformation of large amounts of textual data into succinct statements that describe and explain the research. It is a process of exploring the data collected to

understand its meaning and how it is related to the research area (Strauss & Corbin 1990). The data-analysis process is illustrated in Figure 4-6.

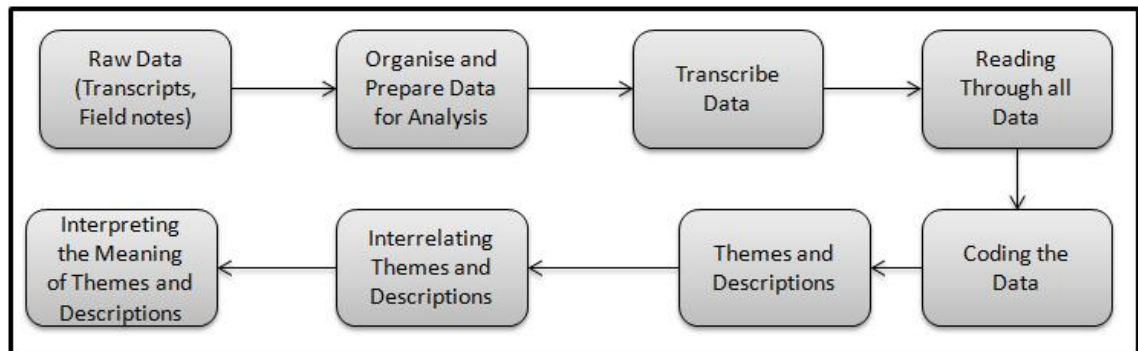


Figure 4-6: Qualitative Data-Analysis Process

Source: Adapted from Creswell (2009)

As illustrated in Figure 4-6, the analysis process includes organising the data in a meaningful way, transcribing it, reading through it and breaking it into manageable themes and codes that describe the results (Creswell 2009). Transcribing data and coding are the main steps in the data-analysis stage (Saldana 2011). These two steps are explained below.

4.6.1 Data Transcription

Before starting the data analysis, it is necessary to have a good familiarity with and understanding of the data (Anfara, Brown & Mangione 2002). Since the data in this study was in audio-recording format, data transcription into a written text format was vital for successful data analysis (LeCompte 2000).

Saldana (2011) identified the transcription process as a vital warm-up for in-depth qualitative data analysis. Creswell (2009) said that reading transcriptions is more effective than listening to audio-recordings not only because it saves time but also because it provides the flexibility to make notes and to identify the codes and themes relevant to the research question. Therefore, as a first step the recorded focus-group discussions and individual interviews were transcribed by the researcher. Even though it is common to hire an expert to do the transcriptions, having it done by the researcher herself had several benefits including greater immersion in the data and increased capacity to make sense of the data (Liamputtong 2009; Saldana 2011).

Data transcription is a time-consuming activity, because qualitative interviews generally result in large amounts of contextual data (Saldana 2011). Liamputtong (2009) wrote that computer-assisted qualitative data analysis programs facilitate the data-analysis process because they help the researchers to find, retrieve, categorise and manage data faster than using a manual process. Creswell (2009) also said that the use of computer programs simplifies the data storing and management process, whereas the researcher still needs to go through every text file to identify codes and themes. The NVivo program facilitates the coding process, to identify the themes easily and facilitate the management of the large quantity of contextual data from the interviews (Liamputtong 2009). Therefore, NVivo, a computer-assisted qualitative data analysis program, was used for this purpose, since the facilities it offers expedited the transcription process as well as data management. For example, according to Welsh (2002), the researcher can link the transcription and the original audio file, so that it is possible to listen to the audio file while reading the transcriptions to be familiar with data; this in turn helps to increase the accuracy of the transcription because, it helps in cross-checking the transcription. Furthermore, it is possible to link secondary documents such as reports, pictures and field notes with the main transcription, which in turn helps to increase the reliability of the data since it is possible to verify the information collected.

4.6.2 Coding and Identifying the Themes

After transcribing the interview data, data coding – the core component of the data-analysis process – was initiated. “Coding is the process of grouping evidence and labelling ideas so that they reflect increasingly broader perspectives” (Creswell 2009, p 208). Literature shows that in qualitative research, data coding is consisted of three sub-processes. First, data can be analysed line by line to create codes. These codes were freely generated and there was no association among the codes, hence this coding process is called “open coding” (Gibbs 2007). Each transcript in this study was coded line-by-line, sentence-by-sentence or paragraph-by-paragraph to identify exclusive and exhaustive codes. Second, similar codes were aggregated into sub-categories that have similar patterns of the phenomena under the study, particularly relevant to the research question (Gibbs 2007). Finally, the themes were developed using the sub-categories

developed, and defined to generate clear explanations (Anfara, Brown & Mangione 2002; Braun & Clarke 2006; Carey 1995).

Before starting the coding process, the transcriptions of each focus-group and interviews were read through several times to explore the data as it allows the researcher to become familiar with and immersed in raw data to have a better understanding of the data. This process helps the researcher to identify the main connections between each stakeholder in the tea supply chain and to develop the supply chain map. This process is further explained in Chapter 5.

Then the researcher starts the thematic analysis process by coding the data collected through focus-group discussions and individual interviews. The transcribed data was initially coded to identify the primary codes by reading the transcripts. They were then aggregated into sub-categories. Finally the themes were developed using these sub categories. The detailed analysis process to identify the themes is illustrated in Chapter 6.

4.7 QUALITY OF RESEARCH

Maintaining the quality of research adds value to any research either qualitative or quantitative. Validity and reliability are used as criteria to access the quality of research (Temple 1998). Veal (2005) defined validity as “the extent to which the information collected in a research study truly reflects the phenomenon being studied”. In other words, validity evaluates or checks the accuracy and truthfulness of the research findings by using certain procedures such as triangulation of data sources and respondent validation (Creswell 2009). The validity, or truthfulness, of the data is also important (Veal 2005) as validity checks as to whether the transformation is accurate (Stiles 1993). Validity is twofold: internal and external. Internal validity is concerned with the question of truth of the cause-effect or causal relationships of the research findings, while external validity is concerned with the generalisability of the results of the sample to the whole population (Creswell 2009).

Reliability is defined as “the degree to which the information produced is representative of the population to which it is generalised” (Goldman 1962, p 67). Reliability shows

how dependable or consistency the collected information is (Maughan 2009; Neuman 2003). Veal (2005) explained that a research method is reliable if the same research carried out on the same sample on a different date or with a different sample within the same population yields the same results.

Both reliability and validity are important for the quality of a study because research results directly depend on what is measured. Sometimes, even if the data is reliable, it may not show the real picture if the research is not truthful. The reliability and validity of the research also depends on the sample size, and how representative the sample is of the whole population (Goldman 1962). Therefore, special attention should be paid to both reliability as well as to validity when deciding the sample size for both qualitative and quantitative methods (Bryman & Bell 2003).

Quality criteria such as reliability and validity have been widely used in quantitative research; the application of these concepts became popular in qualitative research when Lincoln and Guba (1985) asked “[H]ow can an inquirer persuade his or her audiences that the research findings of an inquiry are worth paying attention [to]?” (Lincoln & Guba 1985, p 290).

Golafshani (2003) pointed out that the use of the reliability and validity measures in qualitative research is different to their use in quantitative research because the two research paradigms differ in their underlying philosophical nature (Sections 4.2 and 4.3). Even though reliability and validity are considered separately in quantitative research, they are not separated in qualitative research. Instead, both these concepts are embedded, and terms such as credibility, transferability and trustworthiness are used to evaluate the quality of qualitative research (Golafshani 2003).

Lincoln and Guba (1985) introduced the concept of “trustworthiness” instead of reliability and validity to demonstrate qualitative research rigour. “Trustworthiness” consists of four aspects;

- Credibility – focus on internal validity and ensure that the research findings are true and accurate.
- Transferability – focus on external validity and ensure that the findings are applicable to other contexts.

- Dependability – focus on reliability and evaluate whether the findings are applicable at other times.
- Conformability – focus on reliability and ensure that there is no researcher bias or allowed personal views interfere with research findings.

Many qualitative scholars have proposed various best practices that can be used to increase the quality of qualitative research (Creswell 1998; Creswell et al. 2007; Creswell & Miller 2000; Golafshani 2003; Lincoln & Guba 1985; Temple 1998). This study used some of these strategies to increase the validity and reliability of the research as explained below.

4.7.1 Testing Validity: Credibility and Transferability

The validity is concerned with the correctness and truthfulness during the data-collection and the data-analysis processes. Hence, to enhance the validity, aspects such as credibility and transferability are applied in qualitative research (Lincoln & Guba 1985).

Distortion of information and bias are major issues that affect the credibility of qualitative research. Establishing good practices during the research process ensures credibility. Temple (1998) said that respondent validation and triangulation are two strategies used to increase the credibility of qualitative research. According to Bryman and Bell (2003), research validity can be improved by using respondent validation and clarifications. This was implemented by contacting the participants to solve any confusion on data collected. Since the researcher audio-recorded the interviews (except for two, as explained in Section 4.4.2) and focus-group discussions, the author could cross-check transcripts with the original data sources. Hence, to increase the respondent validation, various strategies such as cross-checking the data with respondents and audio scripts were used in this research.

As pointed out by Roberts, Priest and Trynor (2006), researchers should minimise their own interference during data collection and analysis. To meet this requirement the researcher uses a moderator during focus-group discussion; the moderator avoided contributing to the discussion. The researcher can use methods such as “brackets” to express their beliefs, experience and judgements when collecting and analysing the data

(Roberts, Priest & Trynor 2006). Hence strategies such as maintaining memos and notes were used during data collection and analysis

Furthermore, as recommended by Siccama and Penna (2008) facilities available in the NVivo program were used to increase the validity during the data coding process, as well as to provide richness, depth and insight in the data-analysis process. For example, the use of NVivo enhances validity by providing a single flat form that makes it possible to cross-check analysis easily. It also increases the transparency of the data-analysis process.

Prolonged engagement and persistent observations are another two strategies suggested by Onwuegbuzie and Leech (2007) to increase both credibility and transferability. Prolonged engagement includes conducting research for a sufficient time period and ensuring that the voices of all relevant stakeholders are represented. It also includes building trust between the researcher and the participant (Onwuegbuzie & Leech 2007). As explained in Section 4.4, the data collection for this study was conducted over five months in three stages with representatives of different stakeholders in the Sri Lankan tea supply chain. Furthermore, to identify the characteristics and attributes of the phenomena under study, several field visits and observations were conducted to provide an in-depth description, which in turn increased the credibility and transferability of the research.

Triangulation of research is another way to increase validity (Anfara, Brown & Mangione 2002; Stiles 1993). As explained in Section 4.4.2, this research used secondary data such as business reports, newspaper articles and other relevant reports to provide corroborative evidence. Robert et al. (2006) highlighted that using secondary resources is the best way to cross-check the validity of qualitative research.

4.7.2 Testing Reliability: Dependability and Conformability

In qualitative research reliability is concerned with the trustworthiness of the data-collection procedures and the data gathered from the research (Stiles 1993). Researcher bias is one issue inherent in qualitative research. This can be minimised by increasing the auditability of the data-collection process (Stiles 1993); to do this in the current study, the researcher used an interview guide. Furthermore, as recommended by Stiles

(1993) and Flick (2002), the researcher documented the entire data-collection process, recording the conversations and taking notes as much as possible to increase reliability. These strategies help to increase the dependability and conformability aspects of the research. Checking the interpretation of data is another way to increase reliability. Furthermore, the use of computer data analysis software such as NVivo, which was used in this study, can improve reliability (Roberts, Priest & Trynor 2006).

4.8 ETHICAL CONSIDERATIONS

Ethical implications are very important in qualitative research. The Ethical concerns are particularly challenging in areas such as obtaining consent from participants, the relationship between the participant and the researcher, confidentiality of the information collected and the risk of revealing the identity of the participants (Houghton et al. 2010). Ethical considerations should be taken into account in qualitative research mainly because it involves human interactions; in this study, particularly between the researcher and the research participants. Furthermore, as mentioned in the National Statement on Ethical Conduct in Human Research (2013), researchers should take every possible measure to adhere to trust; accept mutual responsibility to give the required confidentiality for the information collected; treat all participants equally; and respect individuals' values and beliefs.

Ethical approval from the Ethics Committee at the University of Wollongong was obtained before starting the data-collection process. The research was carried out in an ethical manner in accordance with the requirements of the University of Wollongong's Code of Practice – Research and the Australian Code for Research, Responsible Conduct of Research (NHMRC 2007). Prior consent from the participants was obtained before recruiting them as participants. They had the flexibility to leave the research, even after giving their consent, if they felt uncomfortable participating. Maximum efforts were taken not to contact any participants after collecting data, unless they had provided prior consent.

4.9 SUMMARY

This chapter explained the philosophical underpinnings of the research methodology and the research design applied in this research. It discussed the use of different research strategies and provided a justification for selecting a qualitative approach to answer the research questions.

It also explained the rationale for selecting focus-group discussions and individual interviews as data-collection methods. Face-to-face focus-group discussions and individual interviews were conducted in Sri Lanka. The interviews in Australia were conducted over the telephone. Data triangulation was obtained through collecting data from other sources such as secondary documents, field visits and newspaper articles and reports related to the tea industry to enrich the data. The chapter also explained the data-analysis process, where the researcher used content analysis and coding as analysis techniques. NVivo software was used during the data-analysis process.

The next two chapters will discuss the analysis process and major findings of this research: Chapter 5 mainly explores the tea supply network, while Chapter 6 identifies the main influencing factors on sustainable tea supply networks.

CHAPTER 5

EXPLORING AND MAPPING THE SRI LANKAN TEA SUPPLY CHAIN

5.1 INTRODUCTION

This chapter attempts to meet the first objective of the research: to explore the Sri Lankan tea supply chain and to develop a supply chain map to represent it. To achieve this objective, a comprehensive qualitative analysis was undertaken using the data collected through in-depth, semi-structured focus-group discussions and individual interviews with the main stakeholders in the industry. This process is explained in Section 5.2. The analysis is further supported with the use of secondary data (as explained in Chapter 4). This chapter explains the operations of the Sri Lankan tea industry, as mapping the supply chain requires an understanding of the baseline information.

This chapter is comprised of four sections including this introduction. Section 5.2 explores each stakeholder in the Sri Lankan tea industry and their operations, relationships with other partners and responsibilities within the supply chain network. The operation processes for each stakeholder are explored and illustrated graphically. Section 5.3 starts with an aggregated map of the Sri Lanka tea supply network that identifies the main partners and the market channels in the Sri Lankan tea industry. It includes the traditional Sri Lankan tea market system and the supermarket supply chain to the final customer. Finally, Section 5.4 summarises the chapter and explains the main contributions of this analysis to the research.

5.2 DATA ANALYSIS – EXPLORING THE TEA SUPPLY CHAIN

This chapter achieves the first research objective which is to map the tea supply chain. It also creates the foundation to answer the first research question, “What is sustainable

supply in the context of tea” (see Section 1.3 and 1.4). The mapping process involves deep exploration of the data collected from the focus groups and interviews. For this purpose the data collected through focus-group discussions, individual interviews and secondary documents was used. Particularly, the data collected through Section 2 and 6 of the interview guide (Appendix 9), was mainly used for this purpose. Section 6 on fair trade and CSR in the interview guide was also used to enrich the findings by exploring sustainability and CSR aspects. It should be noted that data collected in Section 2 and 6 of the interview guideline was used as the main sources to identify the supply chain; the data collected through interviews and focus-group discussions was also explored, as it provided a strategy to link the strategic decisions with the supply chain concept and to develop an overall view of the supply chain.

As shown in Figure 5-1, the analysis was started by identifying the stakeholders, then exploring their roles and operations in the supply chain. Information on the main stakeholders in the tea supply chain and their main roles on managing the supply chain were explored during data collection.

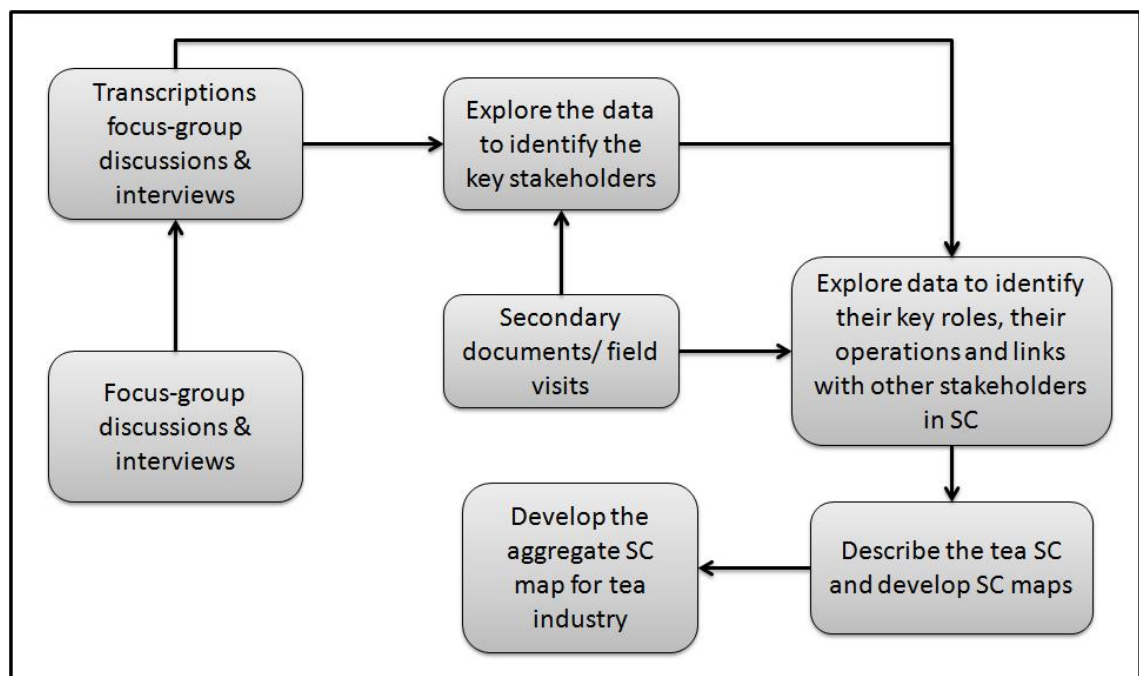


Figure 5-1: Analysis Process to Develop the Tea Supply Chain Map

Source: Developed by the Author

During data collection, participants were requested to explain their supply chain, so that author could map the supply chain based on their descriptions and verify the maps developed with the participants. During the mapping process, the first step was to identify the main stakeholders along the supply chain. The researcher started the mapping process as soon as the data collection process was started. Secondary documents such as company reports were also used to refine the map. The main characteristics of the supply chain and their importance were also explored.

Furthermore, the secondary documents also helped the researcher map the tea supply chain, as the author was able to identify the linkages between stakeholders and to verify the information collected and maps developed through interview and focus-group data. The field visits also helped the researcher map the tea supply chain, as the author could observe the operations of tea plantations, small-farmers, estate manufacturing plants/estate factories and private tea factories at ground level.

As explained in Section 2.5.1, a supply chain map is defined as a map that shows the linkages between the suppliers and the customers. Yacher (2011) says that the supply chain represents the connectivity between all partners both upstream and downstream, including the flow of goods, information and money. As explained in Section 2.5.2, strategic supply chain mapping serves as the starting point for managers to link corporate strategy with sustainability strategy and supply chain strategy; not only internally but also with other stakeholders along the supply chain (Cetinkaya et al. 2011; Gardner & Cooper 2003).

Table 5-1 illustrates the stakeholders involved in the tea supply network and their roles in the supply chain. These stakeholders are categorised as government institutes, private-sector organisations and industry operators. This research focus was on the industry operators who are directly involved in tea production, such as farmers, tea producers, brokers and exporters, since they are responsible for the main operations in the tea supply chain.

Furthermore, operations of two regulating bodies (the Sri Lanka Tea Board and the Tea Small Holdings Development Authority) were also explored as they are directly involved with the industry operators. Additionally, stakeholders such as the Planters'

Association of Ceylon, the Private Tea Factory Owners Association, the Colombo Brokers Association and the Colombo Tea Brokers Association were also explored, as their contribution to managing the tea supply chain was direct and had a considerable effect on the control of the Sri Lankan tea supply chain. Even though the stakeholders were not directly studied, their influence on the tea supply chain was explored with the relevant operators who directly deal with them.

Table 5-1: Main Role of the Stakeholders in the Tea Supply Chain

Stakeholder	Role
Industry Operators	
Input suppliers	Supply fertiliser, pesticides, machinery and equipment, tea seeds
Commercial tea nurseries	Supply tea plants
Large-scale farmers	Supply green tea leaves for producers
Small-scale farmers	Supply green tea leaves for producers
Dealers in green tea leaves	Buy green leaf tea from small-scale farmers, supply green leaves to tea processors or factories, serve as a intermediaries between tea smallholders and private tea factories
Tea-leaf transporters	Collect and transport leaves from the collection centres to the factory, acts as a communication channel between the factory and the farmers
Estate tea-processing factories	Produce tea
Private tea processing factories	Produce tea
Tea brokers	Prepare and distribute samples with catalogues each week; submit tea to auction; prepare reports; conduct tea testing to maintain quality; provide reports and market feedback to the processors
Tea buyers/value-added tea producers/tea exporters	Purchase bulk tea at auction; produce value-added tea, market , advertise and export tea
Local tea importers	Import tea varieties not available in local markets to produce value-added tea for re-exporting
Packaging-material suppliers	Supply packaging materials and printing
Warehouse providers	Provide storage facilities
Transport service providers	Provide transport facilities
Overseas tea buyers/importers	Import, blend and sell tea
Overseas value-added tea producers/re-exporters	Blend bulk teas into conveniently packaged and value-added branded tea; market and advertise; perform quality control and monitoring; re-export value-added tea
Supermarkets and retailers	Sell tea to consumers
Overseas tea distributors	Distribute tea around the world
Refused tea processors	Re-process the tea that is refused due to substandard teas

Stakeholder	Role
	supplied by tea factories; distribute the re-processed teas to local market
Consumers	Purchase and consume tea
Government Institutes	
Ministry of Plantation Industries	Deals with policy matters in the tea industry
Sri Lanka Tea Board	Regulates the tea industry and its stakeholders, monitors tea marketing and promotional operations, collects and distributes statistics related to the tea industry and monitors subsidy programs and quality assurance
Tea Small Holdings Development Authority	Regulates the tea smallholder sector and provide extension services to small-scale farmers
Tea Research Institute	Undertakes research and issues quality-assurance certifications
National Institute of Plantation Management	Deals with human-resource development and conducting training programs to industry partners
Private Sector Organisation	
Planters' Association of Ceylon	Monitors the activities of the planters and function as a representative of the planters in the country
Private Tea Factory Owners Association	Monitors the activities of private tea factories and deals with government policies related to the tea industry
Colombo Brokers Association	Monitors the activities of brokers and conduct auctions
Colombo Tea Brokers Association	Monitors the activities of tea brokers
Tea Smallholders Development Societies	Monitors the activities of tea smallholders, provides assistance and acts as a representative of tea smallholders
Colombo Tea Traders' Association	Monitors the activities of tea traders; consists of members from each industry
Tea Exporters Association	Monitors the activities of tea exporters

Source: Developed by the Author based on Interviews/Focus-Group Discussions and Secondary Documents

The next section explains these explorative findings, where it identifies all stakeholders in the tea supply chain and explains their main responsibilities and characteristics in it.

5.3 STAKEHOLDERS IN TEA SUPPLY CHAIN AND THEIR ROLE

The first objective of this research was to map the tea supply chain. First, the tea supply chain was explored from end-to-end to identify the main stakeholders: tea growers/farmers, tea producers, brokers, tea importers, value-added tea producers, bulk-tea exporters and value-added tea exporters on the supply side (Figure 5-2) and overseas tea importers, value-added tea producers and distributors on the demand side. The analysis shows that the tea supply chain is complex in nature, where the industry is

linked not only with the main stakeholders in the tea supply chain but also with many industries. It is also strongly linked with the social and economic development of the country, hence, as explained in Section 2.2.1, the tea supply chain was identified as “a non-rational supply network”, that is intertwined with many other supply chains such as input suppliers (such as fertiliser suppliers, packaging material suppliers, third-party logistics service providers, seeds and plant suppliers).

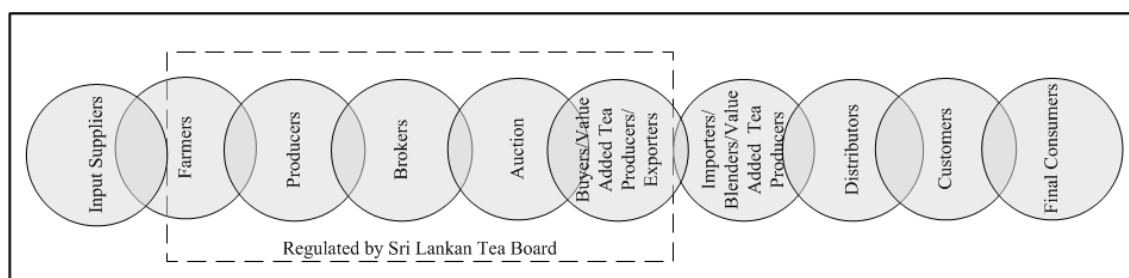


Figure 5-2: Main Stakeholders in the Tea Supply Chain

Source: Developed by the Author based on Interviews/Focus-Group Discussions

The main activities carried out by industry operators are cultivation, production, brokering/selling, value-added tea production, export/marketing, importing, distributing and retail. The links between these main supply chain partners in the industry are shown in Figure 5-2 and Figure 5-3. This section explores these supply chain operations in detail.

5.3.1 Government Regulators

Regulators play a major role in the Sri Lankan tea supply chain because the government strictly controls and monitors the operations in the tea industry from growing to export. The Ministry of Plantation Industries, including the Sri Lanka Tea Board, Tea Small Holdings Development Authority, Tea Research Institute and National Institute of Plantation Management, is involved in managing the tea industry (Table 5-1). Among these organisations, the operations and responsibilities of the Sri Lanka Tea Board and Tea Small Holdings Development Authority were explored deeply, as they are directly involved with the industry operators and tea smallholdings sector. The following section describes their operations.

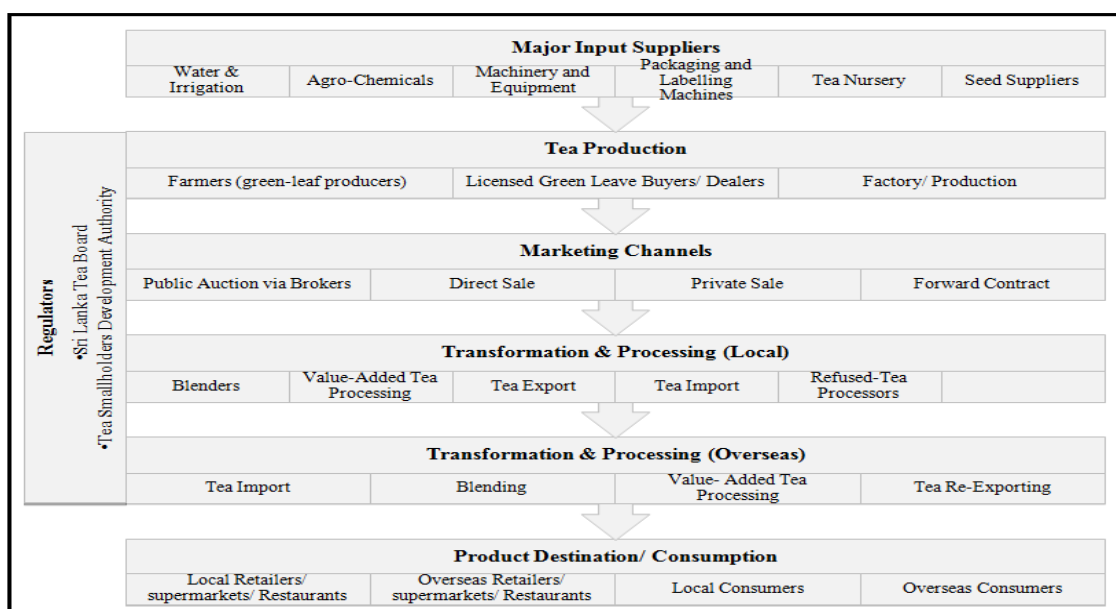


Figure 5-3: Main Stakeholders by Type of Operation and Regulation

Source: Developed by Author based on Interviews/Focus-Group Discussions

5.3.1.1 Sri Lanka Tea Board

The Sri Lanka Tea Board is the main government body that regulates the Sri Lankan tea industry. The Sri Lanka Tea Board was established in 1976 under the Sri Lanka Tea Board Law No. 14 of 1975. The original Act was later amended by several subsequent Acts, including No. 17 of 1985, No. 44 of 1990, No. 29 of 2003 and No. 44 of 2006, and given increasing powers to regulate the industry (SLTB 2010a).

The Sri Lanka Tea Board's main responsibilities are to develop the Sri Lankan tea industry, maintain the quality of the produced tea and promote Sri Lankan tea under "Ceylon Tea" brand name using the "lion logo" globally. More specifically, according to the Sri Lanka Tea Board's annual reports and the interviews conducted with various stakeholders in the industry, the Sri Lanka Tea Board is responsible for regulating the operations at each supply chain node – growing, production, auction and export – through different divisions, such as the Tea Commissioner's Division, Tea Export Division, Tea Promotion Division and Tea Tasting Unit (Table 5-2).

Table 5-2: Sri Lanka Tea Board's Responsibilities

Division	Responsibilities
Tea Commissioner's Division	Regulates tea production process; registers manufacturers, factories, licensed dealers and tea processors; monitors the quality of infrastructure at factories; manages subsidy schemes; monitors tea quality from production to export
Tea Export Division	Regulates tea export operations; registers tea exporters, importers and packers; monitors and controls the export of teas from other origins; monitors and regulates customs approvals on tea exports; monitors the quality of tea exports
Tea Promotion Division	Implements promotion programs locally and internationally; registers brand logos
Tea Tasting Unit	Independently evaluates tea quality; issues Private Sale Panel Valuation certificates

Source: Prepared by the Author

The Tea Commissioner's Division was initially empowered to control areas such as developing, manufacturing, disposing of the contaminated and rejected tea and regulating the industry under Tea Board Act No. 51 of 1957. Subsequently, the division was further empowered to regulate replanting, factory modernisation and subsidy schemes as well as the processing and hygienic standards of tea processing under Tea Board Law No. 14 of 1975. The main responsibilities of the Tea Commissioner's Division include (SLTB 2010a):

- Collecting statistics on tea production;
- Monitoring auction operations;
- Registering tea manufacturers and tea factories;
- Issuing licenses green-leaf dealers;
- Licensing refused-tea processing and sale;
- Performing quality control for and monitoring green leaves and produced tea;
- Implementing development projects;
- Issuing quality certificates and improving the quality of produced tea;
- Administering replanting and factory-modernisation subsidies;
- Providing working-capital loans;
- Establishing good manufacturing practices in tea factories;
- Monitoring tea quality at factory level, and at unloading (for imports) and pre-shipment (for exports);
- Conducting surprise investigations at the factories.

Discussions with the participants from the Sri Lanka Tea Board revealed that it is important to closely monitor tea producers and exporters to maintain the quality of the produced tea. They further highlighted that it is especially important to protect tea smallholders, since they do not have a formalised structure. For example, it is a legal requirement that all tea manufacturers register at the Sri Lanka Tea Board; the main purpose of this law is to monitor their operations closely, particularly whether the reasonable-price formula is implemented and payments are made to smallholders as specified. It was mentioned that in the past there have been instances where manufacturers suddenly shut down their operations without settling outstanding payments to tea smallholders.

The Tea Commissioner's Division is also responsible for registering tea factories, in this case to ensure that the building, equipment and operations processes can produce good-quality tea, and to monitor the quality of the produced tea. For example, as shown in Figure 5-4, the Tea Commissioner's Division carries out rigorous pre-auction and post-auction quality-assurance tests to monitor the quality of the teas sold and exported.

According to the Tea Control Act, the Tea Commissioner has the power to take action against tea manufacturers and factories, if they do not comply with the reasonable-price formula or pay their green-leaf suppliers on time. The Tea Commissioner can also cancel a factory's registration if its facilities are not up to the standards specified by the Tea Board. As listed in the Sri Lanka Tea Board Annual Report (2011), the Export Division is responsible for various operations related to tea exporting:

- Collecting statistics on tea export and import;
- Registration of exporters, packers; warehouses and importers;
- Registration of tea importers and export from other origins;
- Approvals for retrieval of rejected tea consignments from overseas buyers;
- Registration of customs goods declarations prior to the movement of cargo to the Colombo port;
- Monitoring of the minimum international Quality Standard – ISO 3720 for tea exports and imports;
- Denaturing tea not suitable for consumption.

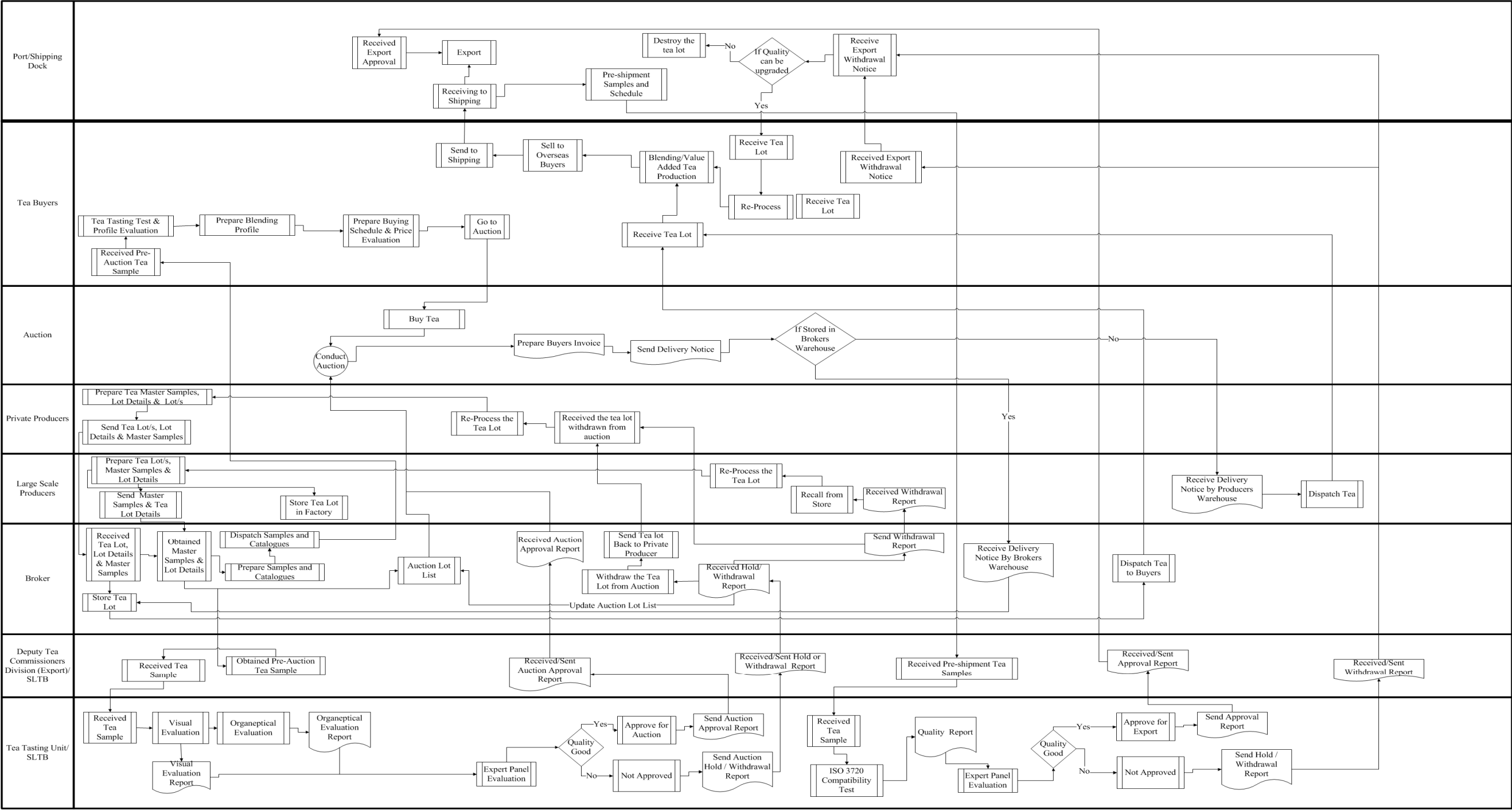


Figure 5-4: Pre-Auction and Post Auction Quality-Testing and Approval Process

Source: Developed by Author based on Focus-Group Discussions and Interviews

The Tea Promotion Division promotes Sri Lankan tea around the world. Its activities include (SLTB 2011):

- Implementing local and international promotion programs;
- Participating in fair trades;
- Promoting Ceylon tea through Sri Lankan missions;
- Conducting, and providing incentives for, brand promotion;
- Promoting tea in general, focusing on its health benefits, with other members of the FAO Intergovernmental Group on Tea, UK Tea Council, USA Tea Council, International Tea Committee–UK and Japan Tea Association;
- Registering and promoting trademarks and the lion logo;
- Registering the Ceylon tea logo and geographical logos under the TRIPS Agreement with WTO and registering the Ozone Friendly Ceylon Tea Logo.

The Tea Tasting Unit is mainly responsible for quality assurance at various stages (SLTB 2011):

- Conducting independent evaluation of teas: pre-auction teas, special investigation teas, pre-imported samples, post-imported samples, pre-shipment, direct sales;
- Registration of tea packs with lion logo;
- Monitoring the quality of Ceylon-logo tea locally and internationally;
- Awarding Private Sale Panel Valuation certificates and approval for green, organic and speciality teas sold exclusively through brokers (not auctions);
- Approving direct sale to producers-cum-exporters (other than green, organic and speciality teas).

5.3.1.2 Tea Small Holdings Development Authority

The Tea Small Holdings Development Authority (TSHDA) was established in 1977 under Act No. 35 of 1975 to provide assistance to tea smallholders who grow tea privately. As listed in the TSHDA Annual Report (2010), its main responsibilities are:

- Develop tea smallholdings;
- Increase the production in the sector;
- Support marketing;
- Increase productivity;
- Improve the welfare of tea smallholders.

The participants from TSHDA stress that they are also responsible for implementing the tasks delegated to the Authority by the Sri Lanka Tea Board. This includes activities such as implementing incentive schemes for replanting, new tea planting and infilling; providing support services for distributing fertiliser and transport facilities to tea smallholdings; implementing and providing extension and advisory services; and monitoring the Tea Smallholders Society and Society for Leaf Collecting Centres.

The focus-group discussions with the smallholders revealed that the TSHDA provides significant support to small-scale farmers, including providing assistance for development, extensive services to improve productivity and encouraging social development. Extensive services mainly focus on land development, including disseminating research findings or practices to improve productivity, and are provided through regional offices with the help of the Tea Research Institute. TSHDA pointed out that they provide assistance to tea smallholders using a results-based approach, where the results are benchmarked against short-term, medium-term and long-term performance goals.

Social development is another main responsibility of THSDA, which is carried out through community-based “tea smallholders’ development societies”, under the supervision of local tea inspectors. These societies advocate for smallholders and support them in improving their quality of life as well as the performance of the tea smallholder sector as a whole.

5.3.2 Tea Growers and their Operations

The supply of green-leaf tea is considered the most important logistics activity in the tea supply chain, since tea-leaves are the main raw material in tea production and its supply chain. Hence, the farmers or the tea growers who supply green-leaf tea are considered the most important nodal point in the tea supply chain.

5.3.2.1 Types of Tea Growers

Similar to other tea-producing countries, Sri Lankan tea growers are classified as tea smallholders or large-scale (estate) tea growers, depending on the extent of land under cultivation (Table 3.3 in Chapter 3). As shown in Figure 5-5, tea growers are also classified as private, corporate and state depending on the ownership of their land. The private sector includes all tea smallholders (who grow teas on private lands where the land area is less than 50 acres) and some large-scale tea plantations (who grow teas on private lands where the land is more than 50 acres). The corporate-management sector includes 20 regional plantation companies owned by the government; 99% of the ownership is leased to the corporate sector on 53-year contracts.

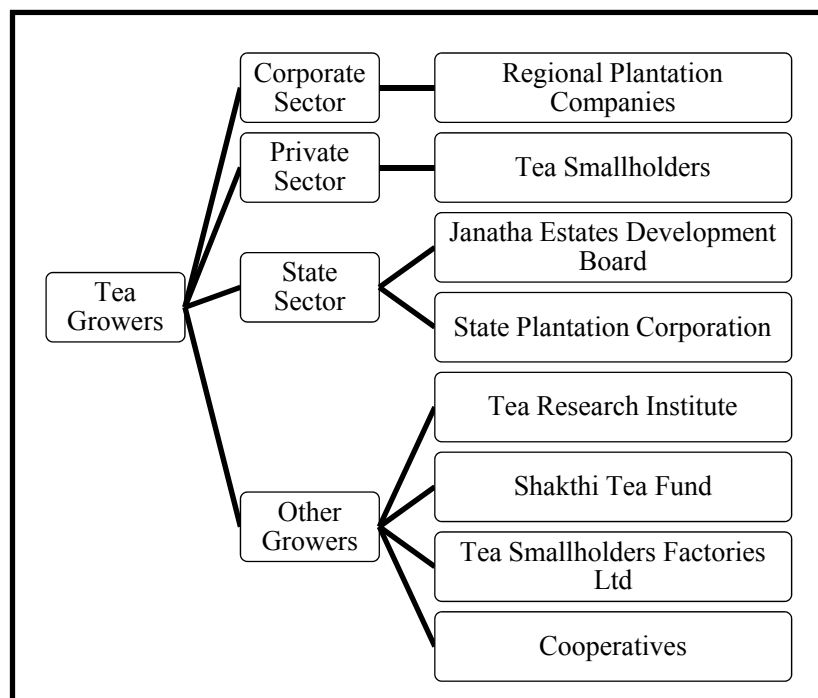


Figure 5-5: Classification of Tea Growers by Ownership Level in Sri Lanka
Source: Developed by Author based on Focus-Group Discussions and Interviews

The state sector includes two state bodies: the Janatha Estates Development Board and the State Plantations Corporation. As noted by the Sri Lanka Tea Board, there are a few other tea growers such as Tea Shakthi, Tea Smallholders Factories Ltd, Sri Lanka Tea Research Institute and a number of cooperatives that grow and produce tea mainly for research purposes. The corporate and private sectors are the two commercial tea-growing sectors that supply the raw material (young tea leaves) for tea production in the country.

The private sector accounts for around 60% of the national tea production. According to the Sri Lanka Tea Board, tea cultivation has become considerably more attractive to smallholders since it serves as a source of income and employment throughout the year (for some tea smallholders, it is an additional income); it requires little investment because the tea is mainly grown in small backyard plots that are mainly managed by family members, but still receive government subsidies and extended services from relevant agencies. Additionally, operating costs are comparatively low for tea smallholders, as they do not have overhead costs such as labourers' facilities, transport and management overheads as in estate-sector.

For tea smallholders, tea cultivation is not the primary source of income in the household; rather they harvest tea in their free time while permanently working somewhere else. For example, in rural areas some tea smallholders work in the government sector and grow tea in their backyards as a secondary source of income. The demand for green leaves has increased considerably, because the number of tea factories has increased in the country but the supply of green leaves has not kept up. Furthermore, large-scale producers now mostly depend on tea smallholders to supply green leaves, as it is cheaper for them to buy than to pay the high labour cost incurred in tea cultivation on large-scale plantations. Therefore, many large-scale-producers highlighted that they now tend to buy green leaves from tea smallholders, as it is economical for them. They look at the costs and benefits between buying or growing, which is one important supply chain concept based on the transaction-cost theory.

Furthermore the price escalation of green leaves is another main reason for an increase in the number of tea smallholders. Their tea plants are very young; hence the yield is high compared to that obtained by large-scale farmers.

In addition, the government provides incentive payments to tea smallholders for cultivation, as well as subsidies for replanting, land development and fertiliser. Additionally, the fragmentation of large-scale farms also has contributed significantly to increased production by smallholders. For example, many large-scale farmers are now mainly focused on tea production and export rather than cultivation and harvesting; as explained above, it is more economical to buy green leaves from tea smallholders than to grow them on their farms.

5.3.2.2 Tea Cultivation: Producing Green Leaves

As shown in Figure 5-6, tea cultivation consists of preparing land, growing tea plants, pruning, weeding, selective harvesting, transporting green leaves, weighing, packing and transporting tea leaves to factories for production. Interviews and field visits gave the author an overview of the process.

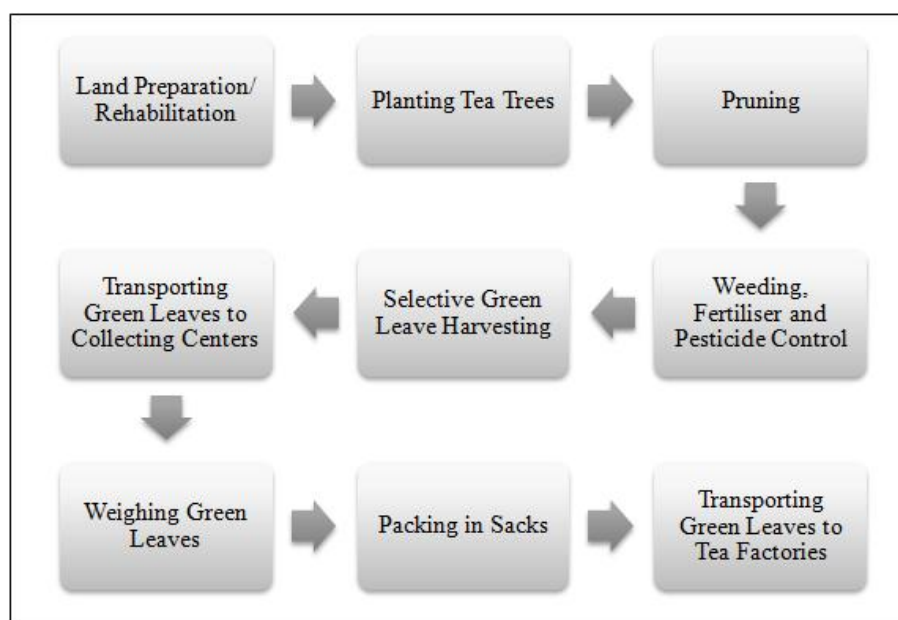


Figure 5-6: Main Activities in Tea Cultivation

Source: Developed by Author based on Focus-Group Discussions and Interviews

Land Preparation

Tea growers highlighted that tea cultivation requires long-term land preparation, whether tea is replanted in old land after uprooting the old plants or in new land. The first step is the preparation of drainage and terrain to maintain the water flow and to avoid soil erosion, as tea is mainly grown in hilly areas in the country. Once the drains are prepared, deep-rooting fibre-grass varieties are planted; this is compulsory since it helps in soil conservation, enhancing the soil structure, increasing the nutrients in the soil and minimising erosion. It is an essential step in the land preparation in obtaining a long-term, sustainable high yield from the tea bush. The farmers pointed out that they use grass varieties such as Guatemala (*Tripsacum laxum*) and Mana (*Cymbopogon confertiflorus*), which are purchased from nearby suppliers. The grass species should be allowed to grow on the potential tea-growing land for around two years; during this time the grasses are cut periodically and the clippings spread on the ground (Picture 1) to increase the level of nutrients in the soil. This is considered a sustainability initiative, as it minimises the use of chemical fertiliser to increase the nutrients in soil. The soil-rehabilitation process, which is labour-intensive, is a common step for both large and small farmers.



**Picture 1: Soil Rehabilitation:
Gautemala Grass Grown on a
Smallholder Tea Farm in the Galle
District**



**Picture 2: A Tea Nursery in a
Smallholder Farm in the Galle District**

Source: Photographs taken in November 2011 by the Author

Tea Planting

Once the land-rehabilitation process is completed, farmers start to plant young tea plants⁶, which are obtained from tea nurseries. Picture 2 shows a tea nursery maintained by a tea smallholder in the Galle district in Sri Lanka. On average around 13,000 plants can be planted on a hectare. The space between plants affects plant growth. Therefore, tea bushes are grown in rows with a gap of around 60 cm between plants and 120 to 180 centimetres between rows. One plantation manager interviewed for this study pointed out that allocating inter-row space is important to obtain a healthy tea bush and maximise the yield, and provide enough space for labourers to move around the tea bushes without damaging the young leaves and other tea bushes.

It was pointed out that the young tea plants are allowed to grow for around three to five years; during this time there is no commercial harvesting. The apical bud is constantly cut back, allowing the tea plants to grow as a bush of a suitable height for manual harvesting, and also providing several harvesting points. This is one of the labour-intensive manual processes for both large-scale and small-scale farmers in the tea supply chain. Other activities such as weeding, clearing and fertilisation are carried out to maintain the health of tea bushes. This further increases the demand for manual labourers for both large-scale and small-scale farmers. A newly planted or replanted tea bush is ready for continuous harvesting in about three to five years. Picture 3 shows a section of a large-scale tea plantation that is ready for harvesting.

Generally a tea bush has a life span of 25 to 30 years, during which it can be harvested continuously. However, to have a healthy tea bush, it is necessary to prune the plant every five to 10 years, leaving about 10 centimetres of the stem above the ground level (Picture 4). A pruned tea plant is ready for harvesting within three to four months. This activity is mostly carried out manually; hence it is another labour-intensive process. However, some large-scale plantations prune the tea bush using a machine to reduce labour costs. Picture 4 shows section of a pruned tea.

⁶Young tea plants are grown from leaf cuttings taken from a stock of a mother tea bush and grown in a nursery for around 12 to 18 months. The nurseries also grow tea plants from the tea seeds obtained from their local Tea Research Institute or from tea-seed importers. Both small-scale and large-scale farmers can maintain their own tea nurseries. Tea Research Institutes also have their own tea nurseries, which they use not only in researching and developing high-yield varieties, but for supplying young tea plants to both large-scale and small-scale tea farmers. Sometimes small-scale farmers also obtain young tea plants from large-scale farmers in the region.



**Picture 3: A Large-Scale Plantation
in High Country Ready for
Harvesting**



Picture 4: A Section of Pruned Tea

Source: Photographs taken in November 2011 by the Author

Tea Harvesting

Green tea leaves are harvested by hand, which is another labour-intensive process. There are two harvesting methods used by the tea growers around the world: fine and coarse harvesting. In fine harvesting, harvesters pick only the young tea shoots, with a bud and two immature leaves close to the bud. In coarse harvesting, in addition to the bud and first two leaves, matured leaves are also picked and used for tea production. Some countries mainly use coarse harvesting, since they have a mechanised harvesting process.

However, it was mentioned that Sri Lankan tea producers mainly use the more labour-intensive fine harvesting method to maintain the quality of the produced tea. In Sri Lanka, tea harvesting is mainly carried out by female labourers due to the delicate nature of the work (Picture 5).

The use of proper harvesting techniques is a vital, because the quality and efficiency of the tea production mainly depend on the quality of tea leaves harvested. It was pointed out that a tea leaf with correct maturity produces the best quality tea. Since more-mature leaves have harder, fibrous parts, the use of such matured leaves to produce tea reduces quality and increases wastage and the use of resources during the manufacturing process. Importantly, fine harvesting produces fine and delicately flavoured tea, which is usually lighter and sweeter.



Picture 5: Tea Harvesters

Source: Photographs taken in October 2011 by the Author

Even though coarse harvesting is faster, it results in stronger flavoured, darker tea. Therefore, the farmers interviewed for this study highlighted that using fine harvesting not only helps to maintain quality and meet customer requirements, but also increases sustainability since it reduces waste and minimises the use of resources, which ultimately increases the efficiency and effectiveness of the production process.

Tea leaves can be harvested at regular intervals of five to seven days; there are around 50 to 70 plucking rounds per year from a single tea bush. A five-day interval between plucking rounds allows the correct maturity level in the green leaves. On average, a labourer harvests around 20 kilograms of green leaves per day in Sri Lanka and each hectare yields around 250 kilograms of green leaves per round per hectare. However, the farmers stressed that the number of picking rounds also depends on other factors such as weather and the age and health of the tea bush.

Both large-scale and small-scale farmers said that green leaves are harvested throughout the year. Therefore, scheduling the tea harvesting itself requires a large amount of planning, particularly on plantations. Each plantation has a manager who looks after the overall operations in the plantation. The plantation manager divides the plantation into sub-divisions, each of which is managed by a supervisor (called as a superintendent) or a junior manager. Additionally, a “Kankani” (who is considered a supervisor)

supervises the labourers in each sub-division. Generally, tea harvesting is mainly carried out by women. Supervisory roles and supporting work such as clearing, weeding and fertilising are mainly carried out by men.

The large-scale plantations have in-house labourers, who live with their families on the plantation. Large-scale plantations are obligated to provide employment to anyone over 18 years who lives within the plantation. Additionally, plantation companies have to provide other basic needs such as housing, water, electricity, health facilities and pre-school and day-care facilities to the in-house labourers and their families.

Smallholders apply the same harvesting techniques, but they do not use in-house labourers as they mainly employ the labourers who live close by. Some tea smallholders do not use external labourers at all as the family members do all work themselves, especially when they grow tea in smaller land plots. However, the small-scale farmers who have more than one hectare of tea lands generally hire labourers not only for harvesting tea leaves but also for other activities such as land rehabilitation, weeding, cleaning, pruning and applying fertiliser. However, the small-scale farmers are not responsible for providing the same social services for their labours as the large-scale farmers, which is a main reason for expanding the tea smallholder sector.

Green-Leaf Collecting Centres

Harvested green leaves are delivered to the collecting centre located within the garden, and weight is recorded against the labourer who picked them⁷ (Picture 6 and Picture 7). The leaves are inspected for debris or mature leaves that are not suitable for tea production (Picture 8). Growers consider this process to be a value-added activity. Once the quality check is completed, the green leaves are packed into small sacks (Picture 9) and stored temporarily for dispatching to the tea factories. Large-scale farmers use their own transportation to collect the green leaves from collecting centres every one to two hours and bring them directly to their own factories on the plantation; production starts within six hours of harvesting. However, this process is different for tea smallholders,

⁷ Labourers' wages are paid according to government-approved daily rates. The rates are revised every two years in negotiation with labour unions and national governments. The normal tea-leaf picking quota in Sri Lanka is around 20 kgs per day per labour. The labourers are paid incentives if they exceed the assigned daily target.

who sell their green leaves to private or estate factories or licensed dealers, as explained in the following section.



Picture 6: Weighing Tea at the Collection Node



Picture 7: Recording the Weight against Each Labourer

Source: Photographs taken in October 2011 by the Author



Picture 8: Quick Check for Debris at the Collection Node



Picture 9: Green Leaves Ready for Dispatch to Tea Processing Factories

Source: Photographs taken in October 2011 by the Author

Selling Green Leaves

Tea smallholders sell their green leaves using different channels Figure 5-7. Private tea factories are the main buyers. They generally collect the leaves at the farm gates, which ensures a steadier supply of leaves, as farmers agree to be regular supplies (some tea smallholders use their own or hired vehicles to deliver the green leaves directly to a nearby factory, particularly if they have a relatively large harvest). Factory managers

arrange transport to collect green leaves from the suppliers in their region. They use a “milk-run” logistics system, where the private factory managers negotiate with the suppliers (e.g. farmers) on green leaves purchasing process and organise transport schedules, identifying the optimum route to maximise the coverage of farmers and increase the volume of tea-leaves collected, while reducing the transport cost.

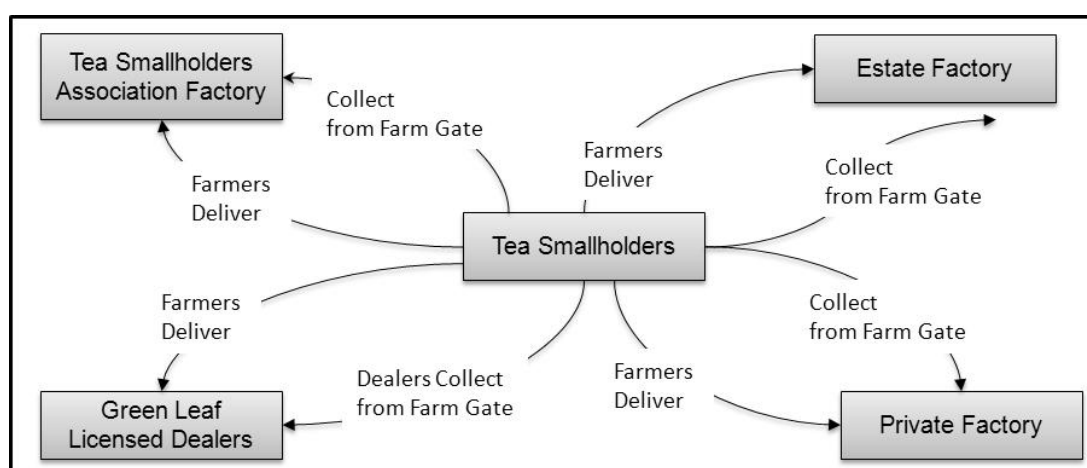


Figure 5-7: Green-Leaf Selling Channels for Small-Scale Farmers

Source: Developed by Author based on Focus-Group Discussions and Interviews

Table 5-3: Number of Licensed Green-Leaf Dealers (2010-2011)

Area	2010			2011		
	Renewals	New Licenses Issued	Total Licensed Dealers	Renewals	New Licenses Issued	Total Licensed Dealers
Bandarawela	148	0	148	132	16	148
Hatton	87	10	97	63	16	79
Gampola	168	0	168	152	22	174
Matara	358	0	358	330	23	353
Galle	347	0	347	314	36	350
Ratnapura	480	0	480	446	80	526
Matugama	268	0	268	220	64	284
Total	1856	10	1866	1657	257	1914

Source: Sri Lanka Tea Board Annual Report (2010) and (2011)

Selling green leaves to a licensed green-leaf dealer is another common channel used by tea smallholders. Licensed green-leaf dealers serve as intermediaries between tea smallholders and tea manufacturers. According to the Tea Control Act all green-leaf

dealers are required to register at the Sri Lanka Tea Board and renew their license annually. As illustrated in Table 5-3, there are 1,914 licensed green-leaf dealers registered at the Sri Lanka Tea Board. It was pointed out that some tea smallholders prefer to sell green leaves to green-leaf dealers, as they pay farmers on the spot for their tea leaves, and then sell the leaves to tea factories in the area. Green-leaf dealers also have a similar transport arrangement (milk-run logistics) as private factories, where they collect green leaves from the farm gates using their own transport and try to maximise the volume collected by covering a wider area. Tea smallholders also sell their leaves to local factories operated by the Tea Smallholders Association; these factories also buy the leaves at the farm gate. Once the green leaves arrive at the factory or to the licensed dealers, leaves are weighed against each farmer, and paid accordingly.

Payments to tea growers or farmers are managed in two ways. Most commonly the farmers are paid in full only after the produced tea is sold at auction. However, some tea factories pay an advance to smallholders as soon they receive the green leaves; the balance is paid after the produced tea is sold at the auction. In contrast, most of the licensed green-leaf dealers pay immediately (although some dealers pay only an advance, while the balance is paid after four weeks). Interviewees in this study pointed out that farmers prefer on-the-spot cash payment.

The farmers said that it is risky for them to wait for four weeks to receive payments, especially if they do not trust or have a good relationship with the buyer. They further stressed that selling green leaves to licensed dealers is preferable, as they offer a better price than the tea factories. The farmers explained that generally the green-leaf dealers pay consistent prices, whereas the prices paid by private tea factories frequently vary depending on the auction price. It was further mentioned that some private factories have now begun to offer on-the-spot cash to attract more farmers. The factories decide the final price for green leaves only after the auction, since they are compelled by the Sri Lanka Tea Board to use its reasonable-price formula, which is based on auction price as explained below, to decide what they will pay farmers.

Green-Leaf Pricing

The Sri Lanka Tea Board has introduced a “reasonable-price formula” to determine the green-leaf price. The Tea Board stresses that the use of this formula to calculate green-leaf prices guarantees a reasonable price for suppliers. The formula considers the average net sale value per month per each factory, a conversion factor and a distribution ratio. Producers mentioned that 32% of the auction price is allocated to the producer while the remaining 68% is allocated to the green-leaf supplier. This formula also considers the government-approved green-leaf-to-black-tea conversion factor, which is 4.5⁸ (or 22.22%). For example, if a processor received Rs 400.00 per kilogram of produced tea at auction, the green-leaf supplier would be paid Rs 60.44 per kilogram of green leaves.

$$\begin{aligned}\text{Green- Leaf Price(per kg)} &= \text{Net Sale Value per Kg} \times \text{Green- Leaf Suppliers Share} \times \text{Conversion Factor} \\ &= \text{Rs. } 400.00 \times 68\% \times 1/4.5 = \text{Rs } 60.44 \text{ per Kg}\end{aligned}$$

The green-leaf conversion factor is the crucial influencing factor for smallholders when selecting their buyers. The farmers pointed out that when factories and green-leaf dealers weigh the green leaves brought by the farmers, they deduct weight for water contained in the leaves and for the sack. Even though the Sri Lanka Tea Board says that the conversion factor is used for this purpose, the discussion shows that the producers reduce water weight twice: when weighing the green-leaves and when deciding the green-leaf price based on the reasonable-price formula.

The discussions with farmers and green-leaf buyers show that the buyers do not always use the formula to decide the price. The interviews and secondary data sources indicated that due to limited green leaves supply in some regions, especially the low-elevation zones, tea-processing centres and green-leaf dealers are competing with each other to get the maximum volume of green leaves by reducing the conversion factor.

The private factories also provide social services to tea smallholders to retain them as suppliers. For example, tea factories provide farmers with financial support, either as

⁸A conversion factor of 4.5 indicates that 4.5 kilograms of green leaves are required to produce one kilogram of produced teas. In other words, 100 kilograms of green leaves produce only 22.22 kilograms of produced tea.

interest-free loans or an advance, to improve their farms. The factories also offer advance payments to farmers during festival seasons and provide assistance in purchasing school accessories for their children. They also supply farmers with inputs such as fertiliser and pesticides. They negotiate with input suppliers on behalf of the farmers to get discounted prices, buy the materials on the farmers' behalf and deliver them from Colombo, and distribute them to the farmers freely. It was pointed out that the farmers are permitted to pay expenses in instalments.

Farmers appreciate these services. This has created a better relationship among the farmers and tea producers in the tea supply chain. The farmers pointed out that these additional services encourage them to continuously supply green leaves to relevant factories that provide additional services. The discussions show that the small-scale farmer's value chain ends at this point; it was observed that the farmers are not interested in either the other operations once the green leaves are delivered to the factory or receiving any information other than the auction price. This was identified as a gap in the tea supply chain, which is broken at this point.

5.3.3 Tea Factories/Manufacturers

The next node in the tea supply chain is the tea factory, where green leaves are transformed into "made tea". The factories are categorised into two segments: estate-owned and private. Tea producing factories should register at the Sri Lanka Tea Board before starting operations; this process ensures that the factories have acceptable buildings, equipment and standards to produce good-quality teas. Additionally it helps the Tea Board to monitor the operations in the factory, control the despatch of tea and monitor whether the factories implement the reasonable-price formula according to guidelines. A Tea Board representative further pointed out that the Tea Board regulates the establishment of new tea factories to maintain the quality of the produced tea, and severe restrictions are essential as the production capacities in the existing factories have increased considerably during last few decades, even though the green-leaf supply has not increased. Due to this fact some factories tend to compromise the quality of the tea by using substandard green leaves.

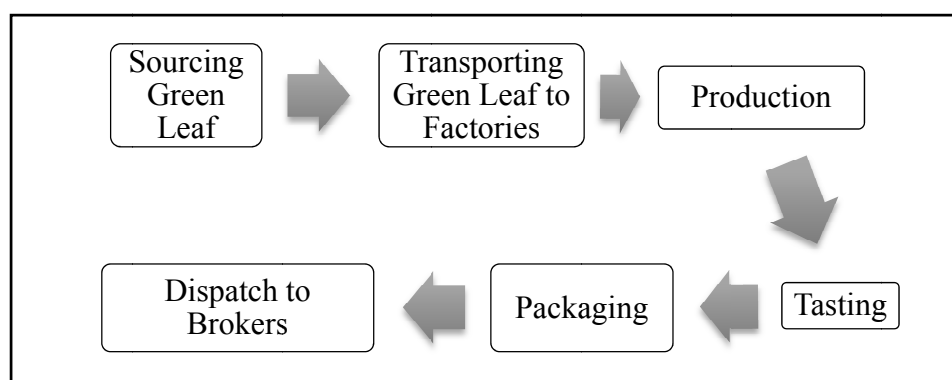


Figure 5-8: Operations Management for Tea Factories

Source: Developed by Author based on Focus-Group Discussions and Interviews

5.3.3.1 Main Logistics Operations in a Tea Factory

Sourcing green leaves and producing tea were identified as the two main logistics operations among the processes in a tea factory (Figure 5-8). Additionally, sourcing other inputs such as infrastructure, energy, machinery, packaging materials, transport equipment and printing facilities were also included.

Sourcing Green Leaves

Green leaves are the main raw material for the tea-factory operations. As explained in Section 5.3.2, large-scale growers have their own production factories, which are called estate-owned factories, located within the plantation. Estate-owned factories mainly use their own leaves and undertake all value-added tea production. Additionally, they source from tea smallholders in the surrounding areas, either directly from the farmers or through green-leaf dealers. Private tea factories mainly source green leaves from tea smallholders in the region, either directly or through green-leaf dealers. Based on their green-leaf sourcing strategy, tea factories are classified into three main categories (Figure 5-9):

- Category 1: Factories that use only their own leaves (around 18% of factories)
- Category 2: Factories that use their own leaves as well as sourcing from other tea growers (around 29% of factories)
- Category 3: Factories that use only bought leaves (around 53% of factories).

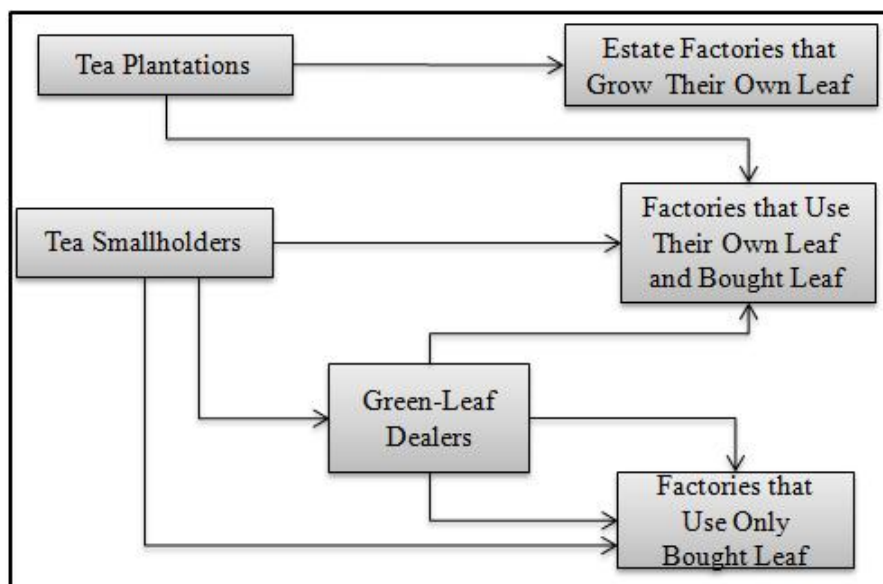


Figure 5-9: Green-Leaf Sourcing Strategies

Source: Developed by Author based on Focus-Group Discussions and Interviews

According to the Sri Lanka Tea Board there are 870 registered tea factories in Sri Lanka; however, as shown in Table 5-4 only around 80% of them are operating.

Table 5-4: Classification of Tea Factories (2010 and 2011)

	No. of Factories by Elevation						Total	
	High		Medium		Low			
	2010	2011	2010	2011	2010	2011	2010	2011
• Grow own leaves	91	69	25	15	9	6	125	90
• Grow own leaves and buy leaves								
• Less than 50% of total production from bought leaves	10	19	30	43	95	150	135	212
• More than 50% of total production from bought leaves	21	74	23	31	24	9	68	114
• Buy leaves only	25	7	48	25	301	247	374	279
• Total number of registered tea factories	179	205	192	181	499	490	870	876
• Registered factories not in use	32	33	66	71	70	77	168	181
• Registered tea factories in operation	147	169	126	114	429	412	702	695

Source: Sri Lanka Tea Board Annual Report (2010) and (2011)

Green-Leaf Transport

Green-leaf transport is another important operation in the tea supply chain. Tea-plantation companies and smallholders have different transport methods to deliver green leaves to the tea factories. Regional plantations have their own transport and collect green leaves from their tea-collection centres on the plantation.

Smallholders explained that they do not have their own transport, as they do not have either enough capital or enough tea volume; hence, they mainly depend on green-leaf buyers' transport services. As explained in the previous section, both estate factories and some private factories use their own transport to deliver green leaves from farm to the factory using a "milk-run" logistics system to increase the efficiency of the process.

It was pointed out that the transport of green leaves is the most important operation, as the quality of the produced tea depends on the quality of the green leaves used. When the green leaves arrive at the factory, they are graded into three categories: "best", "below best" and "poor". The undamaged immature bud and two leaves are considered the "best leaves". Leaves that are immature but damaged are categorised as "below best", while damaged, mature are categorised as "poor". During the discussions, the private factory owners said that almost 70% of the green leaves are categorised as either "below best" or "poor". They pointed out that the green leaves are damaged during transportation due to poor handling and storage facilities on the transport equipment. For example, it was mentioned that almost 90% of the green leaves are transported in soft sacks (Picture 10), which increases the possibility to damage the tea leaves. Even though some large-scale farmers use plastic baskets, many smallholders pointed out that it is not economical for them to use such strategies since the volume they hold is comparatively low. The double handling of green leaves is another reason for deteriorating quality after harvesting. For example, green leaves go through several weighing nodes before arriving at the production floor, which results in increasing susceptibility to damage. It also increases the lead time, which in turn affects the quality of the green leaves, as the oxidation process is started in the damaged green leaves even before they reach the production plant.



Picture 10: Transferring Green Leaf to the Factory
Source: Photographs taken in November 2011 by the Author

Tea-Production Process

Once the green leaves are brought into the tea factory, the tea-production process is started immediately. Production involves five main processes: cleaning and sorting green leaves; withering; rolling and breaking; oxidation; and firing. The production process for black tea is slightly different from that for green (Chapter 3). As soon the green leaves arrive at the factories, they are converted into processed tea within 24 hrs. The following section describes the black-tea production process, as it is the main production type in Sri Lanka.

Two manufacturing methods – crush-tear-curl (CTC) or orthodox – are used in factories in Sri Lanka. Both CTC and orthodox methods use same five steps listed above.

However, CTC production is a far quicker process than orthodox. CTC production is mainly used for mass production for one of the eight main grades of tea. Orthodox production produces 28 different tea grades which have high quality characteristics. Interviewees mentioned that CTC production is cheaper and faster than orthodox. However, the orthodox method produces leafy-type teas that preserve the natural flavours, yielding a better product than the CTC method. Teas produced through CTC methods are more suitable for tea bags, as they give a quick brew. In Sri Lanka the orthodox method is the most popular production method. As shown in Table 5-5, over 92% teas in Sri Lanka are produced using the orthodox production method.

Table 5-5: Production Volume by Processing Method ('000 Metric Tonnes)

Processing Method	2010	2011	2012
Orthodox	302.85	309.73	301.35
CTC	22.53	18.69	23.21
Green Tea	2.99	3.31	2.95
Total	328.37	331.43	327.61

Source: Tea Marketing Reports (2010b) and (2012)

Cleaning and sorting is another activity carried out at the factory to maintain the quality of the tea. Broken, damaged or matured leaves are removed before starting the withering process.

Selected green leaves are then spread out on a wire racks (called troughs or withering racks) where they are air-dried for several hours. This process, called withering (Picture 11), is an energy-intensive process, as electric fans are used during this process. Some tea factories use the heat generated from the ovens used in the drying process to minimise electricity usage and production costs. This process takes around 10-12 hours, during which the leaves are shuffled several times to expedite the drying process. The main purpose of this process is to reduce the water level in the green leaves and to make them softer, which prevents the leaves breaking into flakes during the next step, which is rolling. It was pointed out that the withered green leaves ensure a good taste profile in the produced tea.

The withered leaves are then moved to large rolling machines (Picture 12) to break the leaf cell walls, thus activating the chemical reaction of oxidation. The rolling process

helps in developing the colour, strength, aroma and taste of the tea. Once the leaves are ruptured using the roller, this is followed by a process called roller-breaking.



Picture 11: Withering Process

Source: Photographs taken in November 2011 by the Author



Picture 12: Tea-Leaf Rolling Machine (Roller)

Source: Photographs taken in November 2011 by the Author

The ruptured leaves collected from the roller are then transferred to a roller-breaker-sorter, which is a sloping table with a mesh (Picture 13). This equipment oscillates at a very high speed, and the mesh allows only the smallest particles to fall through into a container below. The remaining leaf particles go down the table and fall in to another box at the end of the table. These collected leaves are sent through the roller again to rupture and then separate them by sending them through the roller-breaker again, until

only fine particles are left. This process determines the type of tea produced. In CTC tea production this process takes a long time and the process is repeated several times until fine particles are obtained, while the process is relatively short in the orthodox process, and aim to get more leafy-type particles that preserve the chemical properties of the tea leaf.



Picture 13: Roller-Breaker-Sorter



Picture 14: Oxidation Process

Source: Photographs taken in November 2011 by the Author

The particles collected through this process are called dhool; they are spread on a table or on the floor to start the oxidation process (also called fermentation) (Picture 14). This process, in which the green-leaf particles turn black or brown as the chemicals in them oxidise, occurs in a cooler room so that oxidation happen slowly. The length of this process decides the type of tea produced. For example, when producing black tea, the dhool is allowed to ferment completely, while the oxidation of green tea is stopped quickly before the tea is fully oxidised.

Once the oxidation process is completed, the oxidised tea leaves are then sent through an oven to dry the particles (Picture 15). This process uses a very high temperature, around 180 centigrade. The drying process is a heavy consumer of electricity, fuel or bio-fuel. This process takes around 30 minutes; at its completion the tea leaves have turned black (for black-tea production). The drying process completely stops the oxidation process and also reduces the moisture level of the tea. After drying, the produced tea is tested to remove any metal particles using sifting conveyors, which are

fitted with a magnetic array (Picture 16). The tea is then sorted using a sifting machine or a sorting machine into different grades (Pictures 17, 18 and 19).



Picture 16: Sifting Conveyor Fitted with a Magnetic Array



Picture 17: Sorting Machine

Source :Photographs taken in November 2011 by the Author



Picture 18: Sifting Conveyor to Grade Teas Based on Particle Size



Picture 19: Colour Sorting (to remove red-stem particles)

Source: Photographs taken in November 2011 by the Author

The graded teas are then sent to the packaging section, where they are weighted and packed. Packaging is another important process in the tea industry, in which companies such as packaging material suppliers and printers play an important role. Using proper packaging materials is essential to maintain the quality of the produced teas. Multi-layers bags, corrugated cardboard cartons or plywood chests are used to package and store teas (Picture 20).



Picture 20: Packing Tea

Source: Photographs taken in November 2011 by the Author

Each bag, carton and chest has an inner aluminium-foil lining to prevent the tea absorbing any moisture after it is packaged. Generally, the teas are packed into packets of 20, 40, 50 or 60 kilograms. Additionally, the factory also prepares master samples of

around 4 kilograms for each tea grade to distribute separately to the brokers to prepare samples for distribution to tea buyers before an auction. The producers also evaluate the quality of the teas they produce before sending the product to the brokers. They have their own resources for this, including tasting professionals and a tasting unit at the plantation or in the factory (Pictures 21 and 22).



Picture 21: Tea-Tasting Unit



Picture 22: Preparing Tea Samples

Source: Photographs taken in November 2011 by the Author

These packages are labelled with estate name, plantation company name, factory name and the registration number, grade of tea, gross weight, net weight, manufactured date, lot number and invoice number. These tea lots are now dispatched to the relevant brokers' warehouses together with the garden or factory invoice. In the case of large-scale producers, sometimes the teas are stored in the producer's warehouse until sold at auction, after which the tea lots are dispatched to the relevant buyers.

5.3.4 Tea Brokers

The brokers who are members of the Colombo Brokers Association are the next main node in the tea supply chain. They are responsible for many activities at the broker-producer and broker-supplier interfaces. The brokers play multiple roles in the tea industry. The broker-producer interface is the key interface in the tea supply chain, as the producers are compelled to sell their tea at auction through one of the brokers registered with the Sri Lanka Tea Board. There are eight registered tea brokers operating in Sri Lanka. Almost 95% of the tea produced in Sri Lanka is sold at auction through these eight brokers. The brokers are mainly responsible for getting the best

price for the producers. As shown in Figure 5-10, brokers' main activities include receiving produced tea from the producers and storing them in their own warehouses or hired warehouses; tasting tea and evaluating the profile of the teas received; sampling and cataloguing the teas; dispatching the catalogues together with samples; conducting auctions, obtaining buyers' demand requirements and sending them to producers; sending assessment reports and feedback on the quality of tea to producers; and managing the payments between buyers and producers.

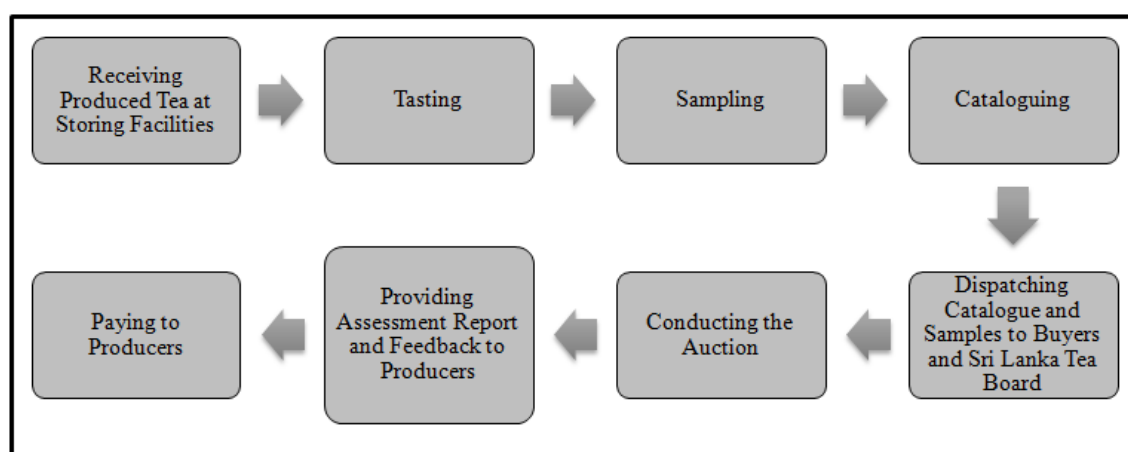


Figure 5-10: Operations at Brokers

Source: Developed by Author based on Focus-Group Discussions and Interviews

5.3.4.1 Receiving Teas at Warehouse

Each week, tea producers send their produced teas, together with the master sample for each tea grade, to the brokers, who are located in Colombo. Trucks are used as the main transport mode. Most tea factories have their own transport, while some producers use third-party logistics services. Once the brokers receive the tea lots, they verify the delivery lots with the dispatch invoice sent by the factory. The bulk tea packages are stored in warehouses in the Colombo area, and the warehouse manager issues an Arrival and Weight Report to the relevant broker or auctioneer.

Sometimes the large-scale producers, such as regional plantation companies, do not send the produced teas directly to the brokers, until they are auctioned. The brokers sometimes ask the producers to store the teas in producers sites, due to several reasons: (1) the lack of warehousing facilities in Colombo; (2) the lack of favourable

environmental conditions in the warehouses in Colombo compared to the tea producers' geographical location (for example the cool temperature in tea-producing areas helps to maintain the quality of the produced tea); or (3) a desire to minimise double-handling in Colombo (for example, producers can deliver the produced tea directly to the buyers' warehouses instead of sending it through the brokers' warehouse). In such cases, large-scale producers first dispatch only the master samples for each tea lot together with the invoice.

5.3.4.2 Tea Tasting and Supportive Services

Once the brokers receive the tea lots, they prepare samples from each tea lot and carry out a profile taste for each, valuing them accordingly; and prepare and print catalogues. Brokers also prepare a price evaluation for all the tea grades they have received. The brokers perform the profile tasting: to assess the quality of the tea and for valuation purposes; this allows them to decide the initial auction price and to provide feedback to the producers to improve their performance. Furthermore, the broker needs to know the characteristics of the estate and factory capacities to provide assistance that can help to optimise the producers' capacities. Hence, brokers or their agents regularly visit the manufacturing plant to evaluate the processes and infrastructure. Furthermore, with the increase of production volume and the contribution of smallholders, brokers have begun to expand their services beyond marketing to providing loan facilities to private tea producers and farmers to improve their capacity and infrastructure.

5.3.4.3 Sampling and Cataloguing

Interviewees mentioned that a single broker distributes over one million samples to registered tea buyers (both locally and internationally) weekly. All these samples are catalogued with estimated unit value, invoice number, estate name, company name, geographical location, tea grade, factory number, net weight, number of lots from each tea grade, date of dispatch from the garden/factory, date of arrival at the warehouse and international standards and certificates held by the producers. These samples are then distributed with the printed catalogues on a weekly basis, normally three weeks prior to a particular auction. Buyers make their sourcing decision after carefully comparing the catalogues and evaluating the samples to determine whether the teas are compatible

with the orders they have received from their customers (such as overseas importers). It should be noted that only the tea-buying companies who have registered with the Sri Lanka Tea Board are eligible to obtain tea samples and catalogues and to bid at the auctions. This policy applies to both local and international buyers. Brokers have to send samples to the Tea Tasting Unit of Sri Lanka Tea Board also to evaluate the quality. The tea board has the authority to stop the auction of any defective tea as explained in Figure 5-4 in section 5.3.1.

In addition to distributing samples and catalogues and managing and organising the auction, the brokers play an important role in providing feedback to the producers. The producers do not have any primary contact or relationship with the tea buyers, since the brokers serve as intermediaries between the producers and the buyers. The producers' and buyers' primary contact point is the brokers (which is another broken link in the tea supply chain). The buyers submit their feedback directly to the brokers, who then forward them to the producers.

Additionally, the brokers conduct research on the tea market to understand the dynamics of demand and supply. The brokers provide basic information about domestic and international tea markets to the producers, and guide the estates and manufacturers on product mix and quality deficiencies (if any). Interviewees pointed out that brokers have to provide this information to both large-scale and small-scale producers to meet the market demand. This is particularly important for smallholders because, unlike large-scale producers such as regional plantation companies, they do not have the facilities to obtain such details due to the nature of their structure. For example, they do not have an organised structure, nor do they have the capability and capacity to obtain such information. Furthermore, brokers also serve as experts in manufacturing, providing advice to the plantations and tea manufacturers to improve the quality of tea. Brokers also operate directly with the tea buyers. They are responsible for conducting the auction, collecting payments for the tea sold at auction and transferring the payments to the producers.

5.3.5 Tea Sale

As illustrated in Table 5-6 there are four official channels to sell tea in Sri Lanka: the public tea-auction centre in Colombo, private sales, direct sales and forward contracts. The public auction system is the main channel, where almost 99% of the produced teas are sold.

Table 5-6: Annual Tea-Sale Volume in Sri Lanka (2010-2012)

Tea-Selling Channel	2010		2011		2012	
	Quantity (Kg)	%	Quantity (Kg)	%	Quantity (Kg)	%
Public Auction	311,285,014	98.72	302,406,833	98.72	305,053,089	98.31
Private Sales (Through Brokers)	2,631,305	0.83	2,434,159	0.79	3,637,423	1.17
Direct Sales	1,398,479	0.44	1,497,633	0.49	1,610,088	0.52
Forward Contracts		0.00		0.00		0.00
Total	315,314,797		306,338,624		310,300,601	

Source: Ceylon Tea Brokers PLC, Tea Market Reports (www.ceylonteabrokers.com)

5.3.5.1 Colombo Tea Auction

The public auction is operated by the Colombo Tea Traders Association (CTTA) under the supervision of the Sri Lanka Tea Board. CTTA is an umbrella body composed of representatives from each segment in the private sector of the industry. This includes the Association for Tea Smallholders, Private Tea Factory Owners Association, Sri Lanka Tea Planters Association, Tea Brokers Association and Tea Exporters Association. Auctions are held twice a week at the Chamber of Commerce in Colombo. It was pointed out that the Colombo Tea Auction is the largest tea-auction centre in the world, with over six million kilograms of tea auctioned weekly (Table 5-7).

Industry participants pointed out that the basic design of the tea-auction system is an ascending auction where large number of buyers bid for a certain tea lot. This is also called an open auction, oral auction or English auction system. As the author observed during a visit to the Colombo tea auction house, the auction starts with the auctioneer announcing a price based on the previous selling prices for the particular tea grade. The price is raised continuously until a single bidder who offers the highest price is left.

Table 5-7: Auction Volume (Million Kilograms) in Major Tea Auctions in the World (2008-2012)

Country	Auction Centre	2008	2009	2010	2011	2012
Bangladesh	Chittagong	55.0	54.2	56.8	57.9	58.1
India	Cochin	58.3	52.5	61.0	58.8	57.4
	Guwahati	143.7	128.9	121.5	122.1	119.3
	Kolkata	139.4	147.2	154.5	166.9	151.0
Indonesia	Jakarta	40.5	39.4	37.9	32.8	31.9
Sri Lanka	Colombo	313.5	284.0	322.4	323.3	325.4
Malawai	Limbe	15.0	17.3	15.8	13.3	124.7
Kenya	Mombassa	302.9	279.3	348.1	333.9	321.5

Source: Sri Lanka Tea Board Annual Report (2010), Indian Tea Board (2013)

The buyers pointed out that when they receive the catalogues and samples from brokers, they evaluate the samples before coming to the auction. They also evaluate the price, comparing it to previous auction prices to have a better understanding of the likely price for the selected tea type or grade. Based on this information they start bidding. The buyers pointed out that generally they decide a price for the teas that they want to buy and the maximum price they are willing to offer.

The auctioneer is normally a trained broker or an experienced tea trader who has a good knowledge of the tea industry. A good auctioneer should be able to sell all teas in the catalogue within the allowed time frame. Speed is extremely important in the auction as thousands of tea lots representing over four million kilograms are sold at the auction per day. The Colombo auction operates from 8.30 am to 4.30 pm two days a week. The researcher observed that the selling of each lot was an extremely fast activity, and bidders offered their prices using various gestures or signals rather than shouting. One tea lot is auctioned within 20 to 30 seconds. Once a bidder wins a bid, it is recorded by the auctioneer and cannot be changed later. The buyer is bound to accept the tea lot that he has bid for.

Once the auction is finished for the day, the broker issues the delivery order to the producer or the broker's warehouse to dispatch the tea lot to the relevant buyer, and sends a tax invoice and a copy of the delivery order to the buyer. The tea is delivered to the buyer's processing plant within seven days. In some cases the buyer will directly collect it from the broker's warehouse. As explained earlier, if the tea is stored in the

large-scale producer's warehouse, they dispatch the tea lot to the buyer's processing plant directly from the plantation as soon they receive the dispatch notice from the broker.

The buyer must transfer the full payment to the relevant broker within seven days, which is called the prompt date. In some cases the buyer pays an advance as soon the tea lot is received and pay the balance to the broker by the prompt date. The broker is responsible for transferring the funds to the relevant producer after deducting any taxes and charges for warehousing, transportation and other services provided by the brokers. The producers receive their payment within four weeks of the auction or on a date agreed to beforehand with the broker.

Importantly, private manufacturers consider the auction as the end point of their supply chain, since they are not involved in any value-added tea production or tea exporting. This is another broken link in the tea supply chain. In contrast, most of the large-scale producers move forward in the supply chain, as they are involved in value-added tea processing and tea exporting. Most of the large-scale plantation companies have their own export companies involved in value-added-tea production and export. However, they still must submit their teas to the auction and bid like other buyers.

There are nine tea-auction centres worldwide, and the prices vary from country to country (Table 5-8). As shown in Table 5-8, Sri Lanka obtains the highest auction price among the main tea-auction centres in the world. In addition to demand and supply of the product, in Sri Lanka auction prices depend on the geographical location, altitude, estate, factory and tea grade. The prices are volatile from week to week. Figure 5-11 shows the auction prices by elevation zone in Sri Lanka. This graph shows that the low-grown teas are sold for better than the national average price. As discussed above, low-elevation regions mainly produce orthodox teas while the high- and middle-elevation producers mainly use the CTC method, which indicates that there is high demand for orthodox teas. For example, the tea board stressed that producing orthodox teas is the strength of the Sri Lankan tea industry.

Table 5-8: Auction Prices (US\$/Kg) in Major Tea-Auction Centres (2008-2012)

Country	Auction Centre	2008	2009	2010	2011	2012
Bangladesh	Chittagong	1.62	1.98	2.63	2.14	2.40
India	Cochin	1.65	1.83	1.71	1.73	1.80
	Guwahati	2.10	2.23	2.43	2.33	2.47
	Kolkata	2.37	2.54	2.85	2.77	2.81
Indonesia	Jakarta	1.51	1.82	1.81	1.97	1.97
Sri Lanka	Colombo	2.87	3.14	3.28	3.26	3.07
Malawi	Limbe	1.37	1.58	1.58	1.61	1.70
Kenya	Mombasa	2.18	2.29	2.54	2.72	2.88

*Source: Sri Lanka Tea Small Holdings Development Authority Annual Report (2010),
Indian Tea Board (2013)*

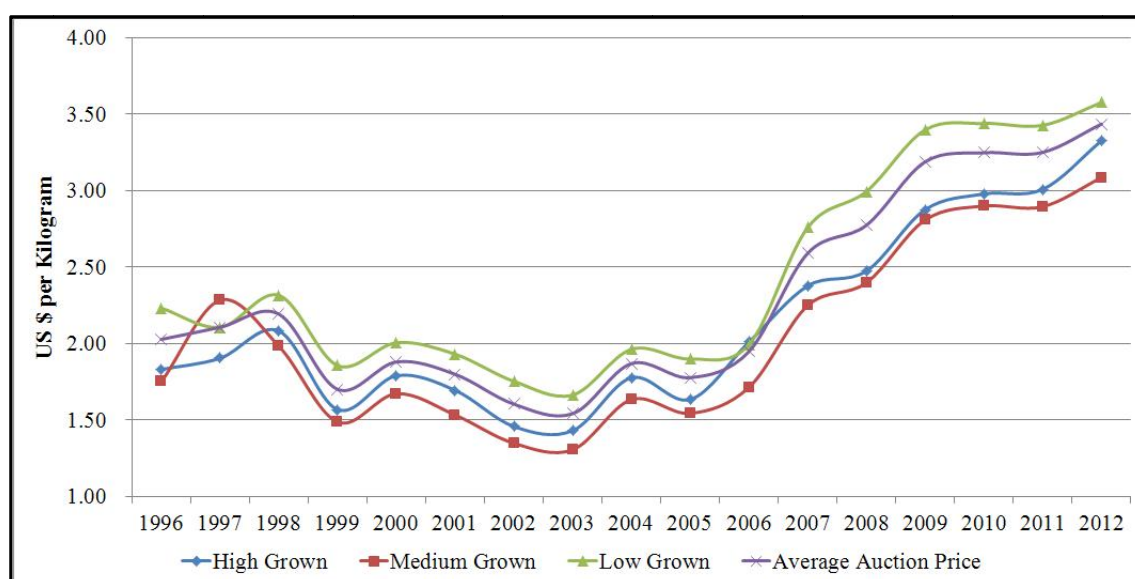


Figure 5-11: Tea Auction Prices by Elevation Zones

Source: Central Bank Sri Lanka, Economic and Social Statistics in Sri Lanka and Central Bank Annual Reports

5.3.5.2 Private Sale

Private sale is another channel used to sell teas, such as green, speciality and organic teas that do not sell through the auction system. However, these teas are still sold through a broker. Producers and brokers are required to obtain prior approval from the Sri Lanka Tea Board to sell through this channel. The brokers need to send tea samples to the Tea-Tasting Unit of the Sri Lanka Tea Board for quality testing.

A Private Sale Panel at the Sri Lanka Tea Board evaluates the teas and issues Private Sale Panel Valuation Certificates approving export after evaluating the teas' samples and tasting reports. Thereafter, the brokers are allowed to export teas through this channel. According to the Sri Lanka Tea Board Annual Report (2010), brokers should obtain ratification for each lot; the Tea Board charges Rs 500/= (approximately US\$ 4.50) per sample. As shown in Table 5-6 private-sale volumes are still very low, less than 2% of total exports. The next chapter will explore this issue further.

5.3.5.3 Direct Sale

The direct-sale channel allows producers and exporters to sell their black teas directly to overseas buyers, still with prior approval from the Sri Lanka Tea Board. Producers are also allowed to sell their green, organic and speciality teas directly to buyers using this channel. Similar to private-sales, direct-sale volumes are also comparatively low, less than 1% of total exports.

5.3.5.4 Forward Contract

Interviewees from the Sri Lanka Tea Board pointed out that a forward contract is another channel for selling tea. This is a contract between a tea buyer and a tea producer to meet the specific terms and conditions as a contract. It was mentioned that Sri Lanka used to have forward contracts especially with countries such as the United States. However, the producers said that these arrangements sold a negligible amount of tea, and currently, as shown in Table 5-6, Sri Lanka does not use this channel at all. Government officials in the tea sector, as well as producers, pointed out that forward contracts are not attractive to producers due to several reasons:

- It is difficult to have a fixed price for the teas, as the quality depends on external factors such as weather conditions, soil profile and wind. Therefore, forward contracts are difficult to establish, and become obstacles to an effective common market.
- Producers also pointed out that direct forward contracts reduce the transparency in the market, which has negative effects on the tea industry.

- The price volatility would be further increased if there were excessive speculation in the market.
- Forward contracts are particularly unattractive to smallholders and private tea factories, as it is difficult for them to find buyers to negotiate on prices. Furthermore, the smallholding sector does not have access to infrastructure and information to reach the international market directly.

5.3.6 Buyers, Value-Added Tea Processors and Exporters

Tea buyers who purchase tea at auction are the next main node in the tea supply chain. Most tea buyers are involved in tea exporting, and so thus are also called tea exporters. They buy teas in bulk. According to the Tea Act No. 16 of 1959, it is essential for companies to register as a tea buyer/exporter, and they must renew their registration annually at the Sri Lanka Tea Board. Furthermore, they must have over Rs 1,000,000 as capital resources and adequate warehousing facilities (SLTB 2011). The number of registered tea exporters in Sri Lanka fell from 347 in 2010 to 217 in 2011 (Table 5-9).

Table 5-9: Number of Registered Tea Exporters in Sri Lanka (2010 - 2011)

Exporter Scale	2010	2011
Large Scale	53	55
Medium Scale	17	14
Small Scale	24	26
Extra-Small Scale	253	122
Total	347	217

Source: Sri Lanka Tea Board Annual Report (2010)

Table 5-9 shows a significant reduction – almost 50% – in extra-small-scale exporting firms. Interviewees mentioned that since the industry is very competitive, with low profit margins, many small-scale exporters haven't managed to achieve a stable market, and they are under constant threat of being driven out of the industry.

Figure 5-12 shows the main operations undertaken by tea exporters; this includes purchasing raw materials (produced teas), tasting, flavouring, blending, packaging and exporting. Most tea exporters also act as tea importers; according to the Sri Lanka Tea Board only registered tea-exporters are eligible to register as tea-importers, and must renew their registration annually. The Sri Lanka Tea Board strictly controls and

monitors tea importation; tea grades that are not produced in Sri Lanka can only be imported with prior approval from the Sri Lanka Tea Board. According to Sri Lanka Tea Board statistics, there were around 57 registered tea importers in Sri Lanka in 2010.

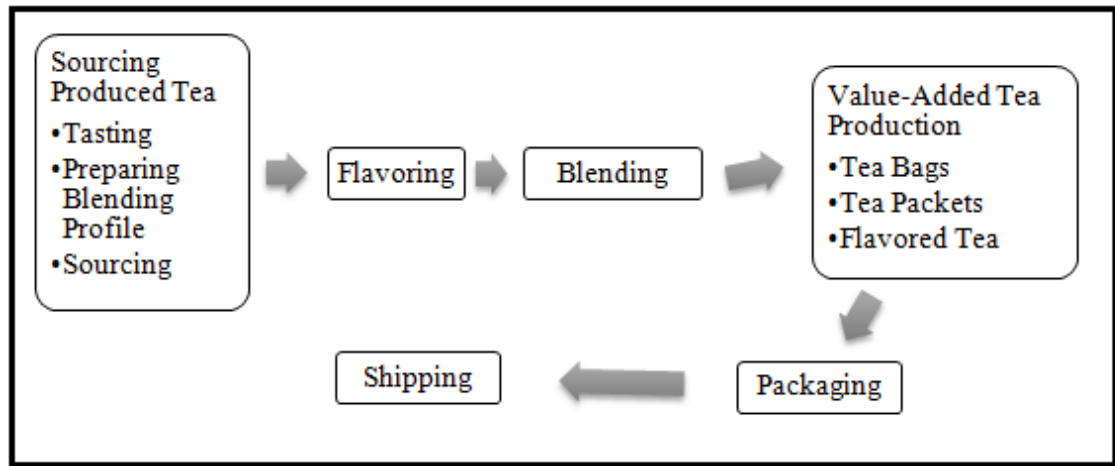


Figure 5-12: Main Operations for Buyers/Exporters

Source: Based on Interviews and Focus-Group Discussions

As explained in Section 5.3.4, all registered tea buyers/exporters receive tea samples together with catalogues from the brokers. As soon as tea samples arrive they are evaluated for quality buyers make any purchasing decisions. The buyers also analyse the price variance for different types of teas using historical auction prices. Based on these evaluations, the buyer determines the price range that they are willing to offer at the auction for each type of teas they have decided to purchase. A tea consultant or an agent from each exporter attends the auction and bids for the tea that they have decided to purchase. Once the tea is bought, the relevant broker issues a dispatch invoice to the producer or to the brokers to deliver the teas to the relevant buyer.

Once the teas are received, there are a series of production processes before they are exported as bulk teas or as value-added teas such as tea bags, tea packets and flavoured tea. As shown in Figure 5-13, tea exported in bulk can include single-origin teas, bulk-mix teas and value-added teas. A single pack of bulk tea contains more than 10 kilograms. Bulk exporting can involve exporting unblended teas received from a single plantation, or blends from different plantations to get different flavours. Both are considered bulk exports, since they involve exporting tea as a raw material for overseas

value-added tea processors. Such teas are packed in sacks of 20 or 40 kilograms and exported directly to overseas buyers.

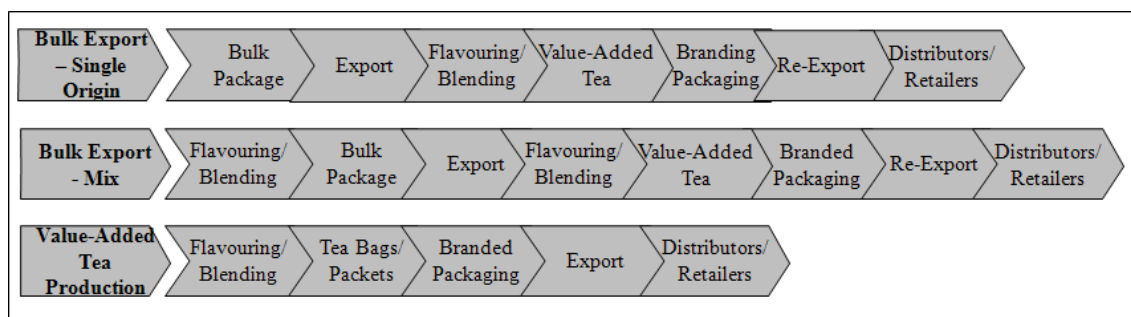


Figure 5-13: Bulk and Value-Added Tea Processing

Source: Based on Interviews and Focus-Group Discussions

When tea is exported as bulk tea, all value-added activities are undertaken by overseas importers. Once these importers receive the Ceylon teas, they are blended with teas of other origins. Some Sri Lankan tea producers pointed out that bulk-tea exports devalue the quality of Ceylon tea because Sri Lankan teas are generally mixed with cheap, low-quality teas imported from other countries.

Tea is also exported as value-added teas, where the local exporters carry out a series of value-adding activities such as flavouring and blending of teas to obtain a better taste profile. However, this is different to the overseas blending process, as local blending is undertaken to obtain a better taste or a flavour rather than an increase in volume. Local blending uses only teas with the same quality standards or higher quality compared to the primary tea. This process genuinely adds value because it upgrades the taste profile. Additionally, local processors are allowed to import a limited amount of premium tea for blending purposes. Therefore, to minimise the devaluing of Sri Lankan teas, the Sri Lanka Tea Board encourages exporters to export tea as value-added teas. As shown in Table 5-10, bulk-tea exports have fallen over the last few years. In recent times, the introduction of geographical trademarks such as garden marks has encouraged producers and exporters to export single-origin teas.

Table 5-10: Tea Export Volume ('000 Tonnes)⁹

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Bulk Tea	176.3	186.6	177.8	200.7	211.4	209.6	186.9	144.0	134.1	132.7
Packeted Tea	98.4	84.1	89.1	79.4	76.0	86.6	80.4	150.5	157.4	160.0
Tea Bags	15.5	17.8	18.0	19.1	22.9	22.1	21.0	31.8	29.6	25.8
Other	8.1	11.8	24.0	28.2	1.5	1.3	1.4	1.8	1.9	1.6
Total	298.3	300.3	308.9	327.4	311.8	319.6	289.7	328.1	323.0	320.1

Source: Central Bank Annual Report (2004, 2008 and 2012)

5.4 SUSTAINABLE INITIATIVES AND QUALITY MANAGEMENT ALONG THE TEA SUPPLY CHAIN

The research participants pointed out that the Sri Lankan tea industry has implemented various quality-management and sustainability initiatives along the tea supply chain. The Sri Lanka Tea Board has specified that the teas produced in Sri Lanka should meet the minimum quality requirements specified in the ISO 3720 standard for black-tea and green-tea production. According to De Alwis (2010), ISO 3720 standards analyse whether the chemical component level of produced tea is suitable for human consumption. Seven parameters such as total ash, water soluble ash, alkalinity of water soluble ash, acid insoluble ash, water extract, crude fibre content and total polyphenols in the produced teas are analysed using eight ISO testing methods. Table 5-11 shows these parameters and their basic requirements according to the ISO 3720 standard.

It was pointed out that the Tea Board checks the quality of the teas at various points – farm gate, factory level, pre-auction, post-auction and pre-shipping – to determine compliance with ISO 3720. The farmers highlight that the compliance to ISO 3720 starts from the farm, during harvesting.

⁹The value-added tea classification has been changed since 2011. The volumes from 2008 are adjusted according to the new classification, which is as follows: bags: less than 4 grams; packets: 4 grams to 10 kilograms; bulk: more than 10 kilograms.

Table 5-11: ISO 3720 Requirements for Black Tea and Green Tea

Parameter	Test Method	Requirement – Black Tea	Requirement – Green Tea
Water Extract %	ISO 9768	32 min.	32 min.
Total Ash %	ISO 1575	4 – 8	4 – 8
Water-Soluble Ash %	ISO 1576	45	45
Alkalinity of Total Ash %	ISO 1578	1 – 3	1 – 3
Acid Soluble Ash	ISO 1577	1.0 max.	1.0 max.
Crude Fibre %	ISO 5498	16.5 max.	16.5 max.
Total Polyphenol % (TP)	ISO 14502-1	-	7 min.
Total Catechins % (TC)	ISO 14502-2		7 min.
Ratio of TC/TP			0.5 min.

Source: Punyasiri (2011)

As explained in Section 5.3.2, Sri Lankan tea farmers use the fine-harvesting method where two leaves and a bud are picked during the harvesting process. This approach helps to minimise the crude-fibre level in the produced tea. At the factory level, various sorting strategies are used to minimise the crude-fibre content in the tea.

As explained in Section 5.3.3, checking tea-leaf quality before starting the withering process helps to remove matured tea-leaves. This selective process prevents matured tea-leaves from entering into the production process, which in turn minimises the crude fibre in the final product. Once the teas are produced, teas are sorted using sifting machines (Pictures 17 and 18), which further remove crude fibre. Some producers use colour sorting machines (Picture 19), which further enhance the quality by removing crude fibre in the final product. The Sri Lanka Tea Board checks whether the teas comply with the ISO 3720 requirements, analysing the tea profile using the methods recommended by the ISO (Table 5-11) at various stages from pre-auction to post-export. The Tea Board stresses that it is compulsory that all produced teas comply with ISO 3720; otherwise the Tea Board has the authority to withhold the auction of such teas and prevent their export. If the teas can be re-processed and improved to an acceptable quality, those lots are sent back to the relevant producer to improve the quality. Furthermore, if the teas have any fungal or poisonous contamination, those teas are completely destroyed. Furthermore, the Tea Board checks the quality of the tea imported for blending purposes. If the teas do not comply with ISO 3720 minimum

requirements, the Tea Board does not allow customs to release those teas to the local market. They are either sent back to the sender or destroyed at the port.

In addition to quality standards such as ISO 3720, other quality standards such as HACCP (Hazard Analysis and Critical Control Point) ISO 9000 and ISO 14000 are also used by tea producers in Sri Lanka. HACCP aims to increase food safety by controlling chemical and physical hazards from production to consumption (2013b). Sri Lankan tea producers apply the HACCP management system to increase food safety and to ensure that tea is suitable for human consumption. For example, as explained in Section 5.3.3, the tea producers in Sri Lanka now use sifting conveyors fitted with a magnetic array to remove metals that may have contaminated the tea during the production process. Some producers pointed out that buyers from Japan and countries in EU are more concerned about the HACCP certifications than the buyers from other countries, and the producers expect that they can increase their market share in these countries using such standards.

Research participants pointed out that some producing companies use ISO 9000: Quality Management System to maintain the quality of Sri Lankan teas and to improve performance. According to ISO 9000 standards, there are eight principles to focus on to deliver consistent good quality products and services. Implementation of ISO 9000 has several key benefits, as shown in Table 5-12 (ISO 2013b).

The producers further highlighted that to minimise environmental damage, most tea producers and large-scale plantations have initiated many sustainability practices for tea growing and production. Especially due to pressure from western countries, many plantations and producers now attain certification under ISO14001: Environmental Management System to minimise the negative impacts of their operations on the environment. For example, energy consumption can be minimised by implementing various strategies such as using recyclable natural resources as energy sources. It was mentioned that some large-scale plantations in the hill country use their own mini hydro power stations to generate electricity not only for tea production but also for domestic use within the plantation.

Table 5-12: ISO 9000 Principles and their Benefits

Principle	Key Benefits
<ul style="list-style-type: none"> • Principle 1 – Customer focus: understand current and future needs of the customers and exceed customer expectations 	Increase revenue and market share, enhance customer satisfaction and improved customer loyalty
<ul style="list-style-type: none"> • Principle 2 – Leadership: Provide direction and create an internal environment that increases the involvement of people to achieve the objects 	People motivated towards firms' goals and objectives; miscommunication avoided; activities evaluated, aligned and implemented; trust established; required resources provided to people
<ul style="list-style-type: none"> • Principle 3 – Involvement of people: People at all levels are important 	People motivated, committed and involved actively, accountable for their performance, eager to contribute to continuous improvement
<ul style="list-style-type: none"> • Principle 4 – Process approach: Manage activities and relevant resources as a single process 	Lower cost and time with effective use of resources, more opportunities for improvements
<ul style="list-style-type: none"> • Principle 5 – System approach to management: Manage interrelated processes as a system 	Integrate and align processes, focus on key processes
<ul style="list-style-type: none"> • Principle 6 – Continual improvement 	Increased performance advantage, alignment of activities and strategic objectives, greater flexibility to react to changes
<ul style="list-style-type: none"> • Principle 7 – Factual approach to decision-making 	Improved decision-making process
<ul style="list-style-type: none"> • Principle 8 – Mutually beneficial supplier relationship 	Increased ability to create value, flexibility to respond to changes, optimisation of cost and resources

Source: (ISO 2013b)

Importantly, some producers highlighted that even though they cannot attain standards such as those set by ISO 14001, since it is costly they implement various other sustainability and environmental-protection initiatives in their production processes. For example, they said that they have reduced the use of fuels such as diesel in their factories, instead using wood fires to generate the required thermal energy. Many plantations and tea producers grow trees such as rubber and albizzia on their tea lands to meet the demand for wood. They pointed out that growing rubber trees has become very attractive, since it provides additional income through selling the rubber milk. Furthermore, the producers highlighted that they use wastes collected from tea production (such as refused teas that are not suitable for reprocessing) as a source of energy. They stressed that using waste as a source of energy reduces not only their energy bills but also waste-disposal issues.

Other sustainability certifications such as organic tea, fair trade (or guaranteed equitable prices for primary producers and farmers) and rainforest alliances are implemented in the tea industry in Sri Lanka. Organic certifications are based on four principles: health, ecology, fairness and care. Overseas tea importers pointed out that to achieve maximum benefits, it is essential to implement these principles along the supply chain from input suppliers (such as fertiliser, seeds and plants) to the consumer.

The industry has also implemented several other sustainability initiatives. For example, tea growers and producers have made attempts to reduce the use of pesticides and chemical fertilisers, using organic fertilisers because they are not only sustainable but also cheaper and easier to obtain. The Sri Lanka Tea Board representatives interviewed for this study pointed out that the Sri Lankan tea industry has completely stopped the use of pesticides that contain methyl bromide in soil conservation, warehousing, quarantine and pre-shipping packaging, since it affects the ozone layer. It was mentioned that Sri Lanka was the first tea-producing country to join the Montreal protocol in 1987. In recognition for its efforts, Sri Lanka was awarded the Montreal Protocol certification in 2007. The Sri Lanka Tea Board has also recently introduced an “Ozone-Friendly Pure Ceylon Tea” logo, which certifies that the tea that bears it is both genuine Sri Lankan tea and 100% ozone-friendly.

Even though many sustainable initiatives are implemented along the tea supply chain, the industry operators pointed out that they do not get the maximum benefits for obtaining such certificates. They said obtaining these standards is expensive, and implementing and maintaining the standards also add cost to their operations. They stressed that despite spending time and resources to maintain the standards, they do not get a premium price for their teas at the point of sale; they considered that this is mainly due to a lack of coordination in the tea supply chain.

5.5 MAPPING THE TEA SUPPLY CHAIN

An exploration of the main stakeholders in the tea industry identified that the tea supply chain varies depending on the type of the tea grower and tea category. For example supply chains for tea smallholders and large-scale producers differ, as they have

different perspectives on their supply chains. Tea smallholders mainly serve as raw-material suppliers to private tea factories and estate factories. Their supply chain ends as soon they sell their green leaves, since they are not involved in the manufacturing process. In contrast, the large-scale producers are vertically integrated, as they are involved not only in growing tea but also in manufacturing and exporting processes.

The supply chain also varies depending on the type of tea produced in the sector. For example, black teas are mainly sold through auction, whereas green tea and other specialised teas are sold through private channels. This complex supply chain structure blocks the implementation of sustainable strategies along the supply chain. For example, even though many sustainable initiatives have been implemented by the farmers and primary producers, mapping the tea supply chain revealed that these benefits are not transferred to the primary supplies (farmers and producers) due to the fragmented supply chain structure. The following section explains the supply chain maps for each category.

5.5.1 Supply Chain by Producer Type

5.5.1.1 Supply Chain for Tea Smallholders

Figure 5-14 illustrates the tea supply chain for tea smallholders. Tea smallholders grow teas and sell the harvested green leaves to private tea factories, green-leaf dealers or large-scale producers. Green-leaf dealers play an intermediate role, purchasing green leaves from tea smallholders and selling them to either private tea factories or estate factories in the area. The tea manufacturers produce teas, all of which are sold at the Colombo Tea Auction through a broker. Once the brokers receive the teas they distribute the tea samples to the registered tea buyers together with a catalogue. The teas are sold at the auction four weeks after the brokers receive the teas. The producers are paid for their teas within seven days of the auction. The factories make payments to green-leaf suppliers within a week, as that is the timeframe within which they receive their payments from relevant buyers. Neither tea smallholders nor private tea factories are involved in value-added tea processing or tea export, since their supply chain ends with selling teas at auction.

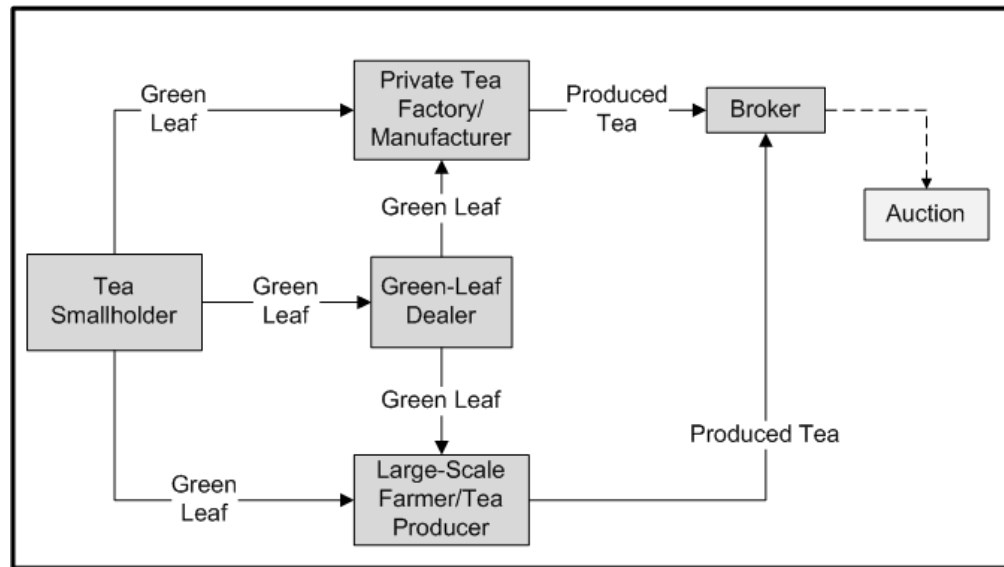


Figure 5-14: Product Flow for Tea Smallholders

Source: Developed by Author Based on Interviews and Focus-Group Discussions

5.5.1.2 Supply Chain for Large-Scale Farmers

As shown in Figure 5-15, large-scale farmers, most of which are regional plantation companies, are involved in tea growing, production, value-added tea production, imports and exports. They use their own green leaves as well as sourced green leaves for tea production. Even though the large-scale farmers are involved in value-added tea production and export, they must still sell their teas at the auction through a broker and bid for their own teas (or others teas from other producers) to continue with value-added tea production and export. The large-scale producers also have the flexibility to sell their black teas to overseas buyers directly. However, this is strictly regulated, and the Sri Lanka Tea Board does not allow producers to sell more than 5% of their production using this channel. As explained in Section 5.3.5, selling through auction is the dominant channel for large-scale producers.

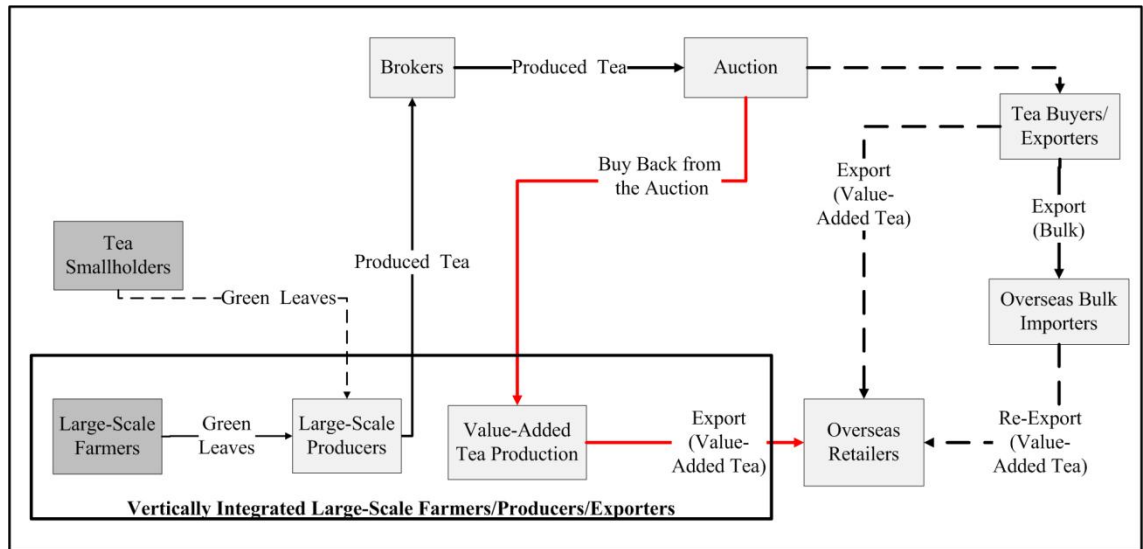


Figure 5-15: Product Flow for Large-Scale Farmers/Producers

Source: Developed by Author Based on Interviews and Focus-Group Discussions

5.5.2 Supply Chain by Type of Tea

5.5.2.1 Supply Chain for Black Tea

As shown in Figure 5-16, black tea is sold using two channels: public auction and direct sales via brokers (Section 5.3.4). As explained earlier, the producers require prior approval from the Sri Lanka Tea Board to sell teas directly. According to the statistics, around 5% of black tea is sold through the direct sales channel; the balance is sold through auction (Table 5-6).

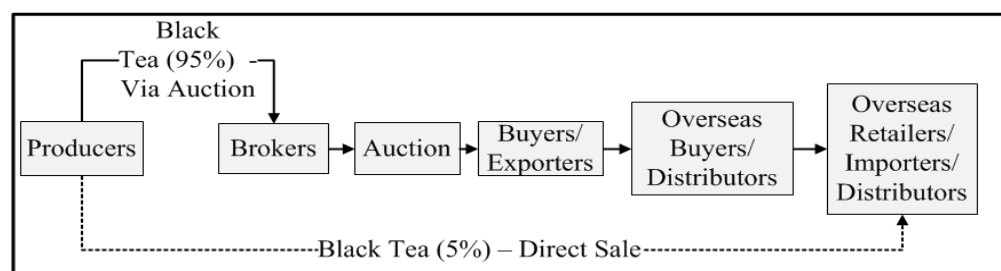


Figure 5-16: Black-Tea Selling Channel in the Tea Supply Chain

Source: Developed by the Author Based on Interviews

5.5.2.2 Supply Chain for Green Tea, Speciality Tea and Organic Teas

All other tea types, such as green, organic and speciality teas, are sold through private sales. As shown in Figure 5-17, the producers must sell all these teas through brokers. However, they do not go through public auction. As explained in Section 5.3.5, producers must obtain prior approval from the Sri Lanka Tea Board to sell teas through private channels. The Tea Board strictly monitors the quality and quantity exported via this channel, similar to other channels.

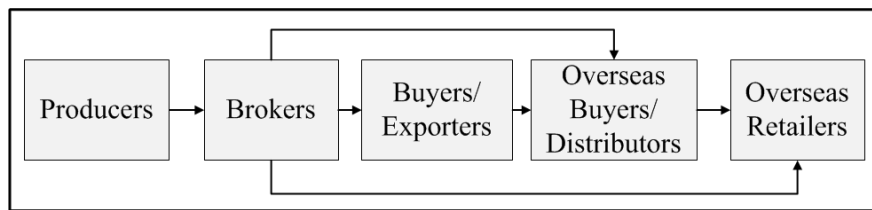


Figure 5-17: Supply Chain for Private Sale for Green/Speciality and Organic Teas

Source: Developed by Author Based on Interviews and Focus-Group Discussions

5.5.3 Aggregated Tea Supply Chains

As explained above the tea supply chain varies depending on the type of producer and type of tea produced. Figure 5-18 and Figure 5-19 shows the aggregated tea supply chain for the Sri Lankan tea industry. Tea smallholders' supply chain ends abruptly after supplying green leaves to green-leaf dealers or tea manufacturers such as private factories or estate factories. They do not have any link with the rest of the supply chain, which can be identified as a missing-link of the Sri Lankan tea supply chain. It also can be described as a broken supply chain where there is no formal connection with rest of the supply chain. As explained earlier in the chapter, the tea smallholders contribute to the tea supply chain by supplying raw materials (which is tea-leaves) to produce over 50% of the national tea production. They play an important role – socially, environmentally and economically – along the tea supply chain. Due to the fragmented nature of the supply chain future benefits are not transferred to these raw-material suppliers which will impact on the long-term sustainability of this important supply chain partner.

As illustrated in Figures 5-18 and 5-19, the large-scale producers also face a similar issue along the tea supply chain. As explained in Section 5.3, large-scale producers are vertically integrated, as they are involved in all main operations along the tea supply chain: tea growing, production, value-added tea production and export. Although these regional plantation companies have the capability and capacity to operate as a customer-oriented supply chain, due to adverse policy restrictions (as will be discussed in the following chapter), their supply chain also has a missing link between producers and local and with overseas buyers and final customers. For example, even though they are involved in all activities from growing to export, they do not have enough opportunities to collaboratively develop any supply chain relationships with the end customers, as they are compelled to operate through a broker. As shown in Figure 5-18, must send their products to auction and bid for their own teas if they want to be involved in other operations such as value-added activities and export.

Due to the fragmented nature of the Sri Lanka tea supply chain, lack of customer focus is a main challenge faced by the producers. As highlighted in Section 2.6.2, the “one-size-fits-all” concept does not improve the efficiency and effectiveness of the supply chain, but having end-to-end visibility along the supply chain is crucial to achieving a long-term competitive advantage (Torres & Miller 1998). The literature in Section 2.6.2 further highlighted that having a consumer-driven supply chain helps to identify consumer needs, and that adding value according to these needs is the best way to improve performance along the supply chain (Rudberg, Klingenberg & Kronhamn 2002).

These supply chain maps illustrate that the Sri Lankan tea supply chain is fragmented and dysfunctional due to the lack of integration with their customers. As illustrated in Figure 5-18 (and previous sections), the fragmented tea supply chain has prevented a customer-focused supply chain and the implementation of any collaborative strategies along the supply chain to improve the performance which would in turn enhance the tea industry’s long-term sustainability.

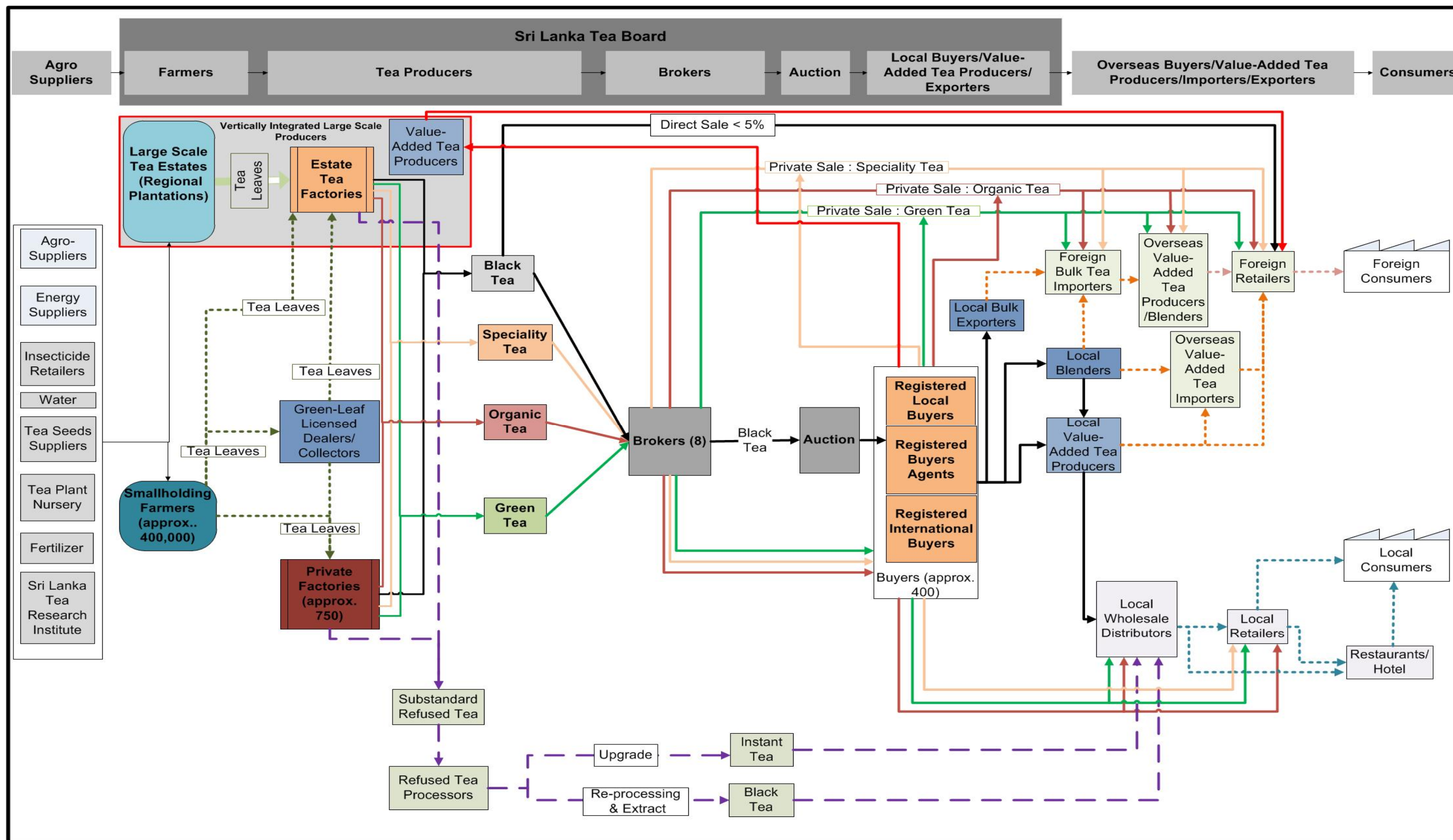


Figure 5-18: Aggregated Supply Chain for the Sri Lankan Tea Industry
Source: Developed by Author Based on Interviews and Focus-Group Discussions

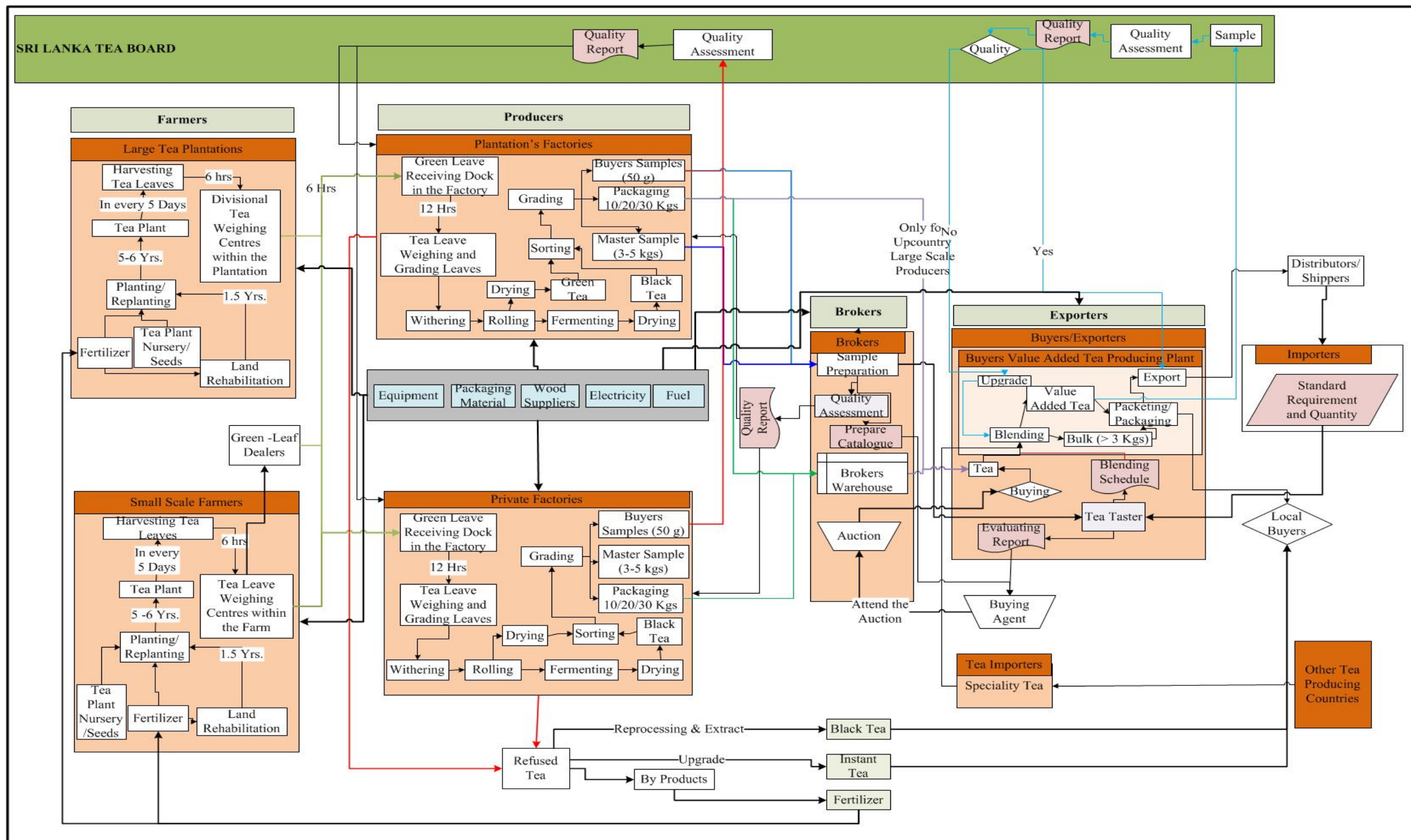


Figure 5-19: Detailed Main Processes in Tea Supply Chain for the Sri Lankan Tea Industry

Source: Developed by Author Based on Interviews and Focus-Group Discussions

Furthermore, the supply chain mapping process revealed that the tea supply chain does apply even basic concepts from supply chain theories such as transaction-cost-theory, system theory or agency theory. For example, tea being a commodity product, implementing better supplier-buyer relationships or partnerships helps to enhance the performance because collaborative strategies optimise the supply chain cost (this is one of the major influencing factors in tea supply, which will be discussed in the next chapter).

Furthermore, better supply chain partnerships also increase system thinking, as all stakeholders can work together to achieve one common objective, which is meeting the final customers' requirements (for example, delivering a better-quality product for a reasonable price) while implementing win-win strategies along the supply chain. However, the current tea supply chain does not contribute to such concepts, as there are several missing links along the chain. Each stakeholder or agency involved in the tea supply chain tries to optimise their own benefits rather than working collectively to improve the performance along the supply chain and within the industry. For example, the Tea Board, which is the main controlling body in the tea industry, considers the tea industry as a sector that they should monitor and regulate closely. However, the industry considers the policies and restrictions introduced by the Tea Board as a main obstacle to improving industry performance and see these regulators as tax collectors who try to increase their tax earnings rather than trying to improve the industry performance.

The research participants pointed out that the current supply chain structure has been a root cause for many issues in the tea supply chain, since the producers cannot implement any strategic decisions to improve performance along the supply chain. These factors are discussed in the next chapter.

5.6 SUMMARY

The main objective of this chapter has been to identify the main stakeholders in the tea supply chain and their operations and to develop supply chain maps. The in-depth interviews carried out with the main stakeholders in the tea supply chain were used for this purpose.

Farmers were identified as the most important stakeholders in the tea supply. They are classified as large-scale plantations, which are managed by the corporate sector, and tea smallholders, who are private owners. Large-scale producers have their own tea factories, while the tea smallholders sell their green leaves to private tea factories. The produced teas are sent to brokers in Colombo. They distribute the samples, together with catalogues, to registered tea buyers. The buyers buy teas at auction and proceed with valued-tea production and export or bulk export. The tea supply chain is strictly regulated, with the Sri Lanka Tea Board controlling the whole supply chain from farming to export.

Mapping the tea supply chain revealed that the tea supply chain is fragmented; this fragmentation has kept producers from getting closer to their final consumers. This is a bottleneck in the development of the tea industry in Sri Lanka. It is specifically a major problem for the large-scale producers, which are vertically integrated with tea growing, production, value-added tea processing and exporting. However, they still have to first send the produced teas to the auction via a broker and bid to buy back their own teas (and buy other teas if necessary) if they want to proceed with value-added tea production and export. This supply chain structure has blocked the implementation of better collaboration on the supply chain close to the customers. It also shows that the current supply chain structure has resulted in several ineffective aspects such as duplicative operations and excessive quality-checking processes undertaken by the Sri Lanka Tea Board.

Furthermore, the analysis shows that even though farmers, tea producers and processors implement various sustainability initiatives, they do not get the maximum benefit from the standards or certifications due to the nature of the supply chain structure. Despite producers' spending time and resources to obtain certifications to improve quality, most of tea is exported as bulk teas, where the value-adding activities are done by overseas importers. This has prevented consumers from getting the same quality as is available at the farm gates, since the exported Sri Lankan teas are mostly blended with cheaper, low-quality teas. This analysis shows that the supply chain structure is a main barrier to improving the performance and sustainability of the tea industry.

The next chapter further explores the supply chain operations and identifies the influencing factors on a sustainable tea supply chain. It uses an explorative analysis approach with using content analysis and coding as analysis techniques to identify the influencing factors.

CHAPTER 6

IDENTIFYING INFLUENCING FACTORS ON A SUSTAINABLE TEA SUPPLY CHAIN

6.1 INTRODUCTION

Chapter 5 explored the tea supply chain and developed supply chain maps for the Sri Lankan tea industry. It further identified the major roles of the main stakeholders in the tea supply chain. It highlighted the fragmented supply chain structure as a major bottleneck on the sustainability of the tea supply chain.

This chapter aims to identify the factors that influence the sustainability of the tea supply chain, specifically focusing on the stakeholders introduced in the previous chapter. The results were based on an in-depth analysis of the focus-group discussions and semi-structured interviews with farmers, tea producers, brokers, exporters and overseas importers and representatives from government agencies and associations. Additionally, secondary documents and reports were also used to support the analysis. As explained in Chapter 4, the influencing factors were identified using content analysis and coding the transcriptions. Based on the analysis, six themes were identified as major influencing factors on the sustainability of the tea supply chain, they are discussed in this chapter.

This chapter consists of nine sections including this introduction. Section 6.2 describes the steps in the data-analysis process and how the themes were identified. Section 6.3 identifies the influence of governance and policy concerns related to a sustainable tea supply chain. Section 6.4 introduces the impact of social factors on the sustainability of the Sri Lankan tea supply chain. Section 6.5 explains the factors related to economic aspects of the tea supply chain. Section 6.6 identifies the environmental factors, while Section 6.7 identifies the influence of research and education on the sustainability of the tea supply chain. Section 6.8 identifies the factors related to supply chain practices and operations on the tea supply chain. Section 6.9 provides a summary of the chapter. The

analyses of these major themes provide the basis for the discussion and recommendations in Chapters 7 and 8.

6.2 DATA ANALYSIS PROCESS – TO IDENTIFY THE INFLUENCING FACTORS

As explained in Section 4.6, qualitative research results in a large amount of contextual, subjective and richly detailed data (Byrne 2001). Liamputtong (2009) said that it is important to transform this data in a meaningful way to understand the phenomena under study. Strauss and Corbin (1990) also said that qualitative analysis is a process of exploring the textual data to understand the meanings of the themes developed from analysis and to see how they are related to the research topic. The analysis process consists of several steps, as illustrated in Figure 6-1.

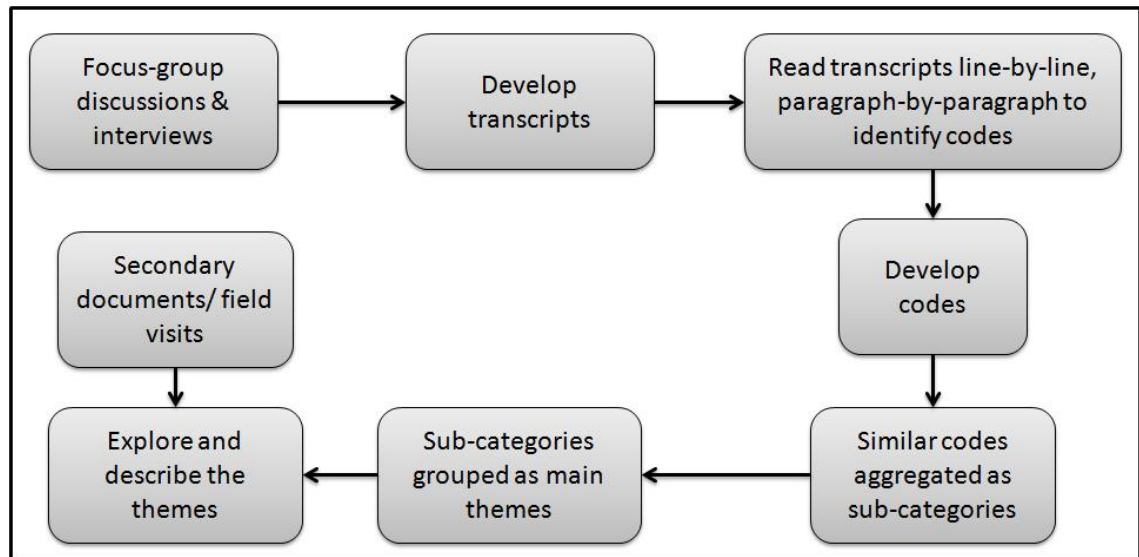


Figure 6-1: Data-Analysis Process to Identify and Describe Influencing Factors

Source: Developed by the Author

As shown in Figure 6-1, transcribing the audio-recorded interviews and focus-group discussions, which was carried out in this study using NVivo software, is considered the first step in the data analysis process. Thereafter, as explained by Anfara, Brown and Mangione (2002), before starting the coding process, the researcher read the transcripts several times, as it is vital to be familiar with data before analysing it. Thereafter, the data-coding process was initiated using NVivo software. It should be noted that NVivo was used only as a tool to manage the large quantity of contextual data and expedite the

coding process. The researcher listened to recordings and read transcripts to identify the codes.

The primary codes were identified by reading the transcripts and the coding process was carried out until no new codes emerged from the data. The analysis process soon revealed that the data saturation occurred even before completing the analysis of the data collected in the first round: the same codes and themes were emerging from the data analysis. However, the coding was continued to check whether any new codes would emerge from the data. Furthermore, the research continued analysing the data collected from the second and third rounds, not only because helped to verify whether the representation of stakeholders in the Sri Lankan tea supply chain was sufficient but also because it increased the validity and reliability of the research. The primary codes were developed accordingly. The primary codes identified from the data were aggregated into sub-categories; finally, the themes were developed. A summary of the analysis of the focus-group discussions is given in Figure 6-2.

Focus-Group 1: Regulator 1 (SLTB)	Focus-Group 4: Regulator 2 (TSHDA)
<ul style="list-style-type: none"> •Quality issues •Uncertainty in the global market •Outdated technology •Health and safety issues in plantation •Transport facilities 	<ul style="list-style-type: none"> •Shortage of management staff and field officers •Lack of finance support •Outdated technology •Lack of customer focus •Input material supply •Lack of integration with strategy & SC structure •Transport facilities •Lack of collaboration •Traceability & information sharing
<ul style="list-style-type: none"> •High production cost •High investment cost •Lack of contribution on research and development •Environmental factors such as adverse weather •Labour availability •High dependency on the industry •Global political conditions •Deteriorating the quality •High energy cost and resource consumption 	
<ul style="list-style-type: none"> •Lack of finance support •Government bureaucracy •Policy restrictions and taxes •Uncertainty of demand in the global market •Lack of customer focus •Input material supply •Lack of integration with strategy & SC structure •Traceability 	<ul style="list-style-type: none"> •Shortage of management staff •Lack of finance support •Government bureaucracy •Policy restrictions and taxes •Outdated technology •Lack of customer focus •Lack of integration with strategy & SC structure •Transport facilities •Traceability & information sharing
Focus-Group 2: Large-Scale Company 1	Focus-Group 3: Large-Scale Company 2

Figure 6-2: Summary of Analysis of Focus-Group Data

Source: Developed by the Author

As illustrated in Figure 6-2, both regulators and producers identified factors such as high production and investment costs; lack of research and development; environmental factors; scarcity of labour and high dependency on the tea industry; high energy usage; unstable political conditions; and deteriorating product quality were identified as influencing factors on the sustainable tea supply. Additionally, producers identified that factors such as government bureaucracy, policy restrictions, lack of customer focus, lack of integration of strategies with supply chain structure and lack of traceability of product flow have an affect on the sustainability of tea supply from the producers' perspective. Similar analysis to explore the factors that affect other stakeholders in the tea supply chain found factors such as high investment costs, environmental factors, scarcity of labour and high dependency on the industry to be common issues for all four segments, as summarised in Figure 6-3. These factors have been grouped into six themes, as shown in Table 6-1. They are further explored and described in the following sections.

Tea Exporters and Importers	Brokers
<ul style="list-style-type: none"> •Quality issues •Government bureaucracy •Policy restrictions and taxes •Uncertainty in the global market •Outdated technology •Transport facilities •Global political conditions •High energy costs 	<ul style="list-style-type: none"> •Outdated technology •Lack of collaboration •Traceability & information sharing •Lack of research and development •Global political conditions •Health and safety issues in plantation
<ul style="list-style-type: none"> •High investment costs •Environmental factors such as adverse weather •Labour availability •High dependency on the industry 	
<ul style="list-style-type: none"> •Lack of finance support •Outdated machinery and technology •Government bureaucracy •Policy restrictions and taxes •Input material supply •Traceability •Transport facilities •Lack of energy sources •High energy costs 	<ul style="list-style-type: none"> •Government bureaucracy •Policy restrictions and taxes •Outdated technology •Lack of customer focus •Lack of integration with strategy & SC structure •Traceability & information sharing •Lack of research and development •Lack of energy sources
Tea Smallholders and Private Tea Factories	Other Stakeholders

Figure 6-3: Summary of Analysis for Individual Interviews

Source: Developed by the Author

Table 6-1: Main Themes Developed from Data Analysis

Themes	Categories
Governance and Policy	<ul style="list-style-type: none"> • Government Bureaucracy • High Tax Implications • Restriction Policies on Ownership, Import and Export
Social Impacts	<ul style="list-style-type: none"> • High Dependency on the Industry • Labour Shortage • Social Inequity • Occupational Health and Safety
Research and Education	<ul style="list-style-type: none"> • Lack of Research • Lack of Funding for Research • Lack of Technology
Economic Factors	<ul style="list-style-type: none"> • High Production Costs • Lack of Investment • Infrastructure Facilities • Technological Gap • Global Economic and Political Conditions
Environmental Factors	<ul style="list-style-type: none"> • Climate • Energy
Supply Chain Operations Management	<ul style="list-style-type: none"> • Supply Chain Structure • Access to Information and Lack of Visibility • Lack of Customer Focus • SC Risk and Uncertainty on SC • Supply Chain Resources

6.3 SUPPLY CHAIN GOVERNANCE AND POLICY

Governance and policy have a major impact on the long-term sustainability of the Sri Lankan tea supply chain. As the tea industry is an international trade, strong government-business relationships are inevitable. Since the nationalisation of the tea industry in the 1970s, the Sri Lankan government has been controlling the tea industry through various policies and Acts of Parliament. The Sri Lankan tea industry is still working on an outdated system due to this policy control. Study participants observed that the industry has operated in the same manner since it began in the 1830s.

Many stakeholders in the tea supply chain pointed out that the rigorous regulation of the tea industry has negatively affected its sustainability in the long term. Industry stakeholders pointed out that the current policies and regulations may have worked 50 or 100 years ago. However, today the global business environment is significantly different. Particularly, the world tea market is hugely competitive, and price has been

the main deciding factor for the ultimate consumers. Unfortunately the industry is still operated in the same way, since any attempts at a collaborative structure are limited by adverse policies and regulations.

The research participants pointed out that due to this factor, the enterprises in the sector do not have the freedom to operate as competitive business entities in the global market. In the current globalised environment the tea industry has diversified, and customer requirements have changed drastically. The “one-size-fits-all” assumption is no longer valid because customers are dispersed around the world and their expectations vary widely. It is essential to supply products while adjusting to constant change in an entrepreneurial way. The industry partners pointed out that an organisation should be lean, nimble and flexible to improve productivity, especially in the globalised context.

The participants indicated that government bureaucracy, unfavourable policy restrictions and tax implications for the tea industry are major concerns that block the development of the tea industry in Sri Lanka. The impact of these factors is explained in the following sections.

6.3.1 Government Bureaucracy

Large-scale tea producers indicated that due to heavy government bureaucracy they do not have any flexibility to make business decisions that could improve the performance in their operations; this ultimately affects the performance of the whole industry. They viewed the bureaucratic legacy as a parasite that destroys the nation’s most important industry, pointing out that there is much red tape preventing efficiency and sustainability along the supply chain.

The large-scale producers particularly stressed that they find it difficult to make any business decisions due to strong government control of the industry. They emphasised that the ownership of business operations is one such major factor, as plantation companies can only lease their land through 53-year contracts. As a result, most of them are reluctant to invest in any improvements or developments, since ownership and returns on investment are uncertain. This is a main reason for not having achieved the targeted replanting rate (which is 6%) in the country, as it takes over 10 years to get a return on an investment in replanting. This has negatively affected the supply of green

leaves, and was identified as one main reason for reduced production volume for large-scale producers.

It was further stressed that institutional susceptibility is a common characteristic of the Sri Lankan tea industry, because any business decision related to the tea industry is completely under the control of government policies and regulations. For example, cumbersome administrative barriers obstruct normal investment and business activities in the sector. Participants further stressed that the bureaucracy reduces competitiveness and lowers the efficiency of business operations due to strict policy control. The farmers and producers pointed out that they waste significant amounts of time filling various applications every day since they have to obtain approval from the Sri Lanka Tea Board almost every time they want to sell their products. This has resulted in increasing the production lead time in several ways as illustrated in Figure 6-4. First, a broker takes over three weeks to distribute the samples and catalogues to buyers, and teas are sold at the auction in the fourth week after it is produced. The produced teas are stored in the broker's or producer's warehouse until they are sold at auction, which participants identified as a waste of product, resources and time. Second, as explained in Section 5.3.1, the Sri Lanka Tea Board conducts multiple quality checks at each step (pre-auction, post-auction, pre-shipping), which further increase the lead time from production to shipping.

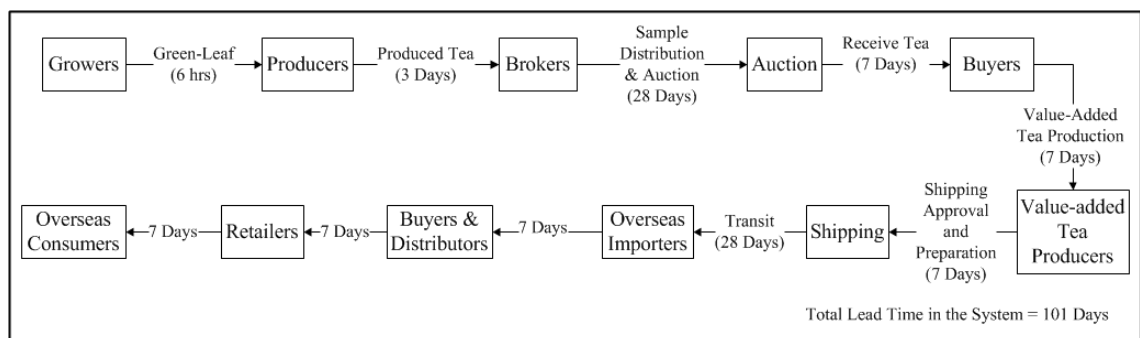


Figure 6-4: Total Inventory Time on the System

Source: Developed by the Author based on Focus-Group Discussions and Interviews

They further highlighted that due to delays in the approval processes and other administrative processes, the quality of tea deteriorates in storage. It was said that it takes over five months for teas to reach consumers. Despite all the efforts and resources

used to maintain quality during production, by the time the product reaches the consumption point, it does not have farm-gate quality. It was further stressed that the bureaucracy increases the transaction cost along the tea supply chain, as more documents and materials move along it in the form of various registration and quality-checking processes. The respondents highlighted that these are non-value-added steps that further increase the cost and waste time unnecessarily. They added that even though the regional plantations are managed by private conglomerates that have better performance in both operations and profits, they are struggling to improve performance in the plantation sector, largely due to administrative hurdles. Some plantation companies said that they are involved in the tea sector mainly because they have been in the sector for a long time and hence cannot simply withdraw, even though remaining is not profitable, since many other stakeholders depend on their operations.

6.3.2 Policy Restrictions

The interviewees argued that the best method to achieve a competitive advantage in the global market is to implement sustainable strategies that minimise total cost while increasing efficiency along the chain. The participants highlighted that they face many policy barriers to implementing such sustainable strategies, and hence cannot successfully compete in the global market.

The industry stakeholders pointed out that the existing policy barriers pose an increasing challenge to the sustainability of the tea supply chain, from tea growing to export. As explained in Chapter 5, any stakeholder who wants to be involved in the tea supply chain needs to register, or renew their registration annually, with the Sri Lanka Tea Board. Most importantly, producers and exporters must obtain certifications from the Sri Lanka Tea Board for every tea lot they export. The tea producers considered that this policy is not economically viable in the long term. The industry participants said that they have to fill out applications and pay various registration fees for every operation, which delays the operations and wastes resources, and that these barriers not only restrict the development of the industry but also hinder innovation to improve product and supply chain performance. One participant commented:

“This is red tape for innovation. I mean we need to have a median way...a lot of freedom also can be dangerous.... But if you have red tape, red tape in everything, regulations and controls all the time, the doers will not be able to do it. That is the other extreme. So this is what happened in most organisations: people who are in control take the law into their hands, and start controlling” (Focus Group 3)

The tea producers and exporters pointed out that if the country wants to increase tea export earnings, the industry should be able to increase production and export volume. Production volume can be increased only by increasing the green-leaf supply, which in turn can only be increased through replanting programs on abandoned tea lands or placing new tea lands under cultivation. However, there are no incentives for such initiatives. Instead, more taxes, such as promotion taxes, have been introduced, further increasing the burden on industry operators, who already operate with a low profit margin. Additionally, the producers do not wish to increase the green-leaf supply due to the high production costs in the sector, and they do not have any flexibility to manage their production costs.

Many industry participants consider policy restrictions on tea imports as another barrier to the sustainability of the industry, as it negatively affects value-added tea production. For example, due to restrictions on import, the industry still exports around 45% of tea as bulk tea, hence blending and value-added operations are undertaken off-shore. They highlighted that overseas tea importers increase the volume by mixing tea from other origins to obtain economies of scale. They said that even though some people argue that tea importation negatively affects the Sri Lankan tea industry, it would actually help the value-added tea producers to increase not only the volume but the quality of the teas if the government allowed them to import specialised teas, as local producers and exporters would then have better control over the final product.

Some large-scale producers also stressed that the restrictions on tea imports keep value-added producers from introducing different flavours using types of teas not produced in Sri Lanka. Relaxing the policies would help increase not only the value-addition but also global market share. The producers further highlighted that greater control by

producers and exporters would provide an opportunity to maintain the quality of the teas.

The producers further stressed that policy restrictions on tea-marketing channels are another bottleneck in the tea supply chain. They pointed out that despite producing teas, they do not have the opportunity to sell their products to customers directly, as they are required to sell the teas through auction:

“The thing is that just that we do not have an option, because now our company produces almost seven million kilos of tea. We are not in a position to do value-addition and real marketing. But individual companies that do value-addition can make a bigger margin.” (Focus

Group 3)

6.3.3 Export Levies and Tax Implications

In addition to lack of government support and ad-hoc policy implementation, high taxes were also identified as a strong reason for the deterioration of the tea industry in Sri Lanka. The industry stakeholders are of the view that this has been an issue since the plantation sector was nationalised. In addition to poor and inefficient management and negative government influence, heavy taxes on the sector have damaged the industry over time. In the early stages of the tea-industry reform, the government supported the development of the tea industry. For this purpose all export duties on plantation crops were abolished in 1992 during privatisation. A special “Tea Board CESS fund” was established for the development of the tea industry. It was directly managed by the Tea Board and used to provide subsidies on replanting, to purchase machinery for tea factories, to start new factories and farms, research activities and extension services and to conduct tea-promotion activities. CESS is charged at the point of export. It was mentioned that currently the CESS charges for value-added tea exports are Rs. 4.50 per kilogram, whereas for bulk-tea exports, they are Rs. 10.00 per kilogram. Even though the CESS fund was initiated to support industry stakeholders in developing production capacity, the government has not released the funds to the industry for the last two decades. Instead, the government has consolidated money to the treasury for government expenses (for example, military expenses during the civil war). The

industry says that this is a violation of the fund's original purpose. As a result, development programs (such as factory development, replanting assistance and subsidies to purchase equipment) have declined or ceased entirely, resulting in declining performance in the sector. Many sources have heavily criticised the government's decision to redirect the CESS funds:

“The funds were previously monitored and money disbursed by a committee of officials from government and the tea trade. But in recent years the cash-strapped government has changed the rules, dismantling the committee and sending the funds to the general government treasury.” (Lanka Business Online)

The respondents also pointed out that the government has further increased the CESS on tea exports in the last year. The industry stakeholders argued that this was not even discussed with the line ministries and relevant regulated authorities. They said that the CESS on bulk tea export was increased drastically from Rs 4 to Rs 10 per kilogram (about 150%). They were of the view that increasing the CESS charges is acceptable if the funds are pumped back to the development of the tea industry, as the performance of the industry has declined considerably during last few years. However, this has not been the case. Some respondents argued that they could understand that the government used the CESS for military expenses, since the government had a difficult time during the civil war. However, they felt that because the civil war is now over, the government should use the fund for their original purpose:

“The [CESS] funds are not being put to the best use in the context of the needs and the benefit of the industry, and this has been seriously violated by a decision taken by Parliament to consolidate at the Treasury all CESS Funds collected on exports of Tea, which provides for their disbursement in accordance with priorities to be determined by this State Fiscal Authority, instead of being utilized exclusively for the benefit of the Industry. This could mean that the Industry may not necessarily be the beneficiary, in any form, of funds that have been speciously extracted from its stakeholders, which, originally, were

directly assigned to and regulated by the line Ministry.” (The Island News Online, 31/01/2013)

Instead of supporting the industry by transferring the CESS funds back, an additional export levy was introduced in 2013. This new tax was introduced as a “tea promotion and marketing levy” of Rs 3.50 per kilogram of tea exports. It was pointed out that the promotion levy was introduced to improve the marketing and promotion of Ceylon tea around the world. The industry operators are in favour of the concept, since Sri Lanka needs to increase the promotion of Ceylon teas in the international market. However, the industry respondents were of the view that the government is again mishandling the funds, and that promotion activities should be separated from the regulatory bodies; instead, they should be the responsibility of an independent private body that has the appropriate capabilities and resources. Moreover, even this new levy is not used to improve promotion strategies. For example, the Tea Board has used this levy to sponsor the Sri Lankan cricket team, as the previous sponsor (who is one of the largest tea producers/exporters in the country) declined to renew the sponsorship. This study’s sources said:

“Only that the last time, when Dilmah [a large tea producer] sponsored the team, they only paid \$2m. Dilmah did not renew the sponsorship. Although no reasons were given it is reasonable to assume that the commercial return was insufficient to justify a larger sponsorship. Now the Tea Board is paying twice what Dilmah paid, for a partial sponsorship. Does this really make commercial sense? The tea industry is already crippled by politically motivated wage hikes and unnecessary regulation, it is imperative that tea CESS funds be used for the maximum possible benefit of the industry.” (Online Blog, 18/07/2013)

The industry experts argued that the levy collected for the promotion of Sri Lankan tea should be used for better promotion programs other than sponsoring sports teams. These findings indicate that such ad-hoc government policies and regulations further cripple the industry.

6.4 SOCIAL FACTORS ON THE TEA SUPPLY CHAIN

Several social factors were identified as major influencing factors on the sustainability of the tea supply chain. Among them were the shortage of human resources along with plantation companies' high dependence on manual labour, social inequality and health and safety aspects.

6.4.1 Labour Shortage/People

6.4.1.1 Labour Availability

Labour availability mainly depends on two factors: the willingness of labourers to work in the plantation or estate sector and the turnout of the labourers when jobs are offered. Both large-scale growers and smallholders say that the labour shortage, which is due to largely to labour migration and poor living conditions on the plantations and in the surrounding rural areas, is becoming a major issue in the plantation sector, poses a risk for the tea industry. There are several reasons for increased labour migration: low dignity of the job, harsh living and working conditions and increasing education levels among the younger generation living within the plantation. Interestingly, participants pointed out that labourers who work in cities are actually paid lower wages than plantation workers. Furthermore, city labourers must provide their basic needs themselves, while plantation labourers often have free basic facilities such as housing, electricity, water and day care within the plantation in addition to their wages. However, labourers – particularly the younger generation – are willingly sacrificing those facilities to escape from the low status of plantation labourers. Moreover, plantation workers argue that even though the free facilities are available within the plantation, they are not of a high standard. For example, they stress that even though housing facilities are given to the plantation workers, the houses are very small and do not have enough space for more than two people. However, normally there are around four to six family members living in a house.

Some respondents pointed out that the labour scarcity is, to a great extent, a site-specific problem: it is a particular challenge in the middle and low-elevation regions, whereas there is an oversupply of labourers in high-elevation regions. The planters from the hill

country pointed out that tea plantations are the main source of employment for the people who live in these regions, who know that if they live within a tea plantation where their parents are working, a job is guaranteed for them as soon they turn 18. Even if there is no demand for additional labourers, the plantation companies are committed to providing employment for anybody who is over 18 years old if they live within the plantation. However, some respondents argue that the labour scarcity has now begun to be an issue for plantations in the hill country as well due to labour migration.

Labour migration is increasing due to two reasons. First, the people who live on the plantation now have the flexibility of communicating with the outside world. They have easy access to information and desire better working conditions, even though the salary rates are lower compared to what they earn on the plantation. One focus group stressed:

“Because the dignity of work and that sort of thing.. they like a factory job or something much smarter and easy.... So there is lot of erosion in the workforce... and even, I would say, we called into Uva area in Badulla, Uva province where there are lot of other types of employment available for workers where there are lot of villages surrounding the estates.... They go to the villages to work, rather than working on the estates.” (Focus Group 2)

Furthermore, they pointed out that the general practice of youth taking up employment on the plantations has changed with improvements in the conditions, such as the availability of education, in the plantation regions.

Although, as the planters further pointed out, the living conditions in the plantations are now considerably developed, with better access to free education, health facilities and housing facilities, and to basic needs such as food and electricity. However, people on the plantations are migrating to cities largely to escape the social stigma of being a plantation labourer.

6.4.1.2 Absenteeism

The labour shortage is worsened by the poor attendance of labourers. Respondents pointed out that despite bonus incentives for attendance, absenteeism is major problem

on the plantations. Some labourers register at the plantation purely to receive the welfare benefits provided by the plantation company. However, they do not report to work regularly, instead working outside the plantation while still living within the plantation with their parents and using the free facilities provided by the plantation company, which of course receives no return from such absentee workers. Even though the plantation managers are aware of the situation, they cannot take any action against these workers due to powerful unions and sensitive ethnic issues, since most of the labourers are Tamils.

6.4.1.3 Management Staff Shortages

The discussion pointed out that in addition to labour shortages in the industry; it is also difficult to find qualified people for managerial levels. Some respondents pointed out that most of the top managers or leaders in the tea industry are “baby boomers” who are close to retirement. In the near future, the industry will be at a greater risk, since the younger generation is more reluctant to work in the plantation sector for several reasons, such as the difficulty of implementing management decisions due to political and governance issues in the industry. It was highlighted that the younger generation views planning operations as inherently difficult due to the nature of the business; strict controls and lack of management flexibility to make decisions and manage the business are challenging, so that potential managers are reluctant to accept work. The planters also said that increased labour disputes are another contributing factor in the decline of management staff’s enthusiasm. One participant pointed out that the younger generation in particular is now reluctant to join the plantation sector, as the working conditions in cities are less stressful and more comfortable than those on plantations.

6.4.2 High Dependency on the Industry

The large-scale farmers pointed out that nearly one million people work directly on tea plantations in Sri Lanka. They said that plantation companies look after labourers and their families, including pensioners and children, providing facilities such as housing, health and education in addition to pension and salary. Therefore, in total over five million Sri Lankans directly depend on large-scale tea companies. The planters further pointed out that the tea industry has a huge impact on the social aspects of the country,

not only within the plantation but also throughout the country; another ten million people or more directly or indirectly depend on the stakeholders in the tea industry. This includes other industries and service providers that supply supporting materials and services such as fertiliser, printing and packaging material, warehousing facilities, transport services and shipping facilities.

6.4.3 Social Inequality

Gender disparity and poor working conditions are social factors apparent in the tea supply chain. The disparity in the wage rates by gender is shown in Figure 6-5. This graph clearly indicates not only that male labourers are paid higher wages than female, but that the wage gap between males and females has increased during the last few years. Despite the imbalance of wage rates, nearly 90% of labourers are female, and they are involved in around 70% of the operations on the tea plantation. Moreover, male labourers mainly play supervisory roles such as “kankani” (supervising tea harvested) and work inside the factories, whereas female labourers are heavily involved in intensive farming activities such as tea picking, weeding and moving green leaves from the farm to the collecting centre.

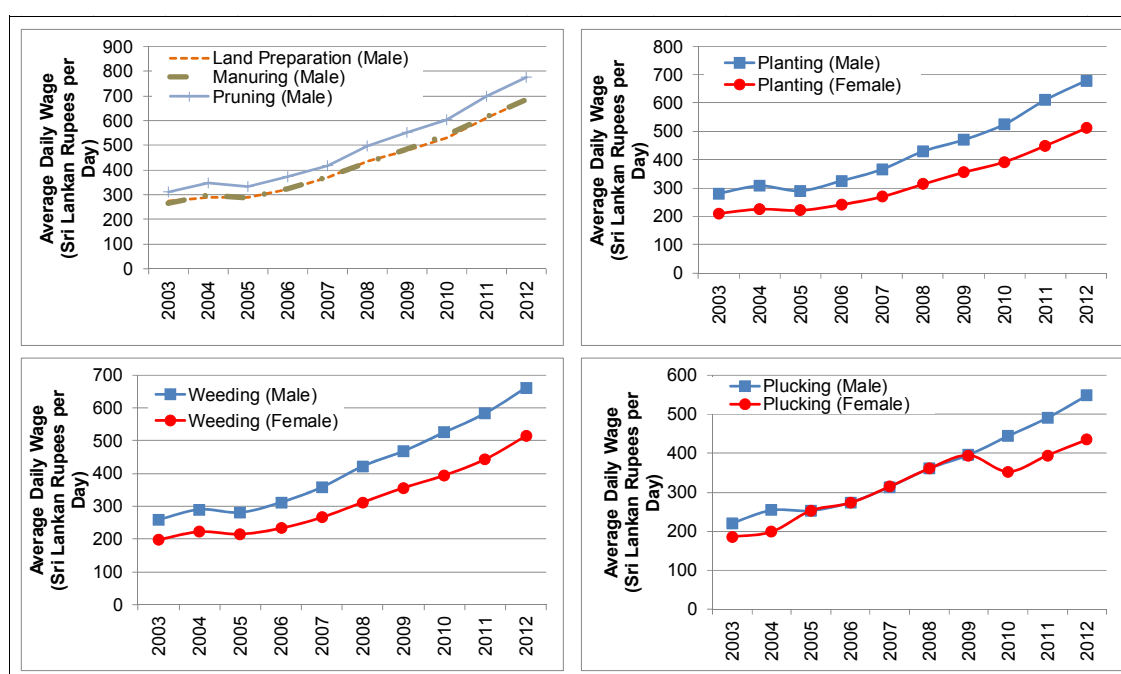


Figure 6-5: Wage Rates for Labourers by Gender (2003-2012)

Source: Economic and Social Statistics of Sri Lanka (2012b)

Despite their higher wage rates, the poor turnout of male workers is also another issue in the plantation; producers commented that male workers are not reliable and their poor attendance is a major issue that disrupts the production process. This has resulted in higher demand for female labourers in the plantations, although this has not yet narrowed the wage gap. It was further pointed out that even though female labourers have traditionally been involved in farming activities, they are now hired to work in the tea factories also.

However, cultural practices ensure that wage discrimination persists in the plantation sector. This is another reason for the labour shortage on plantations, as females are increasingly migrating to cities to work as domestic helpers. According to observations and discussions with labourers and plantation managements, the economic and social contribution of women to the tea industry is not well recognised. This analysis shows that discriminative treatment and lack of equal opportunities for female labourers is a contributing factor to employee migration, and poses a huge risk to the tea supply chain in the long term.

6.4.4 Occupational Health and Safety

The planters pointed out that each plantation has an estate hospital that provides health care to the people working and living in the plantation. These estate hospitals have either a registered medical officer or a qualified medical apothecary. Some plantation hospitals are part of the national health services system and thus have medical officers with an MBBS degree. Most of the plantations have crèche facilities to look after the children of the plantation workers (Picture 24). All health-care costs are borne by the plantation companies.

Despite the availability of health facilities, occupational health and safety is another concern in the plantation community. This is an issue especially for the female labourers, as they work longer hours than the male labourers. Participants mentioned that most female labourers suffer from health problems such as painful abrasions on their hands, back pain and head pain. This is especially true for tea harvesters, as harvesting is an intensive manual operation, which requires around 20,000 hand

movements per day¹⁰. Additionally, female workers are playing multiple roles, where in addition to working under severe conditions they are also responsible for domestic work¹¹ such as cooking and taking care of children; this further increases the risk of health and safety concerns.



Picture 23: Estate Workers' House



Picture 24: Crèche Facility in an Estate

Source: Photographs taken during Field Visits by the Author

The lack of sanitary facilities is another issue on many plantations. The labourers highlighted that even though sanitary facilities exist within plantations, they are not of an acceptable standard. Despite many plantations and tea manufacturers having introduced better working environments under different international food-safety and manufacturing standards, still the living conditions in the plantation houses are not optimal. Participants from large-scale plantations pointed out that they do their best to provide the required facilities. They further stressed that even though they organise various health and welfare initiatives for the plantation workers to improve their occupational health and safety, it is very hard to change the workers' lifestyle: drinking alcohol, smoking and chewing betel leaves have caused serious health problems as well as social issues within the plantations. These issues directly affect the sustainability of the tea supply chain, as the plantation labourers are an essential resource to manage a sustainable tea supply.

¹⁰ This study estimates that around 1,000 hand movements are used to pluck one kilogram of green leaves (based on observations and discussions with plantation managers and labourers during plantations visits) and the average green-leaf harvesting rate is around 20 kilograms per labourer per day.

¹¹ Based on discussions with tea harvesters and observations during plantation visits.

6.5 ECONOMIC FACTORS IN THE TEA SUPPLY CHAIN

Governance and policy implications create negative economic conditions that strongly affect the behaviour of the global commodity chain. They not only create constraints on the global supply chain and integration, they specifically affect the performance of the tea supply chain. This section identifies several economic factors that have an impact on the sustainability of the tea supply chain, including high operations costs, lack of investment and infrastructure, gaps in technological development and unfavourable political conditions.

6.5.1 High Production Costs

The producers pointed out that in addition to volatile market conditions, managing production costs has been a huge challenge for them. The large-scale farmers in particular stressed that they are making huge losses due to increased production costs. Figure 6-6 shows that production costs have increased considerably over the last three decades, particularly since 2002, when the new wage rates were introduced.

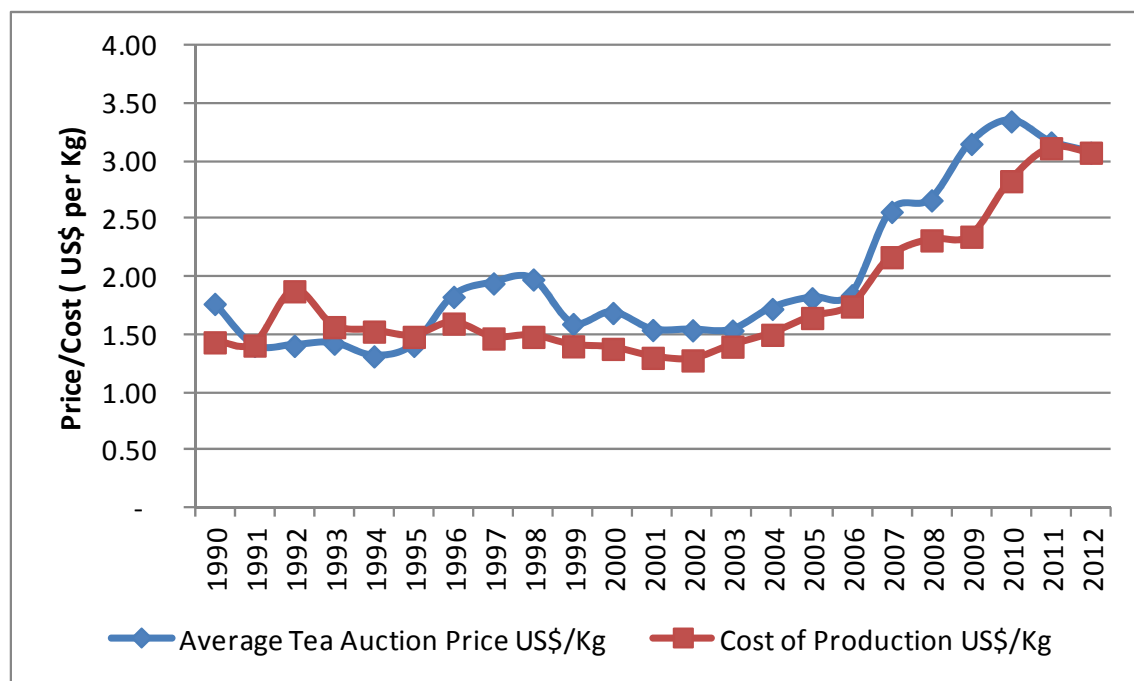


Figure 6-6: Auction Price and Production Costs
Source: Calculated from Central Bank Annual Report (2012b)

As mentioned above, Labourer's wages currently account for about 65-70% of production costs. Both large-scale planters and smallholders complained that they do not have direct control over the implementation of strategies to link labourers' wages to increased performance, as the wage rates are determined every two years by the government after negotiating with the labour unions. Neither plantation management nor tea smallholders participate in the negotiation process, and thus do not have an opportunity to integrate salary with productivity. Large-scale planters stressed that this political decision makes the conditions worse for them because on top of paying high salaries, the plantation companies are responsible for looking after the health and social welfare of the workers and their families who live within the plantation. However, managers contend that these factors are completely ignored, when wage rates are negotiated.

The farmers further stressed that the harvesting norms (daily targets) are also very low in Sri Lanka compared to other tea-producing countries: the daily target is around 15 to 16 kilograms per worker per day in Sri Lanka, whereas in countries such as Kenya it is about 40 kilograms per worker per day. The plantation companies pointed out that this is one of the biggest challenges faced by the plantation sector in Sri Lanka, as they do not have full control over their own businesses and they cannot link productivity to salary or implement any other strategy to increase performance.

There are ethnic considerations as well: most of the labourers working on large-scale tea plantations are of Indian origin, having been brought to Sri Lanka from Southern India to work on tea plantations during the British colonial period. These workers were captives, and it was the government's responsibility to look after them. However, the descendants of these original labourers have been living in Sri Lanka for several generations, and they are considered Sri Lankan citizens, with same rights as citizens of Sri Lankan origin. However, the planters pointed out that in the plantation sector, workers of Indian origin still expect the same social benefits they received under the Indian Ordinance Act when they were not citizens, and it has become an obligation for the plantation companies to continue to provide these facilities.

Both large-scale and smallholder farmers said that even though they willingly use the fine-harvesting method to main the quality of the tea, this has become a huge burden for

them, as it is a labour-intensive process. The producers pointed out that even though they believed that Sri Lanka is producing the best-quality teas, their production is not cost-effective. An operations manager on a large-scale plantation pointed out that this is a huge risk for the sustainability of the industry. The current supply chain structure does not allow the producers to produce value-added tea or to market it directly, both of which would improve the cost-effectiveness of their companies, as they are compelled to sell their tea at auction. Due to these facts, most of the large-scale tea producers are now reducing the growing of their own teas for production, instead buying green leaves from tea smallholders, as it is more economical.

Table 6-2 provides an analysis comparing cost and profit to evaluate the benefits of using sourcing (for example buying green leaves from tea smallholders) and making (growing tea to use for their production) strategies. This analysis shows that it is more economical (especially for large-scale producers) to buy green leaves from tea smallholders than grow their own tea for production. Large-scale producers highlight that they can reduce the production cost by implementing sourcing strategies, since this removes the high labour-cost component from production costs.

6.5.2 Finance/High Investment Cost

High investment costs and poor rates of return in the plantation sector were also identified as influencing the sustainability of the Sri Lankan tea industry. As explained earlier, due to high production costs and poor profit margins, farmers are reluctant to invest in the industry. As shown in Figure 6-6, in addition to the uncertainty of tea prices, production costs are also rising continuously. It was mentioned that the producers are running under heavy losses.

Table 6-2: Cost and Profit Comparison by Stakeholder (US\$ per Kilogram of Produced Tea) – 2012¹²

Tea Smallholders	Price/Cost (US\$)
Green-Leaf Price ¹³	2.26
Harvesting Cost ¹⁴	0.93
Transport	0.20
Profit for Small-Scale Farmers	1.13
Private Producers	
Auction Price	3.54
Green-Leaf Cost ¹⁵	2.26
Production Cost	0.18
Transport and Packing	0.20
Auction Commission (1% of auction price)	0.04
Profit for Private Producers	0.87
Large-Scale Producers	
Auction Price	3.54
Production Cost	3.54
Transport and Packing	0.20
Auction Commission (1% of Auction price)	0.04
Profit for Large-Scale Producers	(0.24)
Exporters	
FOB Price	4.42
Value Added	0.10
CESS (Rs 3.5 per Kg)	0.03
Export Levy (Rs 3.5 per Kg)	0.03
Shipping	0.20
Profit for Exporters	4.06
Retail Price	16.00
Profit for Different Producer Scenarios	
Farmers	1.13
Private Producers	0.87
Large Producers (own leaves)	(0.24)
Large Producers (bought leaves)	0.87
Large Producers (own leaves) and Export	3.83
Large Producers (bought leaves) and Export	4.93

Source: Compiled by the Author based on the Information given by Participants and Data Derived from Secondary Reports

Both large-scale and smallholder farmers pointed out that the initial cost involved in tea growing is high, and farmers have to wait more than 10 years to get a return on their investment. This is one main reason for reducing the land areas under tea cultivation, especially for large-scale farmers such as regional plantation companies. The large-scale

¹² These figures do not include other infrastructure and initial costs.

¹³ Based on the reasonable-price formula, it was assumed that 4.5 kilograms of green leaves are used to produce one kilogram of produced tea.

¹⁴ Assuming the daily wage per laborer is Rs 525 (US \$4.11) for harvesting 20 kg of green leaves per day, with a 4.5 conversion factor.

¹⁵ Calculated using the reasonable-price formula and auction price

farmers pointed out that the privatisation of the plantations has not fully supported the development of the tea industry in Sri Lanka. As explained in Chapter 5, plantation companies are on 53-year leases; hence there are no incentives for investment in the development of the plantation, such as replanting and rehabilitation programs. Large-scale growers pointed out that their future is uncertain, especially with the strong government influence. Hence many regional plantation companies try to reach maximum profit during the leased time frame, rather than making the industry sustainable in the long term.

The capacity of the tea supply chain can be improved by increasing productivity and yield. Producers pointed out that even though the tea-industry regulators expect to maintain a 6% replanting rate annually, currently it is less than 0.5%. As shown in Figure 6-7, it has been staggered around this point for the last few decades. Farmers highlighted that due to low profit margins, they are not in a position to invest in replanting. The large-scale farmers in particular stressed that sourcing green leaves is a better option for them to reduce their labour cost, and hence production costs. As explained in Chapter 5, many large-scale planters are now sourcing green leaves from tea smallholders; this has a major influence on the long-term sustainability of the tea supply chain.

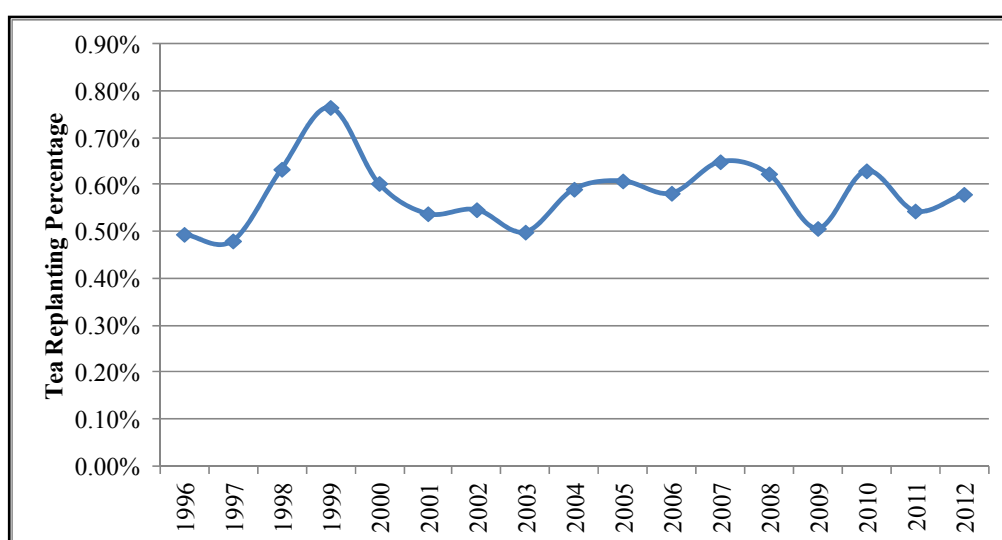


Figure 6-7: Tea Replanting Percentage Distribution (1996-2012)

Source: Calculated from CBSL (2012b)

In addition to lack of funds, a long idle time (five to six years) from replanting to harvesting is another issue. Particularly, this is an economic problem for the smallholders, especially if the tea farm is the only source of income for them.

Obtaining support from financial institutions is also a huge challenge for the agriculture sector, especially for the tea industry. This is a major issue not only for tea smallholders but also for large-scale producers. It was pointed out that commercial banks heavily support other industries, such as the garment industry, with low-interest loans, but hesitate to support the plantation sector. The tea producers argued that the financial institutions do not trust the tea industry, which is the nation's largest agricultural export. Figure 6-8 indicates that commercial bank loans to the tea sector are less than 2% of the total. This also contributes to producers' reluctance to invest in the development of the industry.

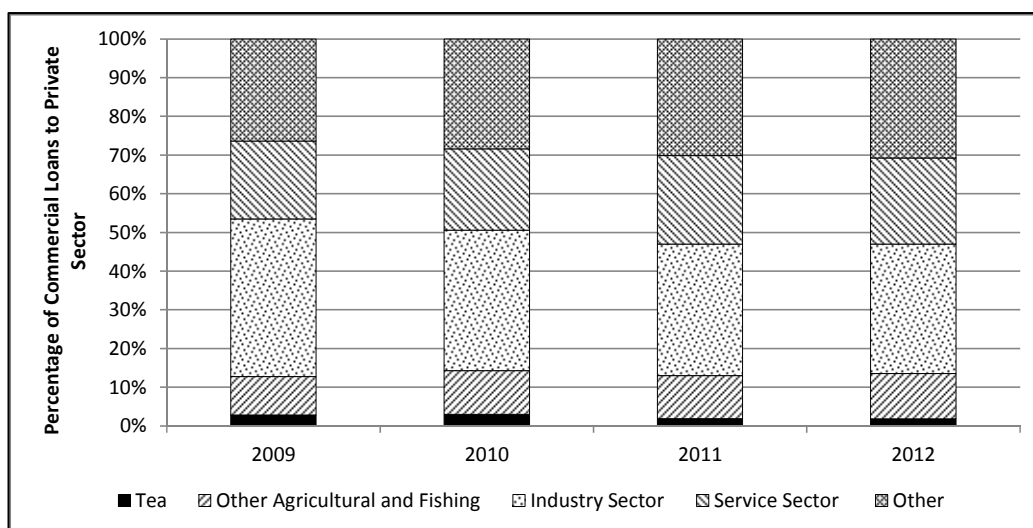


Figure 6-8: Commercial Banks' Loans to Private Sector

Source: Calculated from CBSL (2012b)

To face the financial difficulties, some plantation companies have quietly implemented cost-cutting strategies such as downsizing and abandoning old tea lands, while moving towards sourcing green leaves from tea smallholders. Interestingly, industry data also shows that the labour force in the plantation sector has diminished considerably – by around 30% – during the past 15 years, as shown in Figure 6-9.

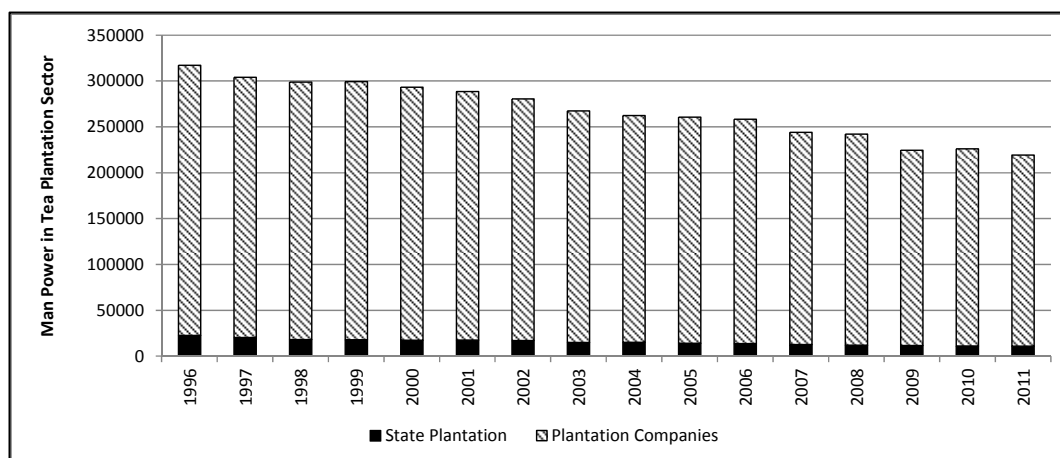


Figure 6-9: Workforce in the Regional Plantation Sector

Source: Annual Report of the Central Bank of Sri Lanka (2012b)

6.5.3 Transport and Infrastructure

Lack of appropriate infrastructure is another constraint on the Sri Lankan tea supply chain. First, poor transport infrastructure is a major barrier, especially for tea producers located outside of Colombo. In Sri Lanka tea is mainly distributed using road transport, and participants commented that this is inefficient and costly. However, they said that they do not have any other option, pointing out that even though a railway system is available, it does not have sufficient facilities to handle goods transport other than transporting small parcels and packages.

They further stressed that the railway is not popular due to lack of facilities at terminals, making rail comparatively expensive for freight transport. Thus producers are compelled to use road transport, despite diseconomies such as traffic congestion, environmental pollution and road accidents, as well as other issues such as pilferage during transport. As explained in Chapter 3, the railway network was developed during British colonial rule to support the plantation sector. However, the facilities have not been updated since then, and it is now mainly used for passenger transport. As shown in Table 6-3, the railway accounts for 2.3% of total freight tonne-kilometres, whereas road transport accounts for 97%.

Table 6-3: Transport Modal Share in Sri Lanka (2011)

Transport Mode	Vehicle Kilometres Operated (Million)	% Share	Passenger Kilometres Carried (Million)	% Share	Tonne Kilometres Carried (Million)	% Share
Buses	1,379	4.99%	55,177	55.49%		0.00%
Railways	11	0.04%	4,574	4.60%	154	2.33%
Private Vehicles	16,605	60.04%	25,759	25.90%		0.00%
Para-Transit ¹⁶	4,841	17.50%	11,348	11.41%		0.00%
Goods/Land Vehicles	4,819	17.42%	2,585	2.60%	6436	97.19%
Water Transport	3	0.01%		0.00%	32	0.48%
Total	27,658	100%	99,444	100.00%	6622	100%

Source: Kumarage (2012)

Disruptive weather conditions also cause delays, especially because earth-slips are very common in high-elevation areas on rainy days. In addition to economic impacts, poor transport facilities also have an impact on the environment and safety aspects, which harms the long-term sustainability of the industry. Oil prices are spiking, but producers are still compelled to use an economically and environmentally unviable road-transport system rather than an improved railway system that can meet producers' demand.

6.5.4 Technological Factors

Technology plays an important role in supply chain management. It was pointed out that the performance of the tea industry and its supply chain has suffered due to the gap between the technology that is available and what is actually in place. Difficulties in obtaining machinery and equipment, lack of new technology in production and processing plants and lack of application of technology at the farm level were discussed as major influencing factors on the sustainability of the tea supply chain.

6.5.4.1 Machinery and Equipment

Accessibility to machinery and equipment has been a challenge for Sri Lankan tea producers and a major constraint on the development of the tea industry. Interestingly, participants mentioned that Sri Lanka used to produce machinery required for the tea industry before the nationalisation of the plantation sector. The local machinery producers had even supplied machinery and equipment to other tea-producing countries.

¹⁶ Includes dual-purpose vehicles such as vans and three-wheelers

However, with the nationalisation of the tea industry, machinery production has diminished gradually, as most of the machinery producers were British owners who were involved in tea plantations as well. They sold their manufacturing companies and terminated their involvement in the sector after the nationalisation of the plantation sector and restarted their operations in other countries such as Kenya. This has left local producers with insufficient demand for machines and equipment, compelling them to gradually close their production plants.

Currently the Sri Lankan tea industry mainly imports tea-manufacturing machines from countries such as India, Kenya and Japan. Furthermore, participants pointed out that the lack of local manufacturers has also become a challenge for procuring after-sale service, which disrupts the entire production process, especially due to the highly perishable nature of the green leaves, (which need to be processed within 12 hours of harvesting).

The participants also said that the government policies on importing parts for production, repairs and maintenance are unreasonable. For example, the government imposes high taxes when importing parts to produce machinery locally, but does not tax the import of complete machinery from countries such as India, at all; this in turn discourages local machinery production.

6.5.4.2 Outdated Technology

The lack of access to machinery and equipment is particularly onerous in the case of new technology. Participants pointed out that most tea producers still use outdated technologies in tea production and value-added operations. This affects the quality of the tea and makes it difficult to compete in the global tea market. For example, it was mentioned that customers are demanding high safety in their food. One Australian importer stressed that they do not purchase any tea that uses metals in the tea bags. They said most of the value-added tea producers still use metal staples on tea bags, and customers are reluctant to buy such products, instead preferring the filter paper of the tea bags to be heat-sealed and the labels attached without using any gum or staple. However, it was mentioned that most of the value-added tea producers cannot afford such high-end tea-bagging machines without financial support. Most participants pointed out that the producers used to receive financial support for factory development

through the CESS fund. However, during last three decades they have not had access to such funds, as discussed above, since they have been used by the national treasury. Thus producers have not invested in developing the factories and purchasing modern technologies; this has contributed to additional increases in production costs and deterioration in performance.

6.5.4.3 IT Facilities

Although the application of information technology has been an important driving factor in the globalised business environment, its application in the Sri Lankan tea supply chain remains very weak, particularly in comparison to other tea-producing countries such as India. Sri Lankan tea producers and industries use IT mainly for basic operations such as record-keeping and document transfer (such as email) between manufacturers and the Sri Lanka Tea Board.

6.5.5 Global Economic and Political Conditions

Participants pointed out that both internal and external economic and political conditions affect the sustainability of the tea industry in Sri Lanka. As explained in Chapter 3 and shown in Figure 6-10, nearly 70% of Sri Lankan tea is exported to Middle East and CIS countries. The participants said that the political instability in tea-importing countries affects the tea industry in several ways. First, it affects tea prices. The demand for tea is volatile; hence the tea producers suffer with any shift of price. This is a major problem for tea producers, as they cannot keep tea in stock due to its perishable nature. Hence, they do not have any option other than to sell the product at an even lower price. There are obstacles to logistics operations such as distribution, information transfer and fund transfer due to political instability in some of the Middle East countries. The exporters stress that some commercial banks are reluctant even to open a letter of credit on behalf of exporters when they trade with some countries due to political instability in those countries.

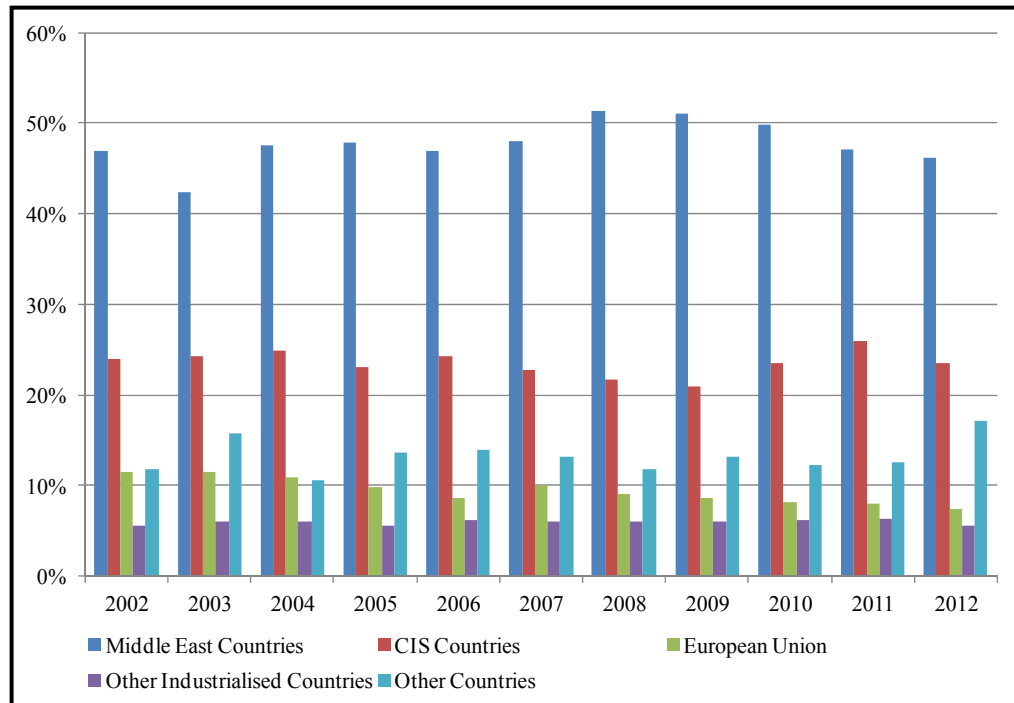


Figure 6-10: Sri Lankan Tea Exports by Destination

Source: Central Bank Annual Reports

The participants further stressed that in addition to the governance and policy restrictions described in Section 6.3, political uncertainty within Sri Lanka also restricts the performance and sustainability of the tea supply chain.

6.6 ENVIRONMENTAL FACTORS ON TEA SUPPLY CHAIN

Not surprisingly, many stakeholders in the tea supply chain raised environmental factors as important drivers in a sustainable tea supply chain. Climate changes, use of renewable energy, waste recycling and various sustainability initiatives were heavily discussed.

6.6.1 Weather Conditions

Global climate change is having a major influence on the sustainability of the tea industry in Sri Lanka. The participants explained that the yields have declined considerably due to unfavourable weather conditions in the country. For example, as explained in Chapter 3, even though global tea production has increased markedly, the growth rate in Sri Lanka, which is around 1.2%, has been insignificant compared to

other tea-producing countries such as China (31.8%), Kenya (57.8%) and Vietnam (53.1%) (Table 3-9). The participants stressed that unfavourable weather conditions are one of the contributing factors to declining yields.

They highlighted that unfavourable weather conditions affect the quality of the tea as well. For example, the changes in the rainy season affect the moisture levels in green leaves, resulting in deteriorating quality due to changes in the chemical reactions of oxidation. It was pointed out that even though Sri Lankan tea is getting better prices than that of other tea producers worldwide, the percentage increase in auction price is much lower than that enjoyed by other tea-producing countries during the last few years. The participants further emphasised that this is true not only for the tea industry but for the whole agricultural sector, which is experiencing huge negative effects.

6.6.2 Energy and Natural Resources

Protecting and preserving environment and natural resources has become an essential decision in any business operation. The tea industry is a heavy user of energy during the production process. Participants identified accessing electricity and diesel as major challenge. Oil and diesel prices are increasing, while access is becoming difficult. It was pointed out that nearly 90% of energy consumed in tea production is used as thermal energy in the withering and drying processes. The tea producers pointed out that the tea industry has taken this issue seriously and tries to implement more proactive environmental strategies to reduce the use of diesel and electricity in production plants, as discussed in Section 5.4.

As a result, most of the tea-production plants, especially those belonging to large-scale planters in the hill country, try to produce their own electricity for production as well as for their workers' domestic use with their own mini hydro power plants. The producers also try to minimise the use of resources such as diesel, instead using bio-energy such as wood and other plant materials. It was pointed out that most of the tea-producing companies are now trying to move to machinery and equipment that use less energy as a sustainability initiative. For example, the producers pointed out that they are converting their ovens and drying fans to use wood and similar resources as an energy source, instead of electricity and diesel. The heat generated from burning firewood in the ovens

is transferred to the withering area to use instead of using electric fans. Many plantations and private producers have started projects to plant trees to use as an energy source for their operations.

The industry operators pointed out that they are facing many obstacles and challenges in implementing energy-saving strategies. For example, access to firewood is a major challenge. It was mentioned that producers have been using rubber wood as a main source to create thermal energy. However, since the demand for rubber products has increased during the last few years, obtaining firewood from rubber trees has become a challenge. Additionally, rubber wood is now mostly used in the furniture industry, further limiting its availability as an energy source.

Most farmers are now using cross-cropping as a solution to their energy issues, as it also provides a source of nutrition and fertiliser. The farmers grow trees such as rubber or *gliricidia*¹⁷, which they can sell to the producers as a source of energy. This provides them an additional income. Moreover, rubber trees can also yield rubber milk that can be sold to relevant buyers in the area. However, growing these plants is also becoming a major challenge due to limited land availability.

Meanwhile, it was mentioned that the industry is searching for substitute bio-energy sources such as paddy harsh, sawdust, rice straw, coconut shells and other by-products of coconut plantations, rubber-tree branches and rice husks. It was highlighted that Sri Lanka has been a main rice-producing country; hence paddy harsh and rice-milling by-products are abundant. It was pointed out that using agricultural by-products is not only a good source of energy, but also a good method of disposing of agricultural wastes (a major issue in many villages); moreover, selling the by-products can provide extra income to farmers. For example, sawdust, a by-product of the furniture industry, is in high demand by the tea industry; and furniture-makers have responded by making sawdust bricks as a substitute for firewood (although the supply is not yet organised and continuous).

The use of bio-mass – or compostable garbage – is another possible source of natural energy. Even though garbage is a major problem in Sri Lanka, especially in the main

¹⁷ Local people called this plant either *albisia* or *wetamara*.

cities such as Colombo, there is no proper waste-management system implemented in the country.

However, it was highlighted that accessibility to these resources is difficult because they are not available in the tea-producing regions. The country does not have an organised logistics system to distribute such materials to tea producers, who are dispersed around the country.

6.7 RESEARCH AND EDUCATION

Research and education was another area highlighted during data collection and analysis. The participants pointed out that lack of knowledge and expertise in the industry, lack of qualified researchers and professional, and lack of funds to undertake research are among some challenges that affect the sustainability of the tea industry and its supply network.

Participants contended that lack of expertise in the sector has held the industry back. They pointed out that most of the top executives in the plantation sector will retire soon. As explained in Section 6.4.1, the younger generation is also moving away from the industry due to bureaucratic and social issues. The education system is also not designed to cater to the needs of the industry. There is a gap in research and education related to the sector, due to several reasons such as lack of funds for research and lack of recognition and rewards for industry-related research and development. It was mentioned that industry operators do not participate in research activities; instead, they expect the government, universities or the Tea Research Institute to undertake research and development activities on their behalf. There are no formal links between industry and the education sector to develop the tea industry. For example, the industry participants pointed out that other industries, such as the garment industry, heavily invest in research and development and form industrial links and partnerships with the university sector. However, the tea industry has failed to initiate any research links with the education sector.

The interviews with industry representatives indicated that they have a different view of research and development. Some argued that it is a responsibility of the government and

the authorities relevant to the tea industry to undertake research to develop the industry. They argued that they are paying huge amounts of money in the form of taxes and levies; hence it is the responsibility of the regulators, such as the Tea Research Institute, to carry out research activities using these funds. In contrast, some producers argue that the industry also should be proactive by participating in research and development if they want the industry to be sustainable in the long term. However, they stressed that even though they understand the importance of research and education, due to the financial difficulties they face, many industry partners find it difficult to invest in research.

6.8 SUPPLY CHAIN OPERATIONS MANAGEMENT

The analysis shows that operations-management practices have a huge impact on the sustainability of the tea supply chain. As explained in Chapter 5, it was observed that each stakeholder in the tea industry has its own objective and mainly focuses on individual operations, which is a result of a fragmented, dysfunctional supply chain structure. It was highlighted that since the business environment has changed, the industry needs to redefine its supply chain to match globalised competition and to win customers. This section explains the factors related to operations management: supply chain structure and strategy, lack of end-customer focus, supply chain resources and availability of inputs, risk and uncertainty in the supply chain and quality management and related sustainability initiatives.

6.8.1 Supply Chain Structure and Strategy

The analysis shows that the current tea supply chain structure has been the root cause of many issues affecting the sustainability of the industry. As highlighted in Chapter 5, the tea supply chain is fragmented by nature. According to the current supply chain structure, the primary producers mainly act as raw-material suppliers, leaving all other value-added operations to exporters and overseas importers. This supply chain structure not only is a missed opportunity for the primary producers to improve their operations with better profit margins, but also prevents the implementation of better supply chain strategies that involve collaboration close to the end-customers. The tea growers and primary producers highlighted that strict government regulation of the supply chain

structure has obstructed the implementation of supply chain management strategies, and thus the industry is facing serious risk along the supply chain. Among them are lack of investment, market uncertainty, strong regulation and lack of trust on the government policies.

It was pointed out that the government has placed huge expectations on the tea industry to double its export earnings by 2015. Participants have objected that this not only an unrealistic objective but also not linked to any policy changes to improve the sector, particularly at the root level. Many research participants say the industry believes that the political leaders are mostly motivated to follow short-term strategies instead of providing a better management framework that can be sustained over the long term.

Participants mentioned that the “silo- mentality” – where each stakeholder has their own interests and focuses on self-benefit without considering the interests of the other stakeholders – pervades the tea supply chain. For example, many local tea producers look at the auction system and the eight brokers as the main bottleneck that hinders the collaborative opportunities in the tea supply chain, actually impeding the passing of economic benefits to the tea growers and producers. Most of the large-scale farmers pointed out that if they were allowed to operate as an independent business, the industry performance would increase considerably. The current structure actually prevents them from establishing good supply chain management practices. The overseas tea importers and distributors also supported this argument, highlighting that they prefer to buy the teas from the original source where there is traceability of the product. They said that customers, especially in the western world, are more concerned with the quality and the safety of the product, hence purchasing directly from the farmers is preferable.

It was further highlighted that the current supply chain structure has significantly affected farming activities, as farmers – especially the large-scale operators – are now gradually leaving the industry or reducing farming operations, since managing farming activities is becoming costly and challenging compared to production and export. As a result, most of the large-scale farmers are now focusing on producing teas, where there is a high profit margin, while sourcing green leaves from tea smallholders. This is obvious when analysing the land area under tea cultivation for tea smallholders and large-scale plantations. Figure 6-11 shows that land area under tea cultivation for

smallholders has increased considerably, whereas it has declined in the large-scale sector. Many large-scale producers are now mostly involved in value-added tea production and export. Most regional plantation companies have their own export arm. However, they still have to bid for their own tea at auction if they want to undertake any value-added tea production.

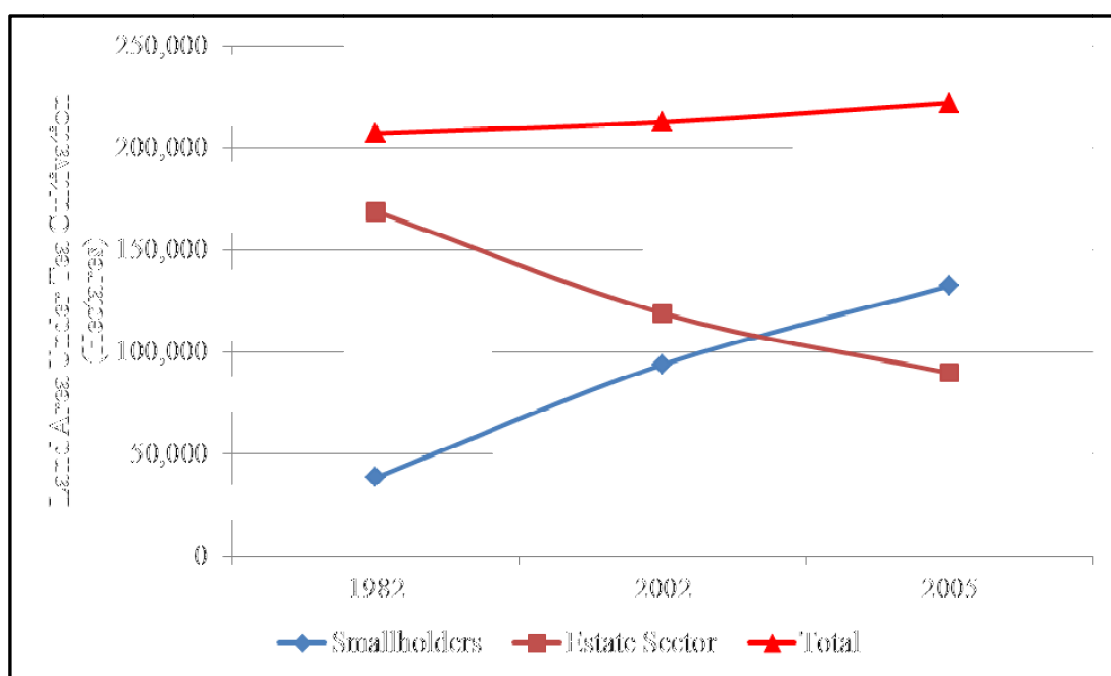


Figure 6-11: Land Area Under Tea Cultivation by Ownership (Hectares)

Source: Department of Census and Statistics (2013)

Furthermore, the current supply chain structure blocks access to market information and increases transaction costs along the tea supply chain. The analysis shows that accessing information is a significant influencing factor, particularly for the tea smallholders, as they have far less direct access to market information than the large-scale plantations and producers. Their only contact point is either the licensed green-leaf dealers or the private factory that buys their green leaves. The discussions with overseas importers pointed out that they prefer to buy teas from sustainable tea smallholders through channels such as ethical partnerships and fair-trade and organic-certification bodies. However, discussions with tea smallholders revealed that they do not have access to such channels due to the current supply chain design. Moreover, even the producers who do have such certifications (almost exclusively large-scale producers) highlighted

that they do not get the maximum benefits from them, as they have limitations on selling directly to buyers who are close to consumers.

Participants also pointed out that there is a high demand for Sri Lankan orthodox teas in the global tea market. As explained in Chapter 5, over 90% of Sri Lankan tea exports are produced by the orthodox method; Sri Lanka produces around 28 grades of orthodox, leafy-type teas, which have a special flavour. Such teas are not suitable for tea bags, but can be used to reach niche markets that meet the specific needs of customer who value the flavour of tea. This has provided a greater opportunity to capture the lucrative specialised-tea market around the world, but the opportunity has been largely lost due to the current supply chain structure.

6.8.2 Lack of Consumer Focus

Lack of understanding of the final customer's requirements was identified as another negative factor in the sustainability of the Sri Lankan tea supply chain. Tea is a commodity product, and meeting the customers' exact needs is crucial. However, due to the tea supply chain design, stakeholders do not understand the needs of the end customer; rather, they focus on their immediate neighbour in their supply chain. For example, the farmers focus on the tea producers' requirement, which is supplying green leaves for production, whereas the producers focus on supplying produced teas to tea buyers through the brokers. The exporters, who are the last node of the tea supply chain in the local section, are focusing on supplying the teas to the overseas importers and distributors, as either bulk or value-added teas. However, even though it is the final consumer who brings new money into the supply chain and who decides which teas to buy, there is a lack of the focus on the end customer.

Discussions with overseas importers (in Australia) highlighted that customers' purchasing behaviour has changed, especially in the food supply chain. Customers are now more concerned with factors such as health, safety of food, food quality, product traceability and sustainability of the production processes. For example, it was mentioned that in Australia the demand for organic teas has increased considerably, and customers are willing to pay a premium price for the value they receive. One tea distributor in Australia said, "Tea is a drink that they [customers] consume every day.

They do not want to put poison into their body. They really care about and are ready to pay for organic products which are safer and also healthier.”

It was mentioned that the customers pay almost double for organic tea compared to other private-label teas available in the supermarkets. Furthermore, it was mentioned that customers are willing to support farmers and primary producers by purchasing products that come directly from farms. However, as explained in Chapter 5, in Sri Lanka only around 5% of the national production sells directly to the customer, while the balance goes through the auction and exporters. Therefore, the lack of focus on the final customer is a major factor in the sustainability of the tea supply chain in the long term.

6.8.3 Information Sharing and Traceability

Due to its fragmented nature, the tea supply chain shows a dysfunctional information system. For example, since farmers and producers have an arm's-length relationship, information sharing is weak. Participants indicated that this was even true for the large-scale producers, as they do not have a direct relationship with the tea buyers.

This has an impact on traceability along the supply chain. Difficulty in tracing product origins was identified as a major factor working against a sustainable supply chain. Many tea importers in Australia highlighted that consumers are now mainly concerned with the ethical and social responsibilities not only of the primary producers but along the whole supply network. Most importantly, they are concerned about the safety of the food they consume. Respondents involved in tea importing and distribution in Australia said that they prefer to buy teas directly from the primary producers, since traceability and tracking of product quality, safety and standards are much more straightforward. They pointed out that it increases customer satisfaction and, most importantly consumers' confidence in the product; this encourages them to become repeat customers.

Traceability also reduces the information asymmetry on the supply chain. The tea importers highlighted that customers now look at the information on the label before buying a product, choosing it only if product traceability is high.

6.8.4 Risk and Uncertainty in the Supply Chain

The interviews indicated that there is a great amount of uncertainty and risk involved in managing the tea supply chain. These uncertainties can be mainly categorised into three types: production and supply; demand; and policy. Production and supply uncertainty is due to several factors. It includes environmental uncertainties such as climate change; lack of input and labour supplies for tea production; lack of investment; and price variation for both green leaves and produced teas.

Demand uncertainty is due to political instability not only in tea-buying countries but also domestically; greater substitutability of tea; and lack of collaboration between buyers and producers along the tea supply chain. Policy uncertainty also has a severe impact on the tea supply chain, as illustrated in Figure 6-12. The following section will further explore these factors.

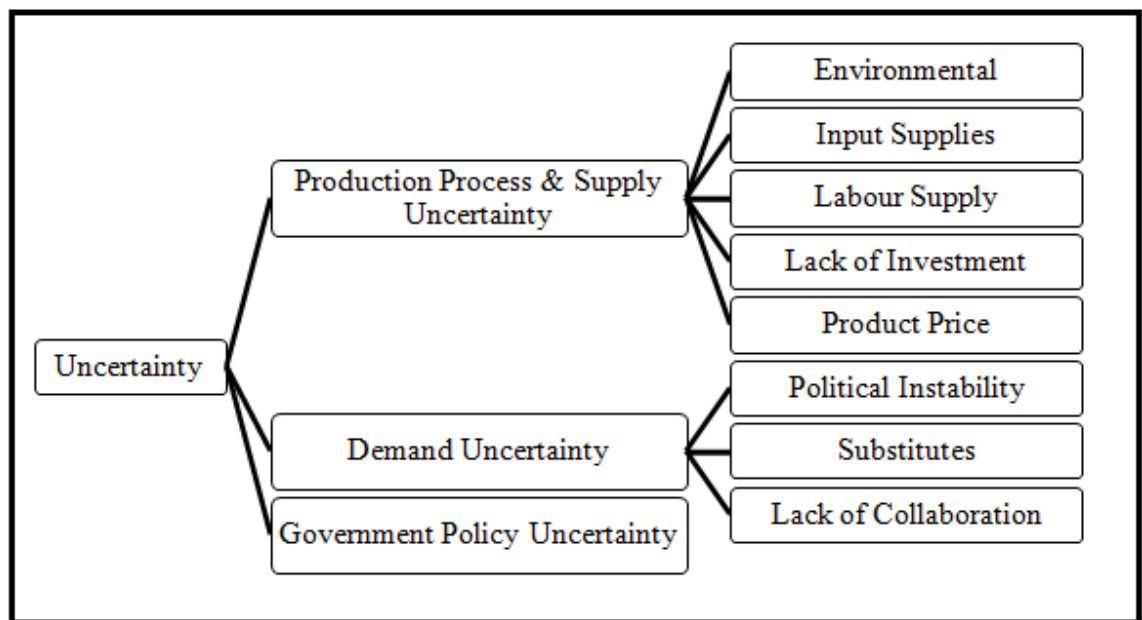


Figure 6-12: Uncertainty Factors in the Tea Supply Chain
Source: Based on Focus-Group Discussions and Interviews

6.8.4.1 Uncertainty in the Production Process and Material Supply

Uncertainty in production and supply is due to adverse weather conditions; lack of input supplies such as energy, fertiliser and machinery; lack of labour resources; lack of investment and variation in production cost and product price.

Tea is a crop that is sensitive to weather conditions; erratic weather directly affects tea production and quality. The participants pointed out that global warming has already instituted severe changes in weather patterns, varying from heavy rains and flooding to erratic dry conditions; these changes affect the green-leaf supply, and hence escalate production costs. Participants pointed out that sudden weather changes also disrupt replanting and harvesting; this in turn, ultimately disrupts the green-leaf supply for tea production, and factories do not get enough raw materials (green leaves) to meet their production capacity. Hence, they are compelled to reschedule their production to minimise the cost. This, in turn, deprives factory workers of employment. For example, to reduce production and inefficiency, one plantation company had to shut down operations temporarily in one of their factories and move production to another, as they did not have enough green leaves to meet the factory capacity. As a result, the number of working days for the labourers in the first factory was reduced from 22 to 15.

Wet weather conditions not only affect production but also lower the quality of the produced tea. Favourable weather conditions¹⁸, including rainfall, temperature and soil conditions, determine the quality of the tea from different “flushes” produced by the same bush or the same variety of bush.

Farmers, especially smallholders, also discussed the uncertainty of green-leaf prices. Even though the reasonable-price formula is used to calculate green-leaf prices, the farmers pointed out that there is no certain policy on weighing green leaves, and tea factories and licensed green-leaf dealers have their own weighing policies. Some buyers deduct unreasonable weight for moisture and “goni” (bags), and the suppliers (the farmers) do not have any opportunity to negotiate, as they must sell whatever they have harvested during the day due to the perishable nature of the supply. The reasonable-price conversion factor varies from buyer to buyer even though the normal conversion factor is 22%. The deduction for damaged leaves demonstrates the same problem. Furthermore, it was pointed out that the buyers reduce the moisture weight and bag weight when they weigh the green leaves, but still use the 22% conversion factor when calculating the average price. The purpose of the conversion factor is to provide a standard factor to calculate the required volume of green leaves to produce a kilogram

¹⁸ *The optimal annual rainfall is around 50 inches (127 cm), and the optimal soil acidity should be a pH of around 4 to 6 (Tripton et al. 1990).*

of tea. However, it was revealed that the green-leaf buyers misuse the system to reduce the prices paid to the tea smallholders. It was observed that factories have significant power over the green-leaf suppliers, where the farmers have naturally become “price takers” due to several reasons, including the perishability of tea leaves, lack of transport facilities and intense competition among green-leaf suppliers.

The perishability of the green leaves necessitates rapid transport, since it is essential to get the leaves to the factory as quickly as possible. As explained in Chapter 5, most of the tea smallholders mainly depend on the buyers’ transport facilities, which further increase the power of green-leaf buyers. Furthermore, it was pointed out that most private factories now have their own tea farms, further increasing the competition among green-leaf suppliers, and thus reducing their bargaining power. It was also highlighted that tea producers face a huge challenge due to the uncertainty of the price they get at auction. For example, producers pointed out that even though they cannot even cover their production costs, they do not have any influence on pricing their product, where the price is predominantly determined by the buyers at the auction. They said that the auction price varies from week to week, as shown in Figure 6-13, and it is neither predictable nor controllable.

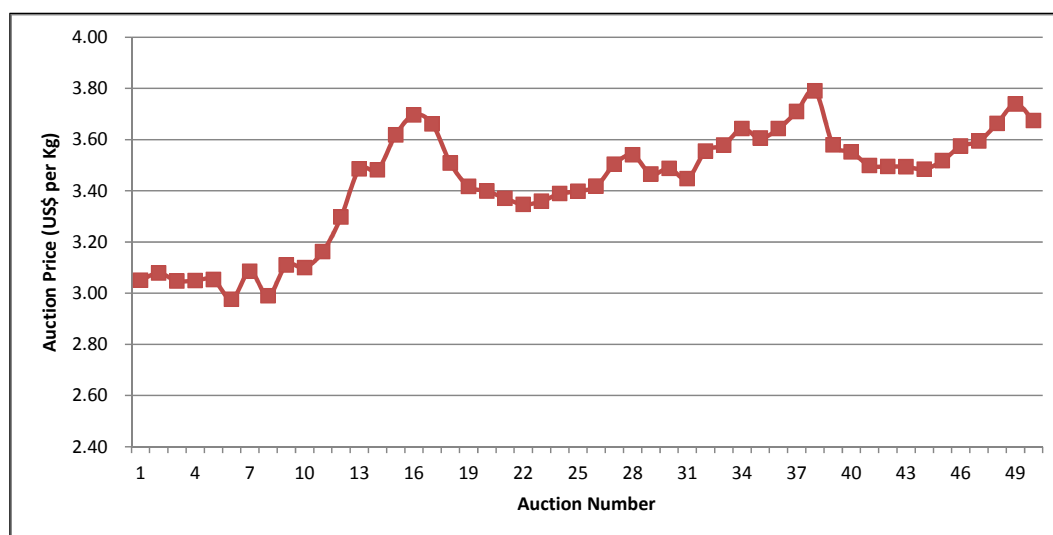


Figure 6-13: Weekly Auction Price for 2012

Source: Sri Lanka Tea Board (2013)

As explained in Chapter 5, tea is sold through three main channels. Participants said that public auction is the main distribution channel for black tea, and only around 5% of

black tea is sold directly. They said that they are able to receive a better price – as much as 20% more – when they sell directly as shown in Figure 6-14.

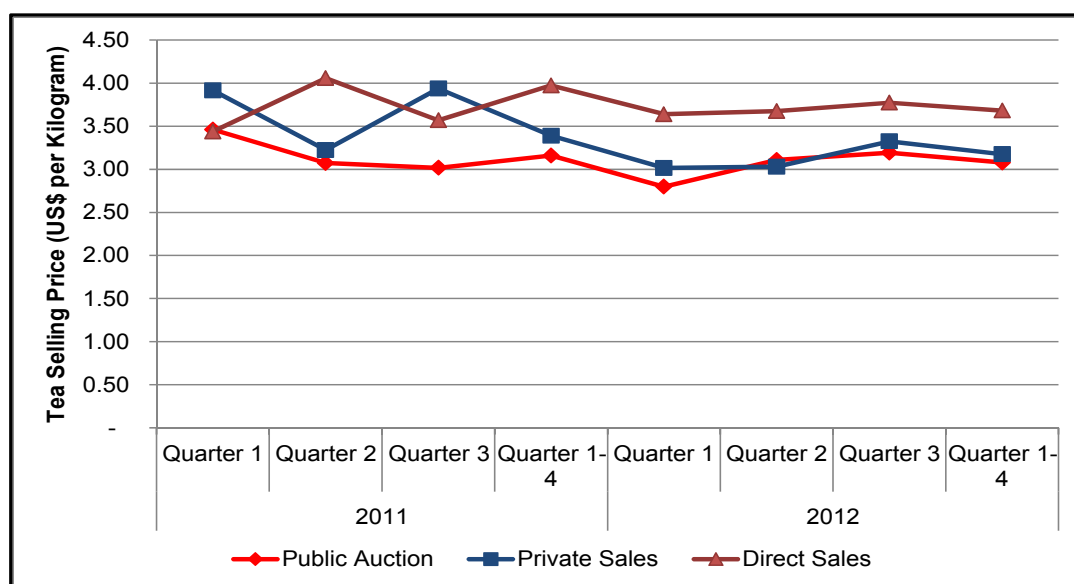


Figure 6-14: Auction Price by Distribution Channel

Source: Sri Lanka Tea Board (2013)

The participants pointed out that even though the Colombo Tea Auction gets the highest price compared to other auction centres, the advantage is comparatively small. As shown in Table 6-4, tea-auction prices in auction centres such as Jakarta (in Indonesia), Chittagong (Bangladesh) and Cochin (in India) have shown an impressive increase.

Table 6-4: Global Tea-Auction Prices (US \$ per Kilogram) (2010 and 2013)

Auction Centre	Auction Price		% Increase between 2010 and 2013
	2010	2013	
Chittagong	2.63	3.22	22%
Cochin	1.71	2.03	19%
Guwahati	2.43	2.25	-7%
Kolkata	2.85	2.56	-10%
Jakarta	1.81	2.27	25%
Colombo	3.28	3.38	3%
Limbe	1.58	1.96	24%
Mombassa	2.54	2.88	13%
World	2.35	2.57	9%

Source: Sri Lanka Tea Board (2013)

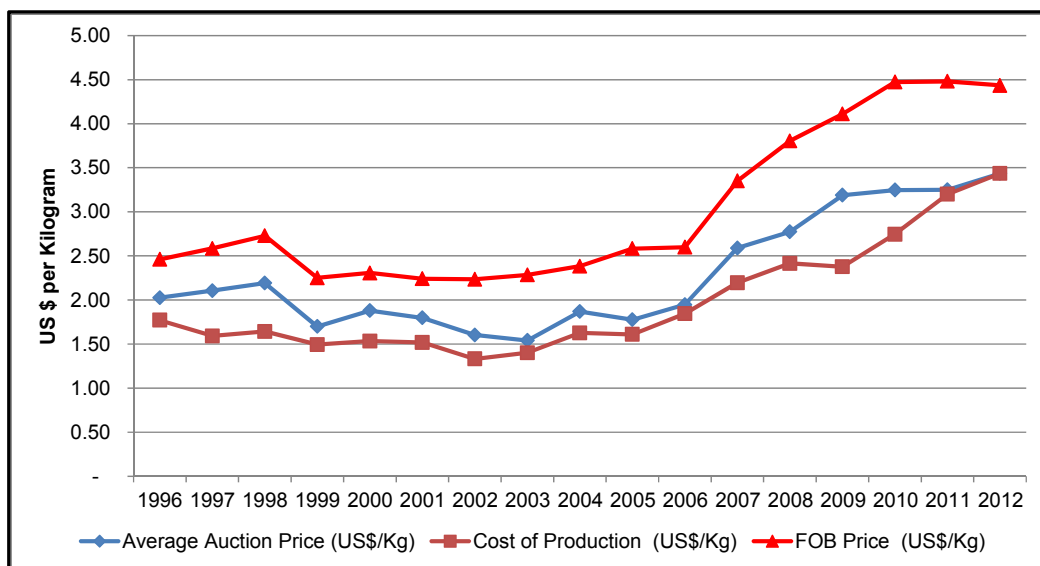


Figure 6-15: Cost of Production, Tea-Auction Price and FOB Price (US\$/Kg)

Source: Various Annual Reports of the Central Bank of Sri Lanka

The unimpressive price increase at the Colombo auction is threatening the underlying profitability of both producers and farmers. This is a severe problem, because production costs are rising remarkably as shown in Figure 6-15, and Sri Lanka now has the highest production cost compared to other tea-producing countries (Section 6.5.1). The producers and farmers who are the main suppliers in the tea supply chain are suffering; this situation is not sustainable in the long term.

The severity of the issues can be further explained when the price transmission along the supply chain is analysed. The asymmetry in price transmission is another risk that affects the sustainability of the tea supply in the long term. Farmers' and producers' prices depend on the auction price. As explained in Chapter 5, the green-leaf price is calculated using the reasonable-price formula. Figure 6-16 shows the price asymmetry along the tea supply chain. It was mentioned that this is as a result of the existing supply chain structure, where the exporters and retailers have strong market power. This is a main reason for not transmitting the price benefits to tea producers. Strong market power passes the price reductions in the world market rapidly to downstream members on the tea supply chain, whereas there are delays to the transmission of price increases. This asymmetric price transmission is a major issue in the tea supply chain. This issue is further worsened by the way the tea supply chain is designed, such that the producers do

not have any collaboration or relationship with the buyers because their teas are sold through brokers.

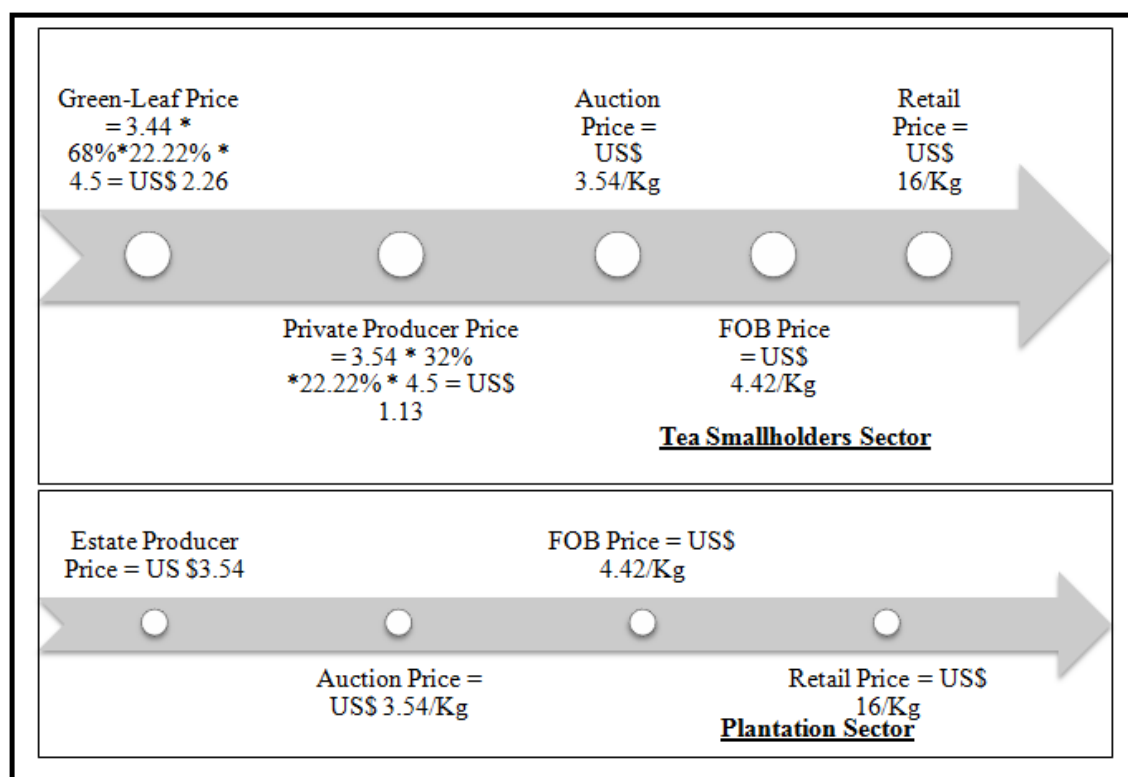


Figure 6-16: Price Asymmetry along the Tea Supply Chain (2012)

Source: Compiled by the Author Based on the Information Gathered from Research Participants and Secondary Reports

Lack of input supplies such as fertiliser and machinery is also an uncertainty in the tea supply chain. For example, even though the government subsidises the fertiliser for the agricultural sector, the availability of fertiliser is becoming a major issue for farmers. Furthermore, participants pointed out that the productivity of large-scale producers is affected, due to negative cash flows; they further struggle to get enough fertiliser. Even the smallholders pointed out that in recent times there has been a lack of fertiliser availability, largely because the government has not paid the subsidies that are due and the major fertiliser suppliers have stopped supplying fertiliser on subsidised prices. As explained in Section 6.3, labour supply and lack of investment are two other uncertainty factors that affect production and supply in the tea supply chain.

6.8.4.2 Demand Uncertainty

Demand uncertainty is also a burning issue. The participants pointed out that due to various factors such as convenience and changes in tea-drinking habits, the actual demand for real tea is falling sharply. It was pointed out that since customers are now more focused on convenience, the demand, especially in western countries, for “ready-to-drink (RTD)” tea has increased. However, this has not helped to boost the production volume, because RTD tea uses smaller quantities of tea than traditional forms. Participants also pointed out that tea drinkers, especially in western countries, are now moving away from “hot and bitter” drinks to “cold and sweet” drinks.

The political instability in tea-importing countries is also another factor in the demand uncertainty in the tea supply chain. Even though Sri Lanka has received high prices from destinations such as Middle East/Gulf region countries, political instability in those regions not only negatively affects the demand for tea but also increases the uncertainty in transferring funds and arranging logistics. The local commercial banks are reluctant to open lease contracts with banks in unstable countries, while the shipping companies hesitate to accept direct consignments to such countries due to logistics issues.

Demand uncertainty also results because producers do not have direct access to their markets or their customers. They do not receive market information and customers’ requirements directly from the customers, due to the supply chain structure, but through brokers, who are the only contact point for the producers.

The Sri Lankan tea industry is focusing on niche markets, where the consumers are more concerned about the quality of the tea. However, producers are not allowed to directly collaborate with such markets and to understand customers and meet their requirements. Even large-scale producers involved in both production and export, still must submit their teas for auction and bid for them if they want to export tea. Since the Sri Lankan tea industry is mainly focused on high-quality tea and competing in these niche markets, it is not easy to compete with other producers without having better collaboration and relationships with their customers. This is identified as a major issue in the tea supply chain.

6.8.5 Supply Chain Resources and Input Supply

The availability of key inputs such as tea plants and seeds was also identified as an area of great risk for farmers, especially for tea smallholders. It delays the replanting and in-filling processes in the tea plantation. Access to other inputs such as fertiliser was also identified as a challenge for tea smallholders. The farmers further highlighted that even though fertiliser is subsidised by the government, access to fertiliser is a major issue for farmers located away from fertiliser distributors in Colombo. As explained in Chapter 5, the farmers mainly depend on the private tea producers to deliver fertiliser; again the farmers become captives of the tea producers, further reducing their bargaining power and increasing the power of the factories.

6.9 SUMMARY

This chapter explained the main influencing factors on a sustainable tea supply. The research used content analysis: coding was used to identify the factors with the use of focus-group discussions and individual interviews with industry stakeholders in Sri Lanka and Australia. Based on the analysis, six themes were identified as main influencing factors on sustainable tea supply chain management: (1) governance and policy; (2) social factors; (3) economic factors; (4) environmental factors; (5) research and education; and (6) supply chain operations management. The sustainability of the industry and its supply chain is strongly affected by governance and policy because the tea industry is heavily regulated by the government.

Governance and policy was identified as a main factor that influences the sustainability of the tea supply chain. Being a highly regulated industry, the tea supply chain is facing a huge challenge in the global market. As tea is a commodity product where there is intense competition in the world market, price has been the main deciding factor for the ultimate consumers. However, due to the strict control of the supply chain, the producers have become price takers, as they do not have any opportunity to negotiate with the buyers.

On top of that, government bureaucracy and high taxes also threaten the sustainability of the tea supply chain. The administrative barriers have increased transaction costs and

delays along the supply chain due to excessive quality-assurance programs and certification processes. Policies on ownership have further increased the risks to sustainability, since farmers, especially plantation companies, are reluctant to invest in replanting and factory developments due to cash-flow issues and poor returns on investments. Furthermore, ownership policies have hindered the introduction of innovative strategies to improve the quality of both product and processes. This chapter also highlighted that the constraints on tea imports have negatively affected the value-added tea production, resulting in outsourcing the value-added operations to overseas importers.

Several social factors such as shortage of human resources, workers' high dependence on the plantation companies and social inequality, health and safety aspects were identified as major contributing factors to the sustainability of the sector. The labour shortage is intensifying due to labour migration, low dignity accorded to the work and harsh living conditions on the plantations. Absenteeism was another contributing social factor, as despite bonus incentives, many labourers' attendance is not reliable, which frequently disrupts production processes. Social inequity was another identified factor, where there is an imbalance of wage rates and working conditions based on gender. Male workers enjoy more benefits compared to female labourers, although the latter work longer hours. Due to this factor, younger female workers are moving to cities looking for other employment opportunities as domestic servants or as labourers in other industries.

Several factors were identified under the economic theme, including high production costs, lack of investment and infrastructure, gaps in technology and volatile prices. High production costs are linked with labourers, as labour costs account for nearly 70% of production costs. There is also another linkage with policies, as salaries are decided by the government based on negotiations with labour unions, and are not linked to productivity or performance. The producers experience huge losses where they cannot even cover the production cost with the price they get from the auction. This has resulted in lack of investment to develop the sector. This factor is also linked with the supply chain structure, where the producers have no opportunities to work closer to the consumers to increase their profits.

Outdated technologies and lack of equipment are another factor that influences the sustainable tea supply chain, limiting productivity and resulting in poor performance. Lack of research facilities for the development of the industry is another factor that emerged from the analysis. The industry is in a debate on who is responsible for conducting and financing research. There are no collaborative research and education programs in the tea industry.

Lack of customer focus is an important influencing factor resulting from the supply chain structure. Producers do not have much opportunity to go closer to the end consumer due to the supply chain structure; this has resulted in a lack of information-sharing and traceability along the supply chain. Traceability is becoming increasingly important as consumers become more concerned with sustainability concepts and transparency in the product flow; and they are typically willing to pay more to buy from the primary producers who produce the product sustainably.

Finally, uncertainties in the production process, material supply and auction prices also surfaced from the analysis. There is a huge price asymmetry along the tea supply chain, mainly due to the supply chain structure. Tea buyers have a high market power compared to producers. These factors have a huge influence on the sustainability of the tea supply chain.

The next chapter discusses the overall findings to address the study's four research questions.

CHAPTER 7

DISCUSSION OF FINDINGS

7.1 INTRODUCTION

The primary objective of this research was to identify the influencing factors on sustainable tea supply chain; specifically in Sri Lanka. The main research question was “What are the influencing factors for maintaining sustainable supply within the Sri Lankan tea industry?” As explained in Chapter 2, this research question aimed to achieve the following specific objectives:

1. Map the tea supply chain in Sri Lanka and explore sustainable supply.
2. Pinpoint the factors that affect the sustainability of the tea industry.
3. Explore, when and how the factors identified above affect the sustainable supply.
4. Establish the factors that have an impact on the future sustainability of the Sri Lankan tea industry.

As explained in Section 2.7, to answer the main research question and to achieve the research objectives, the following subsidiary research questions (RQ) were developed based on the literature review.

RQ1 – What is sustainable supply in the context of the Sri Lankan tea industry?

RQ2 – What are the influencing factors on sustainable tea supply chain management in Sri Lanka?

RQ3 – How do these factors affect the tea supply chain?

RQ4 – In what capacity do they affect the future sustainability of the tea supply chain and its performance within Sri Lanka?

To answer the research questions and to meet the research objectives, this research used the Sri Lankan tea industry as a case study and employed a qualitative research approach, because it was essential to understand deeply the dynamics of the Sri Lankan tea supply chain.

This thesis was structured as follows. Chapter 2 provided a literature review related to the research topic. Chapter 3 presented an overview of the Sri Lankan tea industry; and Chapter 4 explained the research method and the rationale for selecting a qualitative approach to answer the research question. Chapter 5 presented the analysis used to explore the main stakeholders in the tea supply chain, the supply chain structure and its main operations, and presented supply chain maps developed from the research to represent the Sri Lankan tea supply network. Chapter 6 described the major influencing factors on a sustainable tea supply chain for the Sri Lankan tea sector.

The objective of this chapter is to summarise the findings and to link them with supply chain management concepts and theories. This chapter has three sections including this introduction. Section 7.2 describes the findings of the research, specifically focusing on the four research questions set up in Section 2.7. First, based on the analysis given in Chapters 5 and 6 and supported by the literature, it addresses the Research Question 1, defining sustainable supply in terms of tea supply chain. This section also focuses on Research Question 2, identifying and describing main influencing factors and linking them to the literature. It then describes how these influencing factors affect the sustainability of the tea supply chain in Sri Lanka, focusing on Research Question 3. Finally, it addresses Research Question 4 by exploring how these factors affect the future sustainability and performance of the tea supply chain. Section 7.3 provides a summary of the chapter.

7.2 INTEGRATING DISCUSSIONS WITH RESEARCH FINDINGS

This section discusses the empirical findings of the research and specifically refers to the four research questions developed in Section 2.7. An explorative inductive approach was employed in this research and the analysis presented in Chapters 5 and Chapter 6 was used as the basis to answer the research questions.

7.2.1 Research Question 1: What is Sustainable Supply in the Context of the Tea Supply Chain?

The analysis related to Research Question 1 is descriptive in nature, as it aims to define the term “sustainable supply” in the context of the tea supply chain. As explained in

Chapter 4, to define sustainable supply, the researcher first explored and mapped the Sri Lankan tea supply chain to identify the connection and linkages between the stakeholders in the tea industry. To answer this research question and to meet the relevant research objective, the researcher used an explorative approach that incorporated several data sources, including the data collected through focus-group discussions and interviews, secondary documents and existing literature.

7.2.1.1 Defining Sustainable Supply

The term “supply” can be defined from different perspectives. Most importantly, raw-material or component supply plays an important role in the supply of materials within and between firms (Monczka et al. 2010). Acquiring and accessing goods and services is a main focus of any business. However, with the introduction of sustainability concepts and increasing competition in the global market, the supply of other tangible and intangible inputs such as infrastructure, information, innovation and knowledge, people and relationships plays a major role in any business (Waters 2009b).

Not surprisingly, this study’s exploration of the tea industry and relevant literature found that a pure focus on raw-material supply (for example green-leaf supply in tea supply chain) is not enough to achieve sustainable tea supply. In the tea supply chain, while green-leaf supply is important, there are several other important components that should be included in the definition of sustainable supply. This study revealed that with increasing competition and knowledge of sustainability concepts, supply should be defined more broadly than simply focusing on purchasing operations. As shown in Figure 7-1, seven elements were identified as components of sustainable tea supply: raw material supply, capability of supplying money, infrastructure, information, technology and innovation, human resources and knowledge, and relationships.

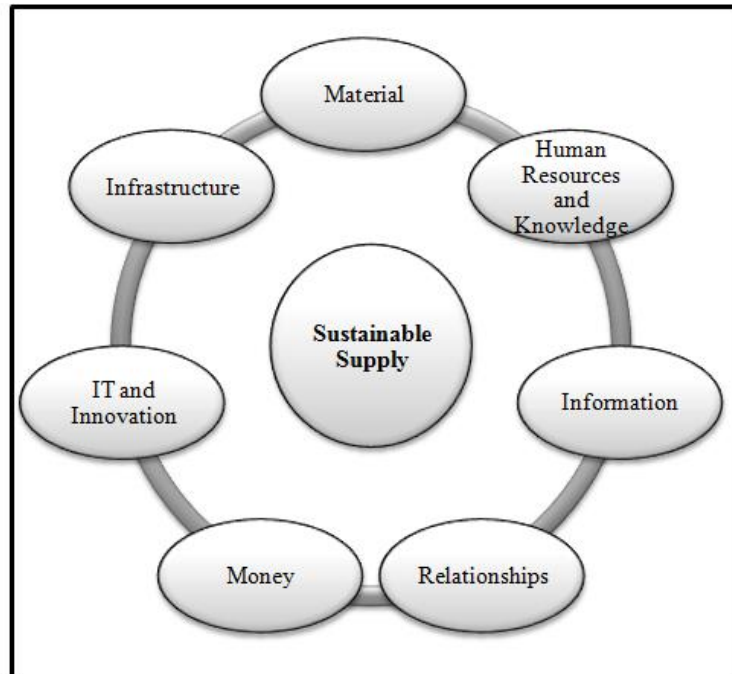


Figure 7-1: Main Components of Sustainable Supply

Source: Developed by the Author based on Focus-Group Discussion and Interviews

Financial supply focuses on the supply and flow of cash, investments and monetary commitments on the operations in the tea supply chain. As explained in Chapters 5 and 6, lack of a sound cash flow along the tea supply chain has been a major issue in obtaining sustainable tea supply. For example, green-leaf supply has declined due to the drop in revenue generated from the tea-production process. In particular, many large-scale tea producers have reduced green-leaf production due to the high production costs involved, as they cannot even cover the harvesting cost when growing tea. Lack of funding along the tea supply chain, especially at the root level has negatively impacted on tea supply. According to Barry (2006a) financial supply is essential to facilitate value creation along the supply chain. Authors like Bovet and Martha (2000) and Styger (2010a) also emphasised that the integration of operational functions within the order-to-cash cycle requires a sustainable reduction in the delays in financial flows along the chain. This indicates that financial supply is important to increase the sustainability of business operations and tea supply.

Supply of infrastructure and facilities, such as production facilities, warehousing, transport infrastructure (roads, airports, shipping ports and railway) and technology, is

also important to achieve sustainable supply (Finch 2008; Swink et al. 2011). This study found that supply of better infrastructure not only improves performance, but also increases the access to the resources required for sustainable supply. For example, in the tea supply chain, lack of transport facilities negatively affects green-leaf supply. The quality of the leaves deteriorates because the green-leaf producers cannot deliver their products to the buyers quickly, which in turn affects sustainable tea supply. As explained in Chapter 5, private tea factories provide transport facilities to collect green leaves from tea smallholders. This has encouraged farmers to grow more types of tea, which increase the green-leaf supply and helps to increase the quality of the green leaves, as better transport service reduces damage during transit.

As explained in Chapter 2, supplying better technology would be a good enabler of the success of any business (Hammant 1995; Siau & Tian 2004). It increases connectivity not only within the company but also with outside partners, increases the integration and innovation in the value chain and enhances sustainability. Integration between channel members can be improved with the use of information technology, which will result in improved the performance measures (Hill 2000). Nidumolu et al. (2009) pointed out that innovation in technology, production processes and raw materials offers further opportunities to increase the sustainability of tea supply.

On the other hand, supply of technology helps to smooth the movement of data and information. The advent of information systems and e-business has been a major enabler in improving business processes mainly in a globalised context (Barry 2006b). Supplying timely and accurate information has become critical for many reasons such as providing better customer service, substituting for inventory and other resources when dealing with uncertainty, removing some costs of the supply chain, increasing the flexibility of resources and helping to gain competitive advantage. Information sharing refines supply chain relationships between partners. Therefore, supplying accurate information in a timely manner would increase the performance of the firm. However, this research indicates that the supply of information is minimal in the Sri Lankan tea supply chain, due to the fragmented nature of the tea supply chain.

This research also highlighted that money, infrastructure and technology are not sufficient to obtain a sustainable tea supply. For example, Fawcett et al. (2007) said that

technology is not a “silver bullet” to solve supply chain challenges. Implementing a technology on a wrong process increases the efficiency of “doing wrong things” and will make mistakes faster compared to manual system, in the environment for example. Thus, it does not add real value to the processes and without talented human resources and the specialised capabilities it is difficult to realign the supply chain. Such human resources are considered as the premium assets for any business (John 2007).

A tea supply chain that has a high social dependency, needs talented people with specialised capabilities along the entire supply chain from farm to export, not only to improve the processes but also to implement strategies to achieve long-term sustainability. For example, labour shortages were identified as a major issue in the tea supply chain: hence, identifying strategies to retain skilled people within the tea supply chain is essential. However, the availability of human resources is increasingly becoming challenging. There is a shortage of labourers on plantations; simultaneously, young managers are moving away from the plantation sector. Companies need to source people with better qualifications, knowledge and skills to implement their strategies. To achieve this objective it is necessary to increase employee satisfaction not only financially but also in terms of opportunities for them to actively participate in operations and decision-making processes, employee empowerment and facilities to increase their well-being (Macdonald 2007).

Supplying innovative ideas and knowledge is also essential for any business to be sustainable in the long term. Better relationships provide linkage between organisation, suppliers and customers to maximise benefits. However, this would not give any positive results to the organisation unless there were also a supply of qualified and skilled human resources (Cavinato, Flynn & Kauffman 2006). Even if there is enough money, strategies or new ideas to increase the efficiency, a firm needs skilled people to implement those strategies. It is not just money or strategy that makes the difference (Rainey 2010). The supply chain needs to be considered as a mix of 45/45/10 – people, technology and hard infrastructure – because in future the competition will be mainly between supply chain alliances (John 2007). Strong consideration of ethical and social responsibilities in people management is essential to have a continuous supply of trained and capable people.

With globalisation, supply chain complexity has increased along with their vulnerability to risk (Pai et al. 2003). Addressing the risks in an environmental, social and economic context is a major challenge for sustainable supply. Proactive companies consider sustainability as a strategy more than just a complement to environmental laws or “being green” (Darmanata et al. 2010). Environmental laws vary from country to country and compliance to the law has become complex in the globalised economy (Nidumolu, Prahalad & Rangaswami 2009). Managers and employers at all levels need to have a broader knowledge of every part of their business and market environment as well as other factors relevant to their social and natural environment. They should be able to craft strategies, manage operations, lead changes and make effective decisions to achieve competitive advantage (Barry 2006a; Bovet & Martha 2000). Styger (2010a) also pointed out that lack of qualified and motivated leaders is a great challenge that restricts the companies moving towards sustainably.

The sustainable performance of the supply chain depends on the relationship between all partners in it (Van der Vorst, Beulens & Van Beek 2000). For example, an organisation might not share information with another company unless there is trust and a good relationship. Technology can build connectivity, but better understanding, trust and relationship between firms is what enhances the overall performance. Considering these factors, this research defines sustainable tea supply as:

“continuous supply of raw materials (green leaves) and other components such as money; infrastructure including buildings (such as office space, factory sites and warehousing facilities), transport equipment, transport modes and terminal facilities (road, rail, port and air); data (production, demand and forecasting), information systems, technology, innovative ideas and knowledge and ethical human-resource procedures; and better relationships both internally and externally to meet current and future customer requirements while increasing the benefits to current and future stakeholders related to tea supply chain in the long term”

7.2.1.2 Identifying Issues in the Tea Supply Chain

The development of a supply chain map for the tea industry identified several issues. It was observed that there is a lack of collective focus and integration among the partners along the tea supply chain, and that each stakeholder tried to maximise their own benefits instead of having shared benefits. For example, even though farmer who are the primary suppliers of raw material (e.g. green tea leaves) are important stakeholders in the tea supply chain, they are facing greater risks and challenge in maintaining the long-term sustainability of tea supply in Sri Lanka, because they are not formally connected with the other stakeholders in the tea supply chain. For example, as explained in Section 6.5.1 high production costs have been identified as a major issue at the root level (e.g. for farmers and primary tea producers). However, stakeholders such as brokers and tea exporters who are at the other end of the tea supply chain gain more price advantages over the farmers and primary producers due to the price discrimination along the supply chain. When the production cost, auction price and export earnings are compared (see Chapter 2), the farmers and primary producers obtain a much lower margin than tea exporters and other industry operators. This has been a major concern for farmers/producers, especially large-scale farmers. As explained in Chapter 6, farmers do not have a sound cash flow to reinvest in replanting and process improvements. This ultimately affects the long-term sustainability of the industry; for example, the entire tea supply chain could collapse due to lack of green-leaf supply. The other stakeholders, particularly, the regulators, have not identified this as an issue due to a lack of awareness in SCM concepts. This has prevented the industry from working as a holistic system to achieve long-term collaboration to improve the performance in the tea supply chain. On the other hand, smallholders or farmers are completely ignored when information on market demand and changes is shared, as they are not involved in the communication channel. This is a major issue, as they are responsible for producing over 50% of the national tea production.

Dynamics along the supply chain are another contributing challenge for the tea supply chain. For example, abrupt policy changes both within and outside of the country, volatile demand and other external factors such as political issues in tea-importing countries are some concerns that affect the tea supply chain. These dynamics

significantly complicate the management of the tea supply chain, and lack of integration along the supply chain makes them even more complex, as the partners who are in the upstream section of the chain do not see the supply chain issues in advance. This prevents the implementation of proactive strategies to solve the issues collectively. The situation is further worsened by the lack of system-wide thinking and implementation of integrated supply chain concepts on managing their business operations. The Sri Lankan tea supply chain is fragmented, and there are several missing links, as explain in Chapter 5. As result, several issues, such as lack of customer focus and collaborative relationships are apparent in the tea supply chain.

7.2.2 Research Question 2: What Are the Influencing Factors on Sustainable Tea Supply Chain Management?

As explained in Chapter 6, a qualitative explorative approach was used to answer the second question; this approach inductively develops a list of influencing factors on a sustainable tea supply chain (Table 6-1) using this study's focus-group discussions and individual interviews. Insights obtained from secondary documents and field observations were also useful in finding the influencing factors. As shown in Figure 7-2, the factors that emerged from the analysis were grouped into four categories: policy (focus on factors related to the business environment), profit (focus on factors related to economic activities), people (focus on factors related to ethical and social concerns) and planet (focus on environmental factors). These four categories will be discussed in this section.

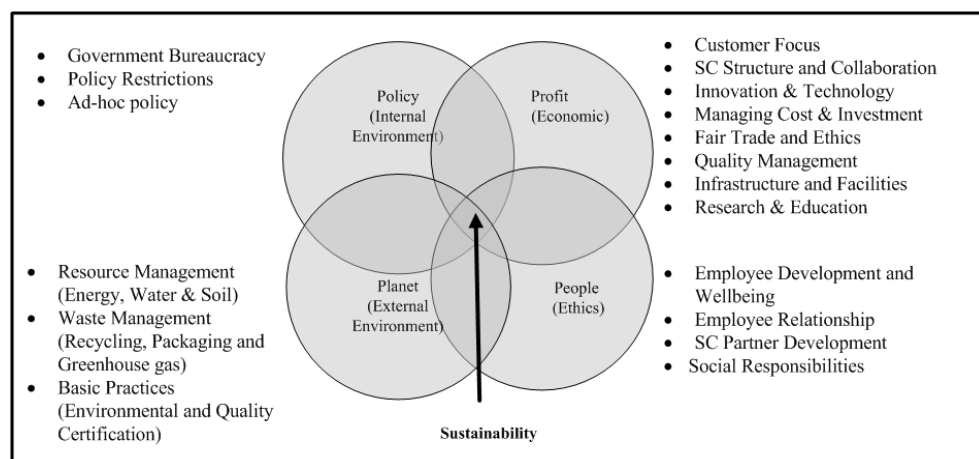


Figure 7-2: The Four Ps of Sustainability in the Tea Supply Chain
Source: Adapted from Carter & Rogers (2008)

The environment represents the “public good” which is defined as shared benefits for all in society. Research shows that many market systems easily ignore the public good. Hence government intervention is essential to motivate corporations to minimise environmental and social damage from their operations (Bhat 2008). Laws and regulations are now trending in favour of sustainability frameworks; however, environmental laws vary from country to country, making compliance to individual laws complex in a globalised economy (Nidumolu, Prahalad & Rangaswami 2009). To a great extent, government legislation and policies play a significant role in protecting the “public good”.

However, as pointed out by many research participants strict governance and policies are a bottleneck on the sustainability of the tea supply chain in Sri Lanka. As explained in Section 6.3, government bureaucracy, high tax implications, and restrictive policies on ownership and tea imports and exports were identified as main factors that negatively affect the sustainability of the tea industry. Bureaucracy increases transaction costs along the tea supply chain, mainly due to cumbersome administrative processes. For example, as explained in Chapters 5 and 6, excessive documentation is required to obtain approval on various processes such as production, export and import at different stages; and vigilant quality-checking process delay business operations, increase transaction and operation costs and waste time. Industry operators do not have the flexibility to manage their businesses in an effective way, as they have to waste time and resources satisfying bureaucratic requirements. According to Lie et al. (2012) supply chain management theories such as LEAN concepts highlight that excessive quality-checking and repetitive processes are highly detrimental: not only they are a waste of time and resources, but they also increase cost and destroy trust along the supply chain.

Adverse policy restrictions on the marketing channel were identified as a root cause for many of the challenges along the tea supply chain. They limit flexibility in doing business, serve as a barrier to better relationships with customers and prevent innovation along the tea supply chain. Due to these policy restrictions, value-added tea production is still underdeveloped. Primary producers cannot undertake it, as they must sell their teas at the public auction before doing any value-added operations. Claro and Claro

(2004) highlighted that the producers in agri-supply chains such as coffee have increased their performance and profit through directly collaborating with buyers. Kaplinsky (2004) also stressed that changes in supply chain governance can provide price benefits to primary producers. For example, being close to the consumer market provides better opportunities to understand consumer needs, supply the right product for the right price, provide any price-reduction benefits and develop a loyal customer base.

Due to the current supply chain structure, the producers neither know their final customers nor understand these customers' exact requirements. They only focus on the immediate customers and assume that their supply chain ends at that point. Anderson, Britt and Favre (1997) said that the fundamental policy in supply chain management is to identify customer needs and develop supply chain strategies to meet those needs while reaching the end consumer effectively and efficiently. Torres and Miller (1998) also added that a "one-size-fits-all" concept does not help to increase performance. It requires end-to-end visibility to increase performance and to achieve competitive advantage in any business sector. Particularly, this is important to the Sri Lankan tea industry as producing high quality is the main principle of the industry, which requires differentiating the customers and designing the supply chain accordingly. As explained in Section 6.5.4, even though tea is considered a commodity, consumers' purchasing behaviour has changed, as they are now more concerned about safety and quality. They are happy to pay a premium price for products such as organic tea or ethically produced teas, as explained in Chapter 6. As pointed out by Fisher (1997), product quality affects purchasing decisions, and customers are willing to wait a longer time and pay a higher price to get the best-quality product. Francis (2008) also says that capturing and satisfying consumer needs in the value chain has been identified as a source of differentiation and competitive advantage.

Participation in fair trade and use of quality standards also has an impact on sustainability. Generally, the greater portion of profit on a product is shared by the stakeholders at the later nodes along the supply chain, with primary producers obtaining only a very low return. This has become a major issue for many agricultural producers (Pérez-Grovas, Cervantes & Burstein 2001). Fair-trade initiatives are facilitating a philosophy of equitable return to primary producers that gives them an opportunity to

use returns to achieve long-term sustainability (social, environmental and monetary). This creates a great opportunity for the primary producers to overcome their cost issues and other social issues at root level. This argument again demands a structural change in the tea supply chain, as such benefits from these standards can be obtained only if primary producers can directly do business with the end customers.

Infrastructure such as production facilities, warehousing and transport infrastructure (roads, airports, shipping ports and train tracks) enable organisations to gain access to scarce natural resources to improve product quality and service while increasing performance along the supply chain (Finch 2008; Swink et al. 2011). Furthermore, improving the agri-supply chain increases opportunities to develop basic infrastructure such as transport and electricity in rural areas, as agricultural activities are more concentrated in rural areas (Stamm et al. 2006).

Innovation is about doing things differently and efficiently. It is the development and exploitation of a new ideas rather than just an inventing a new idea or concept (Tidd & Bessant 2009). It does not need to be associated with sophisticated technology, but can vary from an incremental innovation to radical technological and design driven innovation (Verganti 2009). Innovation should deliver environmental benefits if implemented correctly (Bhat 2008). Nidumolu et al. (2009) emphasised that innovation in technology, production processes and raw materials offers some opportunities to increase the sustainability of any business; however, innovation appears to be lacking at the grass roots of many supply networks (Styger 2010a).

In addition to facing ongoing challenges in operations, companies also have to face fiscal challenges. It is essential to have adequate money to maintain the liquidity of the business. To achieve corporate objectives by implementing better strategies, it is usually necessary to invest money in the business, as implementation of any strategy will initially add more cost to the business system (Styger 2010a). Barry (2006a) showed that better financial supply chain solutions would provide more opportunities to manage receivables, and make accurate financial forecasts while reducing the capital workings required to implement new sustainable strategies.

Many environmental factors such as climate change, lack of accessibility to renewable energy, recycling waste and various sustainability initiatives were identified as important drivers in a sustainable tea supply chain. Depending on the climatic conditions, tea flavour and yield vary considerably; this in turn affects the quality and thus market price. Access to electricity and diesel was identified as major challenge, as oil and diesel prices are increasing. Despite proactive strategies to reduce the use of diesel and electricity in production facilities, there are difficulties in using sustainable sources such as hydro power and bio-energy (for example, wood and other plant materials), since most producers do not have access to such resources or the capability to obtain them. Even though there are substitute bio-energy sources, such as paddy harsh, sawdust, rice straws and husks, coconut shells and rubber-tree wood, the technologies and industries to make these viable energy sources are not yet fully developed.

Social responsibility is increasingly becoming an important topic in the business environment. Roland (2003) said that social responsibility focuses not only on how a company conducts its operations, but also on the final product that it provides. It is essential to consider all stakeholders along the supply chain from the raw material supplier to the final consumer. This includes employment conditions, basic human needs such as health and safety, preserving cultural values around the firm's operations, social benefits to improve the community needs and leaving the environment in good condition for current and future generations.

In Sri Lanka the plantation companies are responsible for providing basic needs to their labourers living within the plantation, such as housing, water, electricity and sanitary facilities, as well as health-care and child-care facilities, addition to wages. As pointed out by the plantation managers, these are additional costs in their supply chain. Despite the extra costs incurred, corporate social responsibility programs such as occupational health and safety are becoming increasingly important. Both large-scale and smallholder farmers said that labourers are now migrating to cities due to poor living conditions on plantations, low dignity of the job and harsh working conditions. The younger generation is especially reluctant to work on plantations, and young adults are moving to cities despite salaries being lower than in the plantation sector. Eisenberger et al.

(2001) stressed that while employees' attitude and behaviour has an impact on their organisations' performance, the organisational culture also has an impact on employee engagement and participation. They asserted that employee commitment can be increased only when employees feel that their organisation cares about their wellbeing and appreciates their commitment. However, this research highlighted that the social stigma of tea-plantation work is a major issue. The employees reciprocate the lack of respect they feel through absenteeism and lack of commitment. Therefore, improved employee-employer relationships are essential to maintaining a sustainable labour force.

This study found that social and gender inequity is another reason for the growing labour shortage. Almost 70% of the plantation workforce are women, who mainly work as tea harvesters. Even though women work longer hours than men, this study's analysis found that their wage rates are lower. Due to this fact, many female labourers are leaving plantations to work in cities as housemaids. While authors such as Wallace and Leicht (2004) pointed out that gender inequality is a major issue even in the developed world, according to Lindsey (2014), the exploitation of women labourers is comparatively high in the developing world and one major reason for increased poverty. This indicates there is a greater need to change management perspectives on this matter to have a socially sustainable supply chain.

7.2.3 Research Question 3: How Do These Factors Affect the Tea Supply Chain?

The factors identified in Chapter 6 indicate that most of these factors are directly linked with the tea supply chain structure. For example, the current structure is under the direct influence of government policies and regulators. Even though many researchers pointed that supply chain managers use theories such as transaction-cost theory to identify the appropriate supply chain structure (Garfamy 2012; Wever et al. 2010), this study indicates that the current tea supply chain structure is a result of the strict government control and policies, not purely based on transaction-cost-theory or any other supply chain management concepts. As a result, the tea supply chain has been using a market structure (spot market), which in turn restricts the industry operators from implementing better collaborative strategies close to customers. It has also prevented the industry operators (especially farmers) from getting the benefits from implementing sustainability initiatives in their operations. It has become merely an additional cost for

them. This has further blocked the transparency along the supply chain and affected the implementation of innovative strategies. These factors are further described below.

7.2.3.1 Tea Supply Chain Structure and Governance

Government intervention is required to motivate corporations to minimise environmental and social damages from their operations (Bhat 2008). In the current globalised environment, law and regulations related to corporate social responsibility and sustainability concepts are becoming very important, especially because environmental laws vary from country to country (Nidumolu, Prahalad & Rangaswami 2009). However, absolute government policies do not always promote competitiveness (Luo & Junkunc 2008). Sometimes unhealthy policies create a government bureaucracy that poses superfluous administrative barriers to operations management. Importantly, some government policies are politically motivated, and are implemented regardless of their impact on the business environment. It is also true that the relationship between government and business is important in market economies, as the success of the economy heavily depends on how the two interact. Even though it is possible to introduce markets without government support, a robust policy framework is essential, as it provides a legal framework to protect businesses not only in the globalised environment but also domestically (Fitriati & Rahmayanti 2012).

The Sri Lankan tea supply chain is under the absolute control of the Sri Lanka Tea Board in a number of ways, including controls on selling channels, production, importing, multiple quality checks and ad-hoc policy implementation. As explained in Chapter 5, it is a policy that all teas produced in the country must be sold through public auction. This policy is destructive, because the producers have no opportunity to take any real business decisions to improve their business performance. Even though the regulators try to justify that the public auction provides equal opportunities for everybody and increases competitiveness in the industry, producers and farmers have a different view. They pointed out that primary tea producers do not get the maximum price for their product, and cannot even cover their production costs under the current structure and government policies.

Under this policy structure, brokers serve as the intermediaries between producers and buyers, and many respondents identified them as the centre of the tea industry. As explained in Chapter 5, farmers simply serve as green-leaf suppliers to tea producers, who in turn serve as raw-material suppliers to value-added tea producers and exporters. Producers' relationship along the tea supply chain ends as soon they deliver the teas to the brokers for auctioning. Under these circumstances, the farmers and primary tea producers are not linked with the rest of the stakeholders in the tea supply chain because they must always go through a broker as illustrates in Figure 7-3.

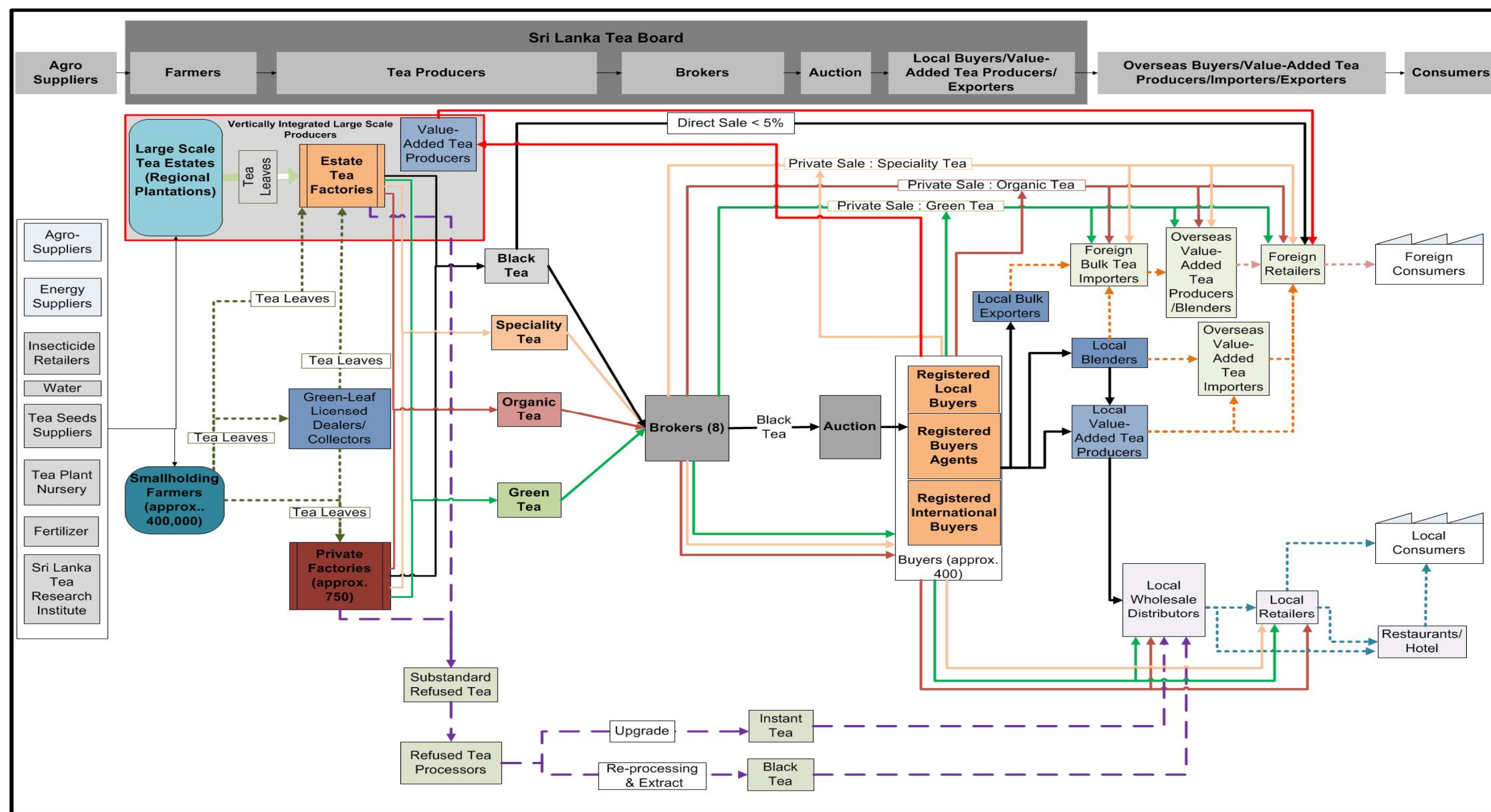


Figure 7-3 : Key Network Relationships in the Sri Lankan Tea Supply Chain

Source: Developed by the Author Based on Focus-Group Discussions and Interviews

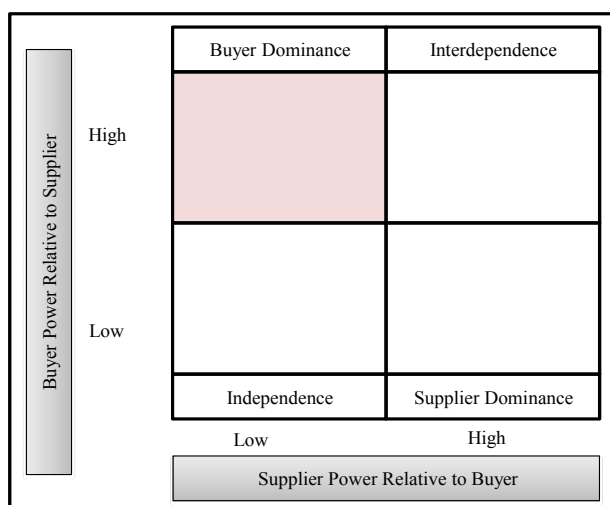
The eight licensed brokers are considered the centre or core firm (i.e. the focal point of the supply chain), with a great deal of power to control the peripheral firms, including farmers, producers and exporters. The brokering organisations handle the bulk of contact between primary tea producers and buyers. This structure has actually prevented producers from establishing links with other stakeholders – including consumers, the most important stakeholder in any supply chain. Due to these facts, the supply chain configuration and legislation has been identified as the root cause in the fragmentation of the tea supply network.

The government agencies related to the tea industry take measures to keep the industry under their control. They regularly introduce ad-hoc tax policies for the benefit of the government rather than for the development of the industry, without consulting industry participants. Participants said that brokers also try to increase their profit by other means, such as providing financial support (such as loans with interest) to tea producers and farmers. This simply traps the producers in unequitable relationships with such brokers. Value-added tea producers and exporters in turn are focused on increasing their own benefits. There is no collaboration or information-sharing among stakeholders. This is similar to the traditional “functional silo” concept. Among these stakeholders, the farmers and primary producers are the vulnerable group, as their business practices are strictly controlled by legislation. As described in the previous chapter, a high proportion of farmers’ and producers’ income is derived from direct subsidies provided by the government, which is not sustainable in the long term.

7.2.3.2 Spot Market (Auction) and Supply Chain Relationships

The performance of the supply chain depends on the relationship between all partners in both downstream and upstream activities (Van der Vorst, Beulens & Van Beek 2000). Better organisational relationships between partners in the supply chain enhance the success of each firm. Moreover, many studies show that a new era has begun, where competition is now not amongst firms but amongst supply chains (Cooper, Lambert & Pagh 1997; Lambert & Cooper 2000). Lambert and Cooper (2000) further argued that better-managed relationships along the supply chain let each partner in the chain make the most of opportunities offered by integration and collaboration; this in turn, increases

the overall performance, and therefore sustainability, of the organisation. According to Ahumada and Villalobos (2009), efficiency concerns have shifted from individual elements to overall network efficiency. Integration between channel members can be enhanced with the use of information technology, and will result in improved performance (Hill 2000). Therefore, integration – and the improvement in relationships it facilitates – also plays an important role in achieving long-term sustainability.



Buyers' dominance is a common issue in many traditional supply chains. According to Cox (2001), a supply chain in which the buyers have high power relative to the suppliers is identified as a "buyer-dominant" supply chain (Figure 7-4), and one in which suppliers have high power relative to the buyers, as "supplier dominant". When both buyers and suppliers have high power at equal levels, there is a high interdependence between them. In contrast, a supply chain in which both suppliers and buyers have low power relative to each other is classed as "independent".

Buyer dominance is identified as a severe issue in agri-supply chains, especially due to the characteristics of the perishable nature of agri-products, which reduces farmers' and producers' opportunities to negotiate with buyers (Cox 2001). Hence, they are compelled to sell their product for whatever the prices the buyers offer. This is a major obstacle for the development of the tea industry in Sri Lanka.

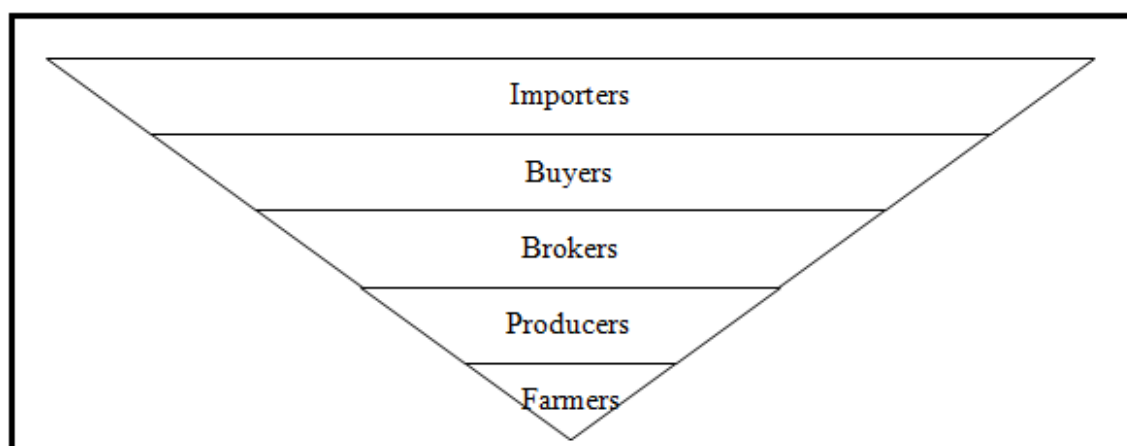


Figure 7-5: Buyer-Dominance in the Tea Supply Chain

Source: Based on Focus-Group Discussions and Interviews

The tea supply chain is designed in such a way that buyers have high bargaining power relative to suppliers (Figure 7-5). As explained in Section 5.3.5 and illustrated in Figure 7-6, almost 98% of the tea produced in the country is sold through auction, this is a major obstacle for large-scale plantation companies involved in value-added tea production and export. Even though these large-scale producers have the capacity, capability and willingness to get involved in direct tea sales, they still cannot use their own tea, but have to sell it – even to themselves through the public auction – (Figure 7-7). This centralised tea-sourcing strategy is not only a waste of time and resources but a source of increased cost and inefficiency in the supply chain, especially the large-scale producers. When the producers are close to the demand, they, as well as the retailers, are in a position to jointly optimise the product price while maintaining the quality of the product. The auction market does not provide any opportunity for strategies such as price hedging or risk management, as prices are set by the buyers. Generally prices vary depend on the grade, geographic location, estate and factory. However, there is no single standard price or indicator for the tea; it varies from auction to auction. Due to

these complexities it is difficult to determine prices; this increases the risk of greater price volatility and makes a common market unfeasible.

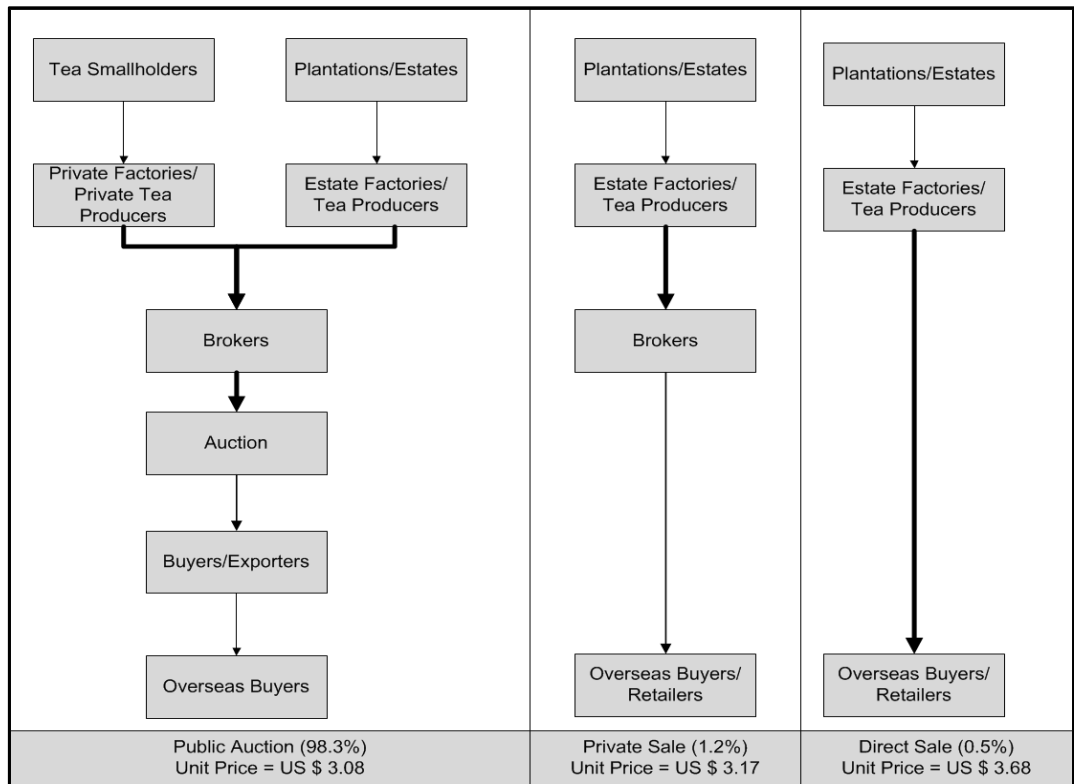


Figure 7-6: Tea Distribution Channels and Tea Prices (2012)

Source: Based on Focus-Group Discussions, Interviews and Secondary Data

Even though other sourcing channels, such as private sales and direct sales, are available in the industry, producers still must obtain prior approval from the Tea Board, a time-consuming and inefficient process. Many participants argued that at least the large-scale producers, which have the capability and resources to directly collaborate with overseas buyers, should be encouraged to get involved in direct or private sale. This would not only provide them with opportunities to have a better profit margin, but also allow them to get closer to the customer.

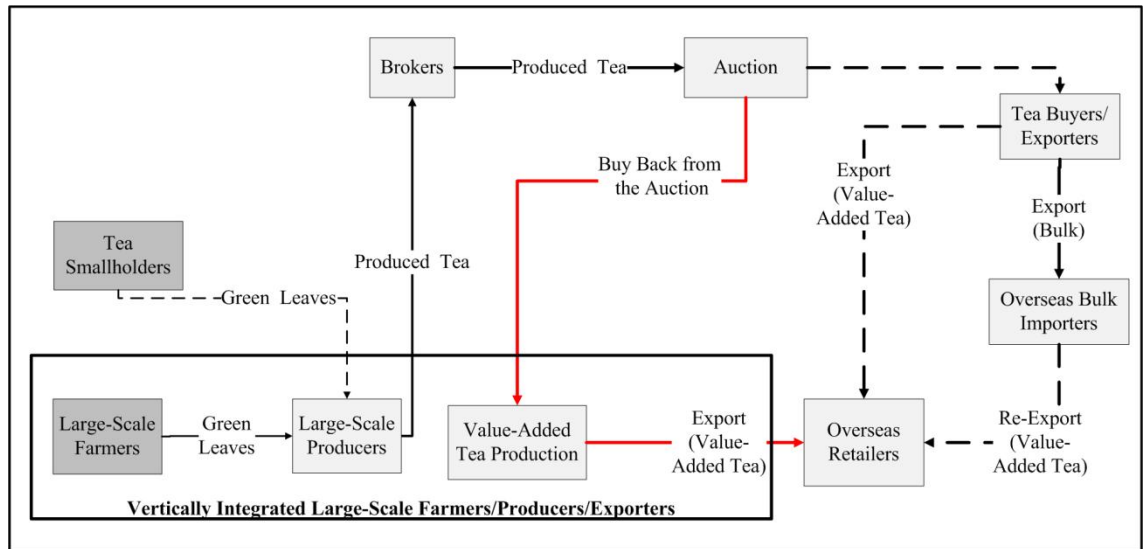


Figure 7-7: Double Loop Sourcing Strategy for Large-Scale Producers

Source: Based on Focus-Group Discussions, Interviews and Secondary Data

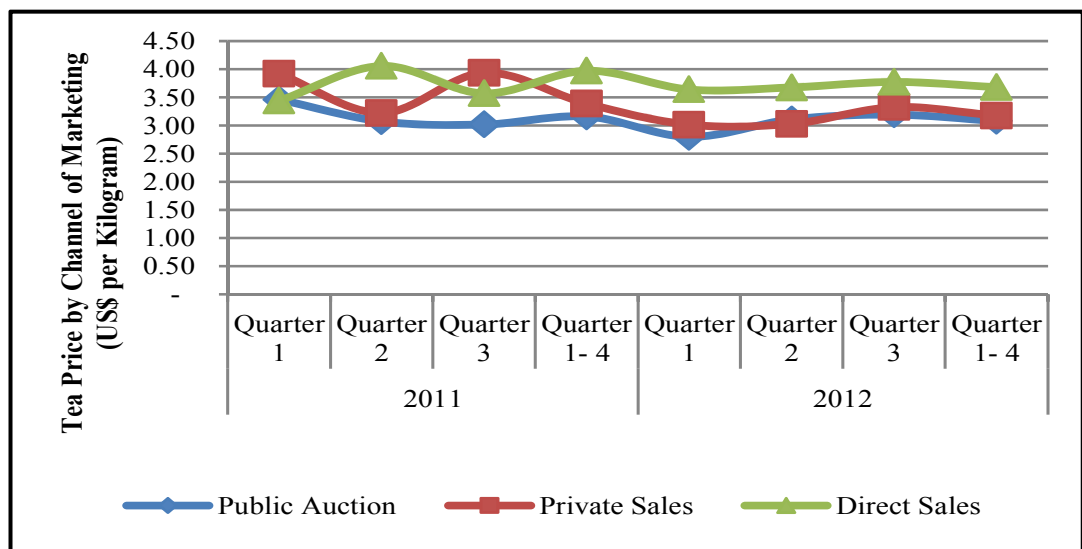


Figure 7-8: Tea Selling Prices by Marketing Channel (2011 and 2012)

Source: Sri Lanka Tea Board Marketing Reports (2012)

According to the analysis in Figure 7-8, producers obtain better prices when they use direct or private sales as the marketing channel compared to the auction prices. The direct-sales channel not only allows the producers to have better collaboration and partnerships with buyers, but also provides opportunities for farmers to select the buyers who offer the best prices. With the current structure the buyers are in an advantageous position, as the producers are compelled to sell their teas for whatever the prices the

buyers offer at auction. Under current legislation, every stakeholder tries individually to increase its business performance rather than working as one system to achieve collective benefits. For example Stock (1997) said that if the stakeholders work on self interest, they might not work for the interest of the other party, and both parties lose at the end. He stressed that theories such as agency theory can be used to overcome these issues by developing strategic partnerships with suppliers, service providers and retailers; managing and sharing supply chain risks; and maximising supply chain integration.

Furthermore, because producers cannot sell their products directly to end customers, they cannot expand their business to include value-added processes; they merely act as raw-material suppliers to buyers and exporters. This significantly affects long-term sustainability and increases risk in the tea supply chain. According to Barba et al. (1998), producers who are closer to the final customers in the supply chain have more opportunities (Figure 7-9), such as identifying a broader customer base, increasing cost-efficiency and, most importantly, identifying customers who are loyal to the products.

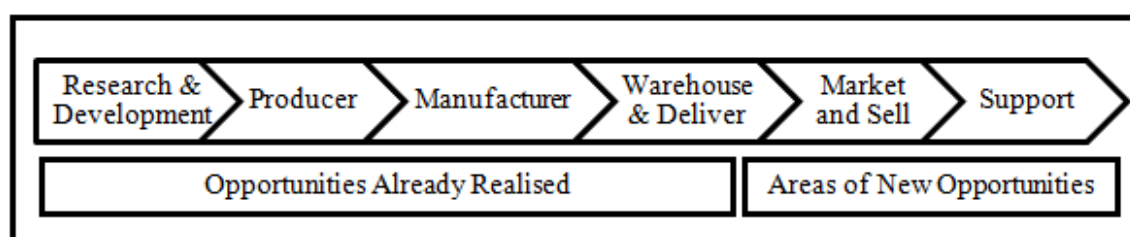


Figure 7-9: Integrated Supply Chain

Source: Barba et al. (1998)

Moreover, integrating with the end customers would, for example, further help producers to reduce performance gaps by allowing them to have greater efficiency and a better supply chain system. It would also help create more opportunities to enter new markets with differentiated products.

Such strategies are apparent in the supply chains for the wine and coffee industries. For example, Portland Roasting Coffee Company initiated a Farm Friendly Direct program, where they developed trade relationships directly with the farmers and paid premium prices for their products. They also initiated local projects to develop the livelihood of

the farmers and their communities. They were able to convince their customers, who are the main retailers, that obtaining coffee through the “Farm Friendly Direct” program ensured a better-quality product compared to coffees supplied by other competitors with third-party certifications such as Fair Trade or Rainforest Alliance, whose products are not traceable or transparent (Bourlakis & Weightman 2004).

Most importantly, Australian tea importers and distributors pointed out that customers are willing to pay more for a product that is produced sustainably. They said there is a huge demand for organic tea, and consumers are now mainly concerned with food quality and safety. This is a very important opportunity for Sri Lankan farmers and primary tea producers. If they are able to avoid intermediaries and establish partnerships with buyers who sell to such consumers, they would not only increase operational efficiency but benefit tangibly from initiatives to ensure a more sustainable supply chain. For example, Pullman et al. (2010) pointed out that the wine industry in particular can differentiate price advantages using better sustainability practices, as they sell directly from farm to retail shop. Furthermore, tea farmers would be more conscious of sustainability if they received tangible benefits such as those in the “Farm Friendly Direct” program in the coffee industry.

Fisher (1997) pointed out that the root of many supply chain issues is that the supply chain design is not linked with the product type. The disintegrated supply chain structure actually blocks the stakeholders from implementing important strategies that are essential to increasing competitive advantage in the global tea market. At the same time, increased competition means that customers are demanding a good-quality product for a lower price. Therefore, it is essential to reconfigure the supply chain structure to remove barriers in the supply network. It is advisable to decouple the farmers from the market and customers by promoting close collaboration with buyers through sharing and implementing strategies to meet the market demand. This would provide opportunities to farmers and producers to make appropriate and collaborative business decisions instead of depending on subsidies and support from the government and other stakeholders. In the same way, buyers also have the opportunity to work closely with their preferred producers to create high-quality products using the best technology, and to create jointly owned products and brands to meet the global demand.

For this to happen, it is essential that buyers move away from the buyer-dominant quadrant in Figure 7-4 to the interdependent quadrant.

However, as producers do not have the opportunity to directly deal with the buyers and customers, they cannot identify their requirements. This is an especially crucial barrier for the Sri Lankan tea industry, because Sri Lankan tea is competing amongst many suppliers. As explained in Chapter 3, nearly 50% of tea produced in Sri Lanka is exported as bulk teas, with value-added operations undertaken by overseas importers. Despite the Sri Lanka Tea Board's stringent quality-assurance programs, neither the Sri Lanka Tea Board nor the tea producers have the ability to trace the quality of Sri Lankan teas that go to consumers through overseas buyers and blenders. Thus the transparency and traceability of the product cannot be assured.

7.2.3.3 Supply Chain Structure and Sustainability Initiatives

The discussions in this study highlighted that the fragmented supply chain – in other words, not having a systems approach to managing the supply chain – is blocking the development and implementation of sustainability initiatives in environmental and social aspects. As discussed in Chapter 6, the Sri Lankan tea industry has identified the importance of quality management, environmental efficiencies and good management of energy usage, materials handling, waste management and fertiliser and pesticide usage in the growing and production processes. To meet these challenges, the Sri Lankan tea industry is implementing various quality-management and environmental standards to respond to global pressure on implementing sustainability initiatives. Despite the farmers' and primary producers' investing heavily to implement strategies to meet the challenges in the global tea market, they do not receive the potential benefits due to the fragmented supply chain structure.

It is a basic requirement that all the teas exported from Sri Lanka should meet ISO standards (for example ISO 3720:2011 for black tea and ISO 11287:2011 for green tea). The Sri Lanka Tea Board conducts random quality tests to monitor compliance with the minimum standards at various stages as explained in Chapter 5, the aim being to ensure the safety and quality of the product. To ensure safety, for example, the produced teas are tested to see whether they have acceptable levels for the substances or chemicals in

the tea brew as stipulated in ISO 3720, that there no any contamination and that the tea lot is suitable for export or import after blending. Another purpose of the quality-assurance program is to prevent tea adulteration (adding neutral or low-quality teas to increase the export volume). This prevents the entry of substandard tea into the global tea supply chain.

Environmental standards are also a major concern when seeking to implement sustainability initiatives. As explained in Chapter 6, Sri Lankan producers adhere to standards such as ISO 9001 (Quality Management Systems), ISO 8000 (Information Integrity), ISO 14001 (Environmental Management Systems) and ISO 22001 (Food Safety Management) (ISO 2013a). The ISO 9000 certification series helps companies guard against poor-quality tea production, thus minimising customer complaints while increasing profitability and productivity.

Hazarika and Muraleedharan (2011) pointed out that most of the tea-producing countries are yet to adhere to such standards. Despite its stringent quality-assurance programs, Sri Lanka still exports nearly 50% of its tea in bulk to be blended with teas of other origins that may not be up to international standards. This not only prevents customers from having farm-gate quality in their cup, but results in lack of transparency of operations and traceability of the product, which in turn increases uncertainty and risk along the supply chain.

7.2.3.4 Transparency, Uncertainty and Risk

Risk is an inherent feature of any supply chain. It can be defined as a “threat that faces any supply chain that disrupts the resource flow or events that stop things happening as scheduled” (Waters 2009a). However, some of the risk can be minimised with better supply chain strategies.

In the Sri Lankan tea supply chain the lack of transparency has increased the risk involved in the environmental, social and economic contexts. Even though some study participants asserted that the auction system is very transparent and unbiased, it is difficult to obtain information from the auction centre. Tea smallholders in particular receive very little information on tea auction prices and other relevant subjects. Also, once the teas are sold at the auction, even local exporters blend teas with different

garden-origin teas to obtain different flavours and to increase the volume. This results in the loss of transparency about the origin of the tea and increases the risk, as not all the teas that are sold at the auction meet the ISO standards mentioned earlier.

7.2.3.5 Innovation and Knowledge

Innovation is about doing things differently and efficiently. It is more than just inventing a new idea or concept, as it involves their development and exploitation as well (Tidd & Bessant 2009). Innovation does not need to be associated with sophisticated technology. It can vary from an incremental innovation to radical technological and design-driven innovation (Verganti 2009). Innovation should deliver environmental benefits if implemented correctly (Bhat 2008). Nidumolu et al. (2009) emphasised that innovation in technology, production processes and raw materials offers some opportunities to increase the sustainability of any business; however, innovation appears to be lacking in the grass roots of many supply networks.

Despite the importance of innovation for any supply chain's sustainability, it has been neglected in the Sri Lankan tea industry, where operations are still carried out as they have been for many decades. For example, despite the development of information technology, brokers distribute millions of paper catalogues weekly to buyers. The production processes are still manual operations, although opportunities exist to automate some processes to overcome the labour shortage. This would not only make production more efficient but also help improve product quality by minimising contamination in the tea.

7.2.4 Research Question 4: In What Capacity Do They Affect The Future Sustainability of the Tea Supply Chain And Its Performance?

This section focuses on Research Question 4, exploring the effects of the factors identified earlier on the future sustainability of the tea supply chain and its performance. This study shows that the current policies and legislations related to the tea industry strictly control the supply chain, heavily affecting the supply chain structure. The lack of supportive and constructive policy and legislation has been a significant source of many issues apparent in the Sri Lankan tea supply chain. This has resulted in lack of customer focus, disintegration between network partners, lack of transparency,

increased risk and uncertainty within the network, lack of financial resources to manage operations and implement better supply chain partnerships and lack of systemic thinking and its application to achieve better performance and sustainability.

Due to the current tea supply chain structure, managers focus on traditional performance measures such as optimising their own firm's performance and ignoring external supply chain partners. Supply chain performance is defined as "the degree to which a supply chain meets end-user and stakeholder requirements concerning the relevant performance indicators at any point in time" (Van der Vorst 2006). However, to obtain competitive advantage in a supply chain, it is essential to consider the impact of organisational strategies on other partners in the supply chain; otherwise it will negatively affect overall supply chain performance (Green, Whitten & Inman 2008).

Although the industry operators in tea supply chain understand that close collaboration between supply chain partners is essential to manage their operations smoothly and to obtain long-term sustainability, they are bound by various government legislations, and hence they cannot initiate any collaboration or partnerships with supply chain members. For example, as explained in Chapters 5 and 6, in Sri Lanka only 5% of black tea is sold through direct channels; the balance is sold through public auction. However, the demand for tea in the global market has now changed; customers now prefer to obtain their product directly from the producers, due to increasing concerns about safety, sustainable and ethical production and transparency (Ling & Yanbin 2012).

The trust component has huge impact on the tea supply chain and its structure. For example, as explained in Chapter 5, the Sri Lanka Tea Board carries out quality checks at various stages along the tea supply chain; pre-auction, post-auction and pre-shipping. Even though they argue that they undertake these quality checks to ensure that the tea is up to the standard, the operators argue that it is excessive and increases the cost along the supply chain. Evans and Lindsay (2008) stated that excessive quality-checking – which is considered as a non-value-added activity – increases the overall supply chain cost, and many of this study's participants considered it a waste of time, resources and money. Even though quality-checking has reasonable objectives from the regulators' perspective, Lie et al. (2012) also highlighted that according to supply chain management theories such as LEAN concepts, excessive quality-checking and repetitive

processes are highly detrimental, wasting time and resources, increasing costs and destroying trust along the supply chain.

The literature indicates that excessive quality checks are executed when there is a lack of trust along the supply chain (Hoejmoser, Brammer & Millington 2012). They damage the collaborative relationships along the supply chain as the trust element plays an important role on integration and collaboration in supply chain management. According to Ling and Yanbin (2012), implementing trust mechanisms with partners plays a decisive role in the supply chain. For example, it reduces transaction costs, simplifies operations, increases flexibility, mutual cooperation and understanding, and most importantly creates long-term sustainable relationships.

As explained by Boehlje, Hofing and Schroeder (1999), agri-food supply chains now try to capture efficiencies, reducing cost and risk while meeting customer needs. Salin (1998) said that implementing better supply chain management practices in agri-supply chains is becoming important due to increased awareness of food quality, safety and sustainable practices. Additionally, Husti (2006) also said that that increased awareness of sustainability concepts has further increased the challenges in the agri-food sector. These factors have created great demands on the Sri Lankan tea supply chain. As explained in Chapters 5 and 6, customers are now demanding not only a good-quality product but one that is produced ethically, and that producers increase their social responsibility in their business operations. The increased demand for ISO certifications such as quality management, environmental management, food safety and information integrity pose a great challenge for the tea supply chain. To be competitive in the global market, the industry needs to meet these requirements. However, producers can obtain the real benefits from implementing these requirements only if they work close to the final customers. The Sri Lankan tea supply chain needs to focus on these factors, as they affect the overall performance and long-term sustainability. Based on these findings, this study has developed a conceptual framework which is given in Figure 7-10. This framework shows that policy and legislation has an impact on supply chain structure, supply chain management practices, performance and sustainability. It also indicates that the supply chain structure has an impact on supply chain management practices.

These hypotheses can be further explored in future research, as they are outside of scope of this project.

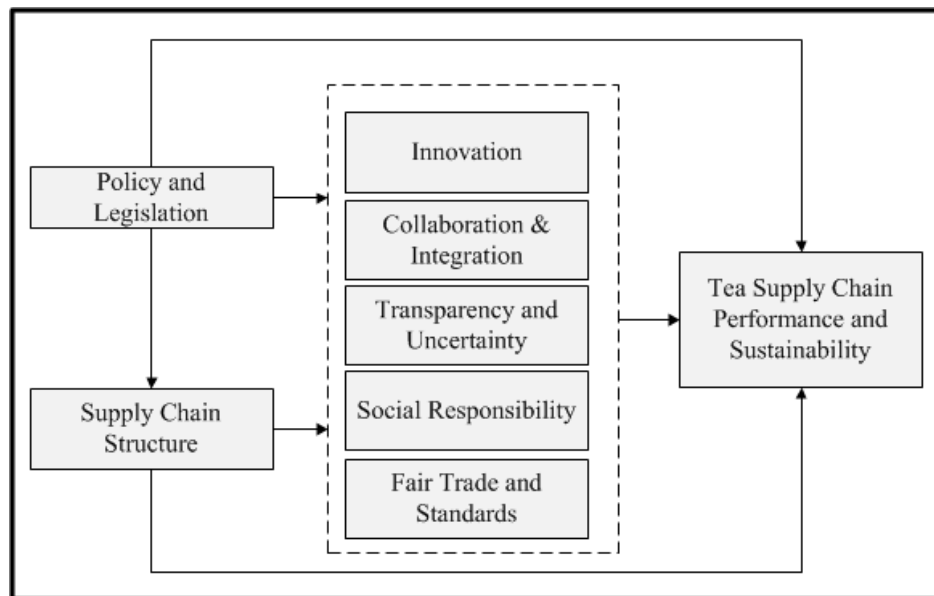


Figure 7-10: Key Relationships Between the Main Influencing Factors in Tea Supply Chain

Source: Based on Research Findings

7.3 SUMMARY

The findings of this study show that the Sri Lankan tea industry is facing significant challenges in the long term. First, mapping the tea supply chain revealed that the supply chain structure has prevented the producers and processors from developing and implementing improvements in their products and performance. Second, it found that governance and policy constraints have resulted in a dysfunctional and fragmented supply chain where there is a little understanding of supply chain concepts and a lack of customer focus. It was observed that even though industry operators are willing to take extra steps to improve products and performance, they are bound by many policies and restrictions, and cannot introduce innovative strategies to improve production processes and supply chain performance. Despite the implementation of many sustainability initiatives, producers do not receive any direct benefits from such initiatives due to the fragmented supply chain structure.

Third, high production costs have resulted in process changes, where large-scale producers gradually move away from farming. It was observed that large-scale producers now mainly depend on green-leaf supplies from tea smallholders, abandoning tea-growing on their own plantations, as producing green leaves is expensive for them due to high production costs and the social responsibilities of looking after the plantation workers and their families. This is a serious issue, as a failure in the green-leaf supply would disrupt the whole supply chain.

Fourth, the tea-auction system has created a “buyer-dominant” supply chain, where buyers have high power relative to suppliers (tea growers and primary producers). The buyers and sellers are not collaborating with each other, which has resulted in a “silo mentality” where each focuses on its own efficiency and profit; this is not sustainable in the long term. These issues have prevented implementation of better strategies along the tea supply chain to increase performance and efficiency through interdependency. Lack of information-sharing and collaboration among supply chain partners has prevented innovation and increased uncertainty and risk along the tea supply chain.

Even though the Sri Lankan tea industry has implemented many sustainability initiatives, a large number of these initiatives have become an extra burden on producers without any tangible benefits. This is mainly because of the supply chain design and the lack of coordination with the final consumers, who value sustainability.

Finally, lack of research and education has been another significant influencing factor on the sustainability of the Sri Lankan tea supply. Neither industry operators nor the government has paid any attention to researching improvements to production processes and product quality to increase supply chain performance.

Considering these factors, it can be suggested that the sustainability of the tea supply chain depends mainly on policies that control the industry, external environmental factors, profit and the ethics affect employees, supply chain partners, customers and general public. Based on this analysis, in addition to the economic, environmental and social pillars of sustainability in the tea supply chain, this research adds a fourth pillar: policy. Accordingly this study proposes a framework for sustainable tea supply chain management, where environmental (planet), social (people), economic (profit) and

policy factors are integrated as illustrated in Figure 7-2. Moreover, a conceptual framework has been developed based on the findings of the research as illustrated in Figure 7-10, which can be used to further expand the research in future.

CHAPTER 8

CONCLUSIONS AND RECOMMENDATIONS

8.1 INTRODUCTORY OVERVIEW

This chapter summarises the salient findings of this research and highlights its contributions. It consists of seven sections including this introduction. Section 8.2 explains the key findings of the research. Section 8.3 presents a number of recommendations to improve the performance and sustainability of the Sri Lankan tea supply chain, and describes possible impacts on implementing these recommendations for practitioners to consider. Section 8.4 illustrates the research contributions, Section 8.4 explains the research strengths, Section 8.6 highlights the limitations of the research and Section 8.7 provides recommendations for future research.

8.2 SUMMARY OF RESEARCH FINDINGS

As explained in Chapters 1 and 2, the Sri Lankan tea supply chain has not been explored from a supply chain management perspective. This research has filled the gap through studying the tea supply chain from end to end with a focus on the Sri Lankan tea industry using a case-study approach. The intent was to identify the influencing factors on a sustainable tea supply. As explained in Chapters 1 and 2, the objectives of this research were to (1) map the tea supply chain in Sri Lanka and explore issues of sustainable supply; (2) pinpoint the factors that affect the sustainability of the tea industry; (3) explore when and how these factors affect sustainable supply; and (4) establish the factors that have an impact on the future sustainability of the Sri Lankan tea industry. A qualitative research approach was employed to achieve the research objectives and to answer the research questions given in Chapter 2. The field work was undertaken in Sri Lanka and Australia to understand the end-to-end supply chain configuration and to identify the key interactions of the nodes along the supply chain from farmer to end consumer.

As a first step, the main stakeholders in the chain were identified to map the tea supply chain and to understand the connectivity from end-to-end. It was found that the tea supply chain is actually a network of six “rings” of suppliers and stakeholders as shown in Figure 8-1. The first is the pre-supply networks of suppliers of tea seeds, nursery plants, fertiliser, water, power, infrastructure and labourers. However, mapping of this pre-supply network was outside the scope of this project because the main focus was on the stakeholders who are directly involved in tea-production operations.

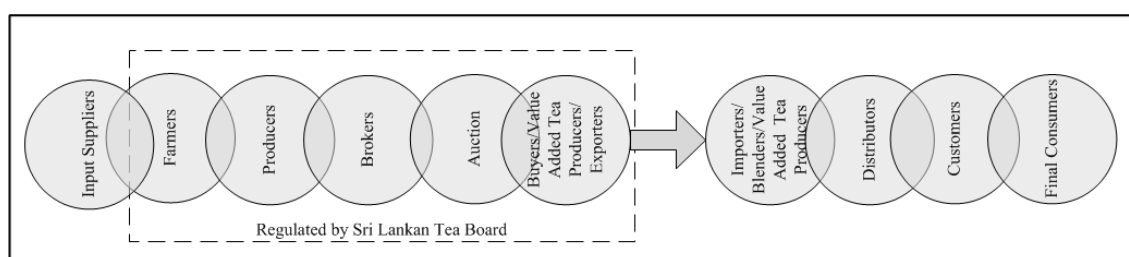


Figure 8-1: Participant Rings in the Fragmented Tea-Supply Network

Source: Based on Research Findings

This study’s literature review revealed that the Sri Lankan tea supply network has not been explored or studied to understand the tangible connections and dynamics of the supply chain. This research examined this crucially important, yet unstudied interconnection between the second set of rings in the supply network, where there is no proper logistics function, distribution authenticity or, in most cases, reliability. Furthermore, there is little tangible evidence to suggest that the tea industry as a whole has any concept of an industry supply network beyond this point. Thus it is reasonable to suggest that there is no common language on understanding supply chain concepts within the tea supply network in Sri Lanka.

Further investigations from the point of the broker to end consumer suggest three further rings on the network supply: from broker to exporter, exporter to importer and importer to retailer. However, study participants at each ring showed limited or even negligible understanding of the overall supply network and the end customer. This is mainly because at each point the supply chain members focus solely on their own operations without interacting with the next point. In other words, even though there is normally a focus on customers, it overlooks actual customers present within the supply network.

This study's participants felt that the Sri Lankan tea supply network has evolved perfectly to deliver what they (for example, the industry operators and regulators) believed to be the best option. Any strategic changes in the network – such as direct exports, which would increase the product value for producers/farmers (along, for example the lines of the Scottish whisky and Australian wine industry) – would require significant structural changes in the supply network, including radical changes to how auctions and tea buyers operate. Such a radical change may generate turbulence within the micro network and consequent sudden changes along the supply network: this might cause end consumers to search for alternative suppliers, thus distressing the Sri Lankan tea supply network. However, this would be temporary, as it is likely that both suppliers and customers would adapt to changes quickly.

Interestingly, the fragmented nature of the tea supply chain has been a direct result of the regulation and policies that have been applied to the supply chain structure. This in turn has blocked the implementation of supply chain management concepts that are essential to increase the sustainability of the tea supply chain.

8.3 CONCLUSION

The primary objective of this research was to identify the influencing factors on sustainable supply chain specifically focusing on the tea supply chain in Sri Lanka. The main research question was framed as:

“What are the influencing factors for maintaining sustainable supply within the Sri Lankan tea industry?”

Based on the comprehensive inductive analysis, this research identified 18 factors that affect the sustainability of the tea supply chain in Sri Lanka. These factors are illustrated in Figure 7-2 in Chapter 7, and they are grouped into four categories: policy, profit, people and planet. They are summarised in Table 8-1 for ease of reference.

Table 8-1: Influencing Factors on Sustainable Tea Supply Chain

Category	Factor
Profit (factors related to economics)	<ul style="list-style-type: none"> • Lack of Customer Focus • Dysfunctional Fragmented Supply Chain Structure and Collaboration • Managing Operating and Investment Cost • Lack of Infrastructure and Facilities • Research and Education • Innovation and Technology • Fair Trade and Ethics • Quality Management
People (factors related to ethics)	<ul style="list-style-type: none"> • Lack of Employee Development and Wellbeing • Employee Relationships • Lack of Supply Chain Partner Development • Lack of Social Responsibilities
Planet (factors related to external environment)	<ul style="list-style-type: none"> • Managing Energy and Resources • Waste Management • Environmental and Quality Certifications
Policy (factors impact on business environment)	<ul style="list-style-type: none"> • Government Bureaucracy • Ad-Hoc Policy • Policy Restrictions

The factors listed in Table 8-1 are directly linked with the flawed tea supply chain structure in Sri Lanka. As explained in Chapter 2 being close to the consumers provides better opportunities to understand consumer needs and to develop a loyal customer base. This is especially true for agricultural supply chains due to the perishable nature of the product. However, due to the current supply chain structure, the producers neither know their final customers nor understand their requirements, whereas the primary producers focus solely on their immediate customers (for example brokers and exporters) and assume that their supply chain ends at that point. Even though theories such as transaction-cost theory are used to decide on an appropriate supply chain structure and control, this research shows that the Sri Lankan tea supply chain structure is a direct result of the strict government control and policies that position the eight licensed brokers as the centre or core firm of the tea supply chain, this position gives them a great deal of power to control the periphery firms, including farmers, producers and exporters, as explained in Chapter 7. This structure has prevented producers from establishing collaborative links with other stakeholders close to consumers, including retailers and distributors. Hence, it is both financially and economically unviable in the long term. The current trend in agri-supply chains is to have contractual or closer

associations with the farmers due to several factors, such as increased concerns about having farm-gate product quality, product traceability and increasing awareness of sustainability concepts as explained in Chapters 2 and 6. This research found that the industry believes that the current structure is perfectly designed for the better control of the industry and product quality, while the regulators believe that the current structure effectively protects the industry. However, this study shows that this is not sustainable in long term, particularly because the Sri Lankan tea industry mainly focuses on delivering a high-quality product, which requires differentiating the customers and designing the supply chain accordingly. However, the current supply chain design does not support this concept: over 60% of the tea is exported in bulk, with blending and value-adding carried out by overseas importers off-shore, where neither local tea producers nor the Sri Lanka Tea Board has the power to control the quality of the teas that are blended with Sri Lankan tea. The product characteristics and supply chain design do not match: hence in long term the tea supply chain is at risk of collapsing entirely unless the supply chain is redesigned to align with customer requirements using fundamental supply chain principles. Hence, redesigning the tea supply chain to be customer-focused is essential to achieve long-term sustainability.

8.4 RESEARCH IMPLICATIONS

The following implications have been concluded from this research:

1. Need for a Customer-Focused Supply Structure and Strategy
2. Legislation and Tea Supply Chain
3. Research and Education in Supply Chain Management Aspects in the Sector

8.4.1 Need for a Customer-Focused Supply Chain Structure and Strategy

As explained in the literature review, the customer is the starting and end point of an effective and efficient supply chain (Rudberg, Klingenberg & Kronhamn 2002); hence in the current competitive business world, focusing on consumer-driven supply chain structures is essential to increase long-term sustainability (Anderson, Britt & Favre 1997). In addition to integrating suppliers and internal customers, it is essential to integrate the end customer to enhance the sustainability of the supply chain (Al-

Mudimigh, Zairi & Ahmed 2004; Lee 2010). This requires integrating the information system, as information plays an important role on designing a customer-focused supply chain (McCormack 2003).

As illustrated in Figure 8-2, increased quality focus is required to introduce customer-focused strategies and adapt the supply chain structure to cater for the identified niche market; which in turn would increase the sustainability of the supply chain. In addition to quality, customer-focused supply chains must improve efficiency, cost, reliability and flexibility along with eliminating redundant supply chain activities to maintain competitiveness in the market. Actors along the supply chain must identify the final customers' exact needs and design the supply chain structure to reduce the overall cost and to increase reliability and efficiency along the supply chain to meet those needs.

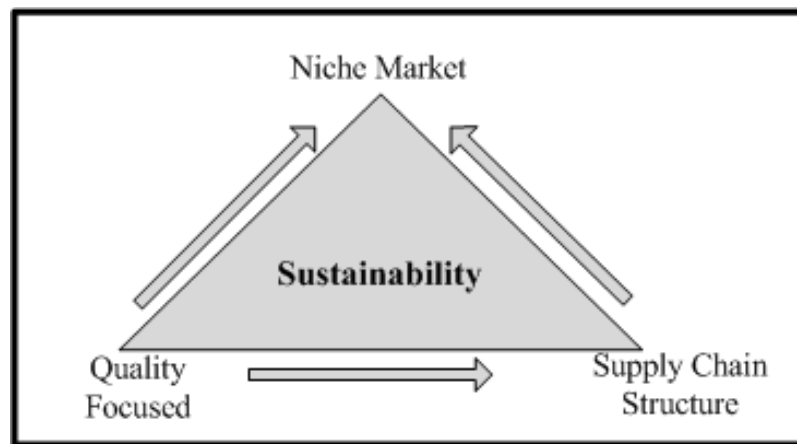


Figure 8-2: Customer-Focus Triangle

Source: Developed by Author Based on Research Findings

8.4.2 Legislation and Tea Supply Chain Structure

The auction system, in which auctions are held in Colombo two days in every week, is the main platform for selling tea in Sri Lanka, as it has been since the beginning of tea production in Sri Lanka nearly 300 years ago. It is an ascending-bid auction, where brokers put forward an opening price for each tea lot supplied by different producers in the country. The opening price, which mainly depends on the taste profile and the quality, is decided by the relevant tea broker. Bidding is then opened for registered buyers. There are inherent advantages and disadvantages of the auction system for the Sri Lankan economy, the tea industry and the stakeholders in the sector, as explained

below. On one hand, if the existing auction system is removed, there can be more opportunities for producers to access end customers directly and add value to the industry. On the other hand, removing the auction system can negatively affect the tea smallholders in the country. These two points are discussed below.

8.4.2.1 Possible Positive Impacts from Changing the Tea Supply Chain Structure

Removing the buyer-driven supply chain would help to create a relational or interdependent supply chain structure, which provides more opportunities to have better supply chain contracts between primary producers and buyers. Suppliers (for example, primary tea producers) believe that they will be able to get a better price if they have the opportunity to negotiate with buyers. However, under the current tea supply chain structure, which is an auction system, the suppliers are price-takers, as the buyers decide the price for the product.

Most importantly, relaxing the policy on selling through auction would allow producers to undertake more value-added activities such as blending tea to get unique flavours, packaging and labelling, so that they could export directly, negotiating with buyers for better prices. This would help to improve brand promotion, geographical tea brands and garden marks introduced by the Sri Lanka Tea Board. This would allow producers to provide farm-gate quality at the consumption point and would further help to reach new markets and customers who are willing to pay more for a better-quality product.

The suppliers would have the ability to select their buyers, and to have a better relationship with them. The auction system shows the characteristics of a cartel where the buyers decide the prices. The nature of the auction system encourages bidders to explicitly or tacitly collude to avoid up-bidding prices; for example, bidders can use the early stages of the auction, when the price is still low, to signal who will win the bidding for the particular lot, and then tacitly agree to stop pushing prices up. The producers do not get the maximum possible price due to the hidden oligopolistic nature of the system. In the auction, weak bidders are prevented from bidding because stronger bidders, such as multinational companies, collude, knowing that no one else can enter the bidding to outbid the collusive price they have created. A relational supply chain would remove such collusive and predatory buyer behaviour.

The auction system mainly focuses on a fixed number of bidders who can bid non-cooperatively, which would increase the effects for risk-averse suppliers and those with budget constraints. Small-scale tea exporters cannot effectively compete with the large-scale multinational tea exporters/agents, and hence miss opportunities to improve their businesses and the tea market. Therefore, they have only very little incentive to participate in the auction system.

Improvements in the tea supply chain relationship and collaboration between producers and buyers in a relational market approach would be more beneficial (Simatupang & Sridharan 2002; Stank, Keller & Daugherty 2011), especially for the large-scale producers who have the capacity and capability to implement widespread innovation strategies such as introducing new farming techniques to increase the yield, improving production processes to increase the quality of the final product and introducing innovative marketing strategies to reach final customers. Increased quality, value and volume of tea would lead to sustainable profit and performance in the long term. Furthermore, tea smallholders would also have the opportunity to directly collaborate with the buyers and implement various sustainability and ethical initiatives such as fair-trade and ethical-tea partnerships, which would provide more opportunities to increase their share in the global market and thus enhance the quality of life in the farming communities.

8.4.2.2 Possible Negative Impacts from Changing the Tea Supply Chain Structure

Almost 95% of the tea produced in Sri Lanka is sold at the Colombo auction. Some tea growers, tea producers and regulators are strongly in favour of the existing system, as they believe that they get a reasonable price for their product. They also believe that the auction system gives equal standing to both large-scale producers and smallholders, as the price is solely decided based on the quality of the tea and the demand on the particular day, not the scale of the producer. The auction price is linked to the green-leaf price through the reasonable-price formula. This system actually protects the green-leaf suppliers. However, if the auction system were removed from the tea supply chain, it would at least temporarily create uncertainty in selling green leaves, especially for smallholders. This would be a major issue for smallholders, as they are not as organised as large-scale farmers and they do not have the capacity to negotiate with buyers.

Furthermore, removing the auction system would cause disruptions in the logistics of sample distribution. As explained in Chapter 5, over one million samples are distributed weekly, which requires significant attention around the logistics of the process. Since the tea price depends mainly on the quality of the tea, it is crucial to distribute samples to all potential buyers. Currently brokers manage sample distribution, and removing this node from the tea supply chain would create pressure on farmers and producers and might increase the logistics cost for all stakeholders: this would be particularly onerous to smallholders. Also, as all potential buyers are accessible in one place, the auction bidding system is a cheaper option for producers of all sizes.

There is a possibility that removing the auction might disrupt the tea supply, especially from tea smallholders. Similar issues are currently observed in other agricultural supply chains such as rice and vegetables, where farmers are struggling to sell their products on time and at a good price due to the disorganised nature of their supply chains. Sometimes they cannot even cover their costs due to intense competition and their weaker bargaining power in the system. Currently, tea smallholders are protected by the reasonable-price formula, as the tea selling price is transparent to a great extent and the Tea Board monitors the implementation of the formula. Moreover, in the current dynamic bidding system, all the tea supplied for bidding is sold; hence there is no inventory. This is important, as the quality of teas held in inventory would deteriorate with time. The producers can instead focus more on their core competency – farming and production – while obtaining a fair price for their products at the auction.

8.4.3 Research and Education in Supply Chain Management

This research shows that there is a gap in research and education related to supply chain management in the Sri Lankan tea industry. The tea industry, being part of global trade, has a complex supply network, and supply chain management concepts play an important role in obtaining a competitive advantage. As explained in Chapter 2, with the world's changing economic structure, competition is now more global, as it is now not between individual business entities but between entire supply networks (Gattorna 2000; John 2007). To meet these challenges the supply chain need to be more innovative. Innovation is about doing things using new methods that are effective and

efficient to exploit new ideas or concepts that improve the product and processes (Nidumolu, Prahalad & Rangaswami 2009; Olavarrieta & Ellinger 1997).

Even though innovation offers opportunities to increase the sustainability of any business by increasing the quality and value of the product (Siau & Tian 2004), innovation appears to be lacking at the grass roots of tea supply networks. This is mainly due to lack of research and education which is an essential element of innovation. For example, in the current business environment, to identify critical customers and to design the supply chain accordingly requires better understanding of supply chain concepts. This, in turn, requires the implementation of best strategies to meet the needs of the critical customers (Francis 2008; Lee 2010). This requires the supply chain managers to use the firm's capabilities and resources. Compatibilities and resources are the most important asset in any supply chain (John 2007). Research and education play a crucial role in developing capabilities and resources by focusing on research and understanding the supply chain.

This research shows that there is a gap in research and education in the tea supply network, particularly regarding the use of technology and innovative strategies, which are essential to challenge the complex globalised supply chains. Research and education help to develop and implement innovative concepts on managing supply chains, which in turn helps to increase the value, volume and quality of the product as illustrated in Figure 8-3. Increases in volume generally increase economies of scale. Increases in value and quality help to further increase the volume, because in the current competitive world, customers prefer to purchase good-quality products that deliver a desired value to meet their expectations.

Furthermore, this research shows that employees are leaving the tea industry due to the challenges of managing operations, which include strict policy and regulations and lack of understanding of the overall operations from supply chain management perspective.

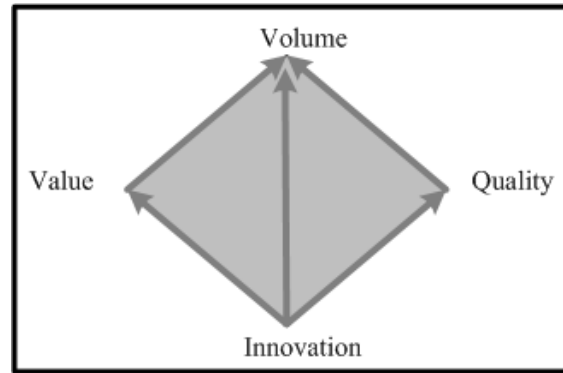


Figure 8-3: Quality-Value-Innovation-Volume Diamond
Source: Developed by the Author Based on Research Findings

8.5 RESEARCH RECOMMENDATIONS

The following recommendations have been concluded from this research:

1. Introduce a Customer Focus Supply Strategy
2. Refine Legislation and the Tea Supply Chain Structure
3. Increase Awareness of Supply Chain Perspectives

8.5.1 Introduce a Customer-Focused Supply Chain Strategy

The Sri Lankan tea industry focuses on producing the best-quality tea. In the current competitive market, delivering a quality product is a key to achieving competitive advantage. This means that the industry needs to enter a niche market and design a supply chain that is focused on the customer. Based on supply chain management concepts, the industry needs to adapt a supply chain design to cater for the customers who value the extra quality and are happy to pay a premium for it. This requires producers to be close to the final customers. Hence, it is recommended that the Sri Lankan tea supply chain develop and implement customer-focused supply chain strategies for cater the customer needs.

8.5.2 Refine Legislation and the Tea Supply Chain Structure

To implement a customer-focused supply chain strategy, relaxation of policies and legislations on the tea supply chain structure is essential. As explained in Sections 7.3.2 and 8.3.2, the current supply chain structure acts as a barrier to implementing a relational supply chain structure. Direct collaboration with end customers would provide more opportunities for large-scale producers who have capability and capacity, while tea smallholders, who are not as structured and organised as large-scale producers, would still require the services of intermediaries such as brokers and exporters, at least in short term. Therefore, considering these factors, it is recommended to implement a hybrid strategy that relaxes the policies and regulations on tea marketing. In other words, relaxing policies that restrict the marketing channel would give large-scale producers, who are vertically integrated, the flexibility to involve themselves in more direct sales by allowing them to implement collaborative partnerships close to the final consumers. This would help the producers to increase not only their cash flow, but also customers' satisfaction by supplying farm-gate quality teas. The smallholder sector would also have the flexibility to have a closer relationship with the private and estate producers, which would give them more opportunities to increase collaborative contracts or relationships, thus optimising benefits for both parties. Both large-scale producers and smallholders could have the flexibility to submit their products to public auction as well if they desired. Therefore, this research recommends that relaxing policies on the supply chain structure in long term while maintaining the auction system, at least until a new supply chain design is established. Refining the current supply chain structure and introducing close relationships with customers (such as retailers and distributors) close to consumers will help to mitigate the influencing factors identified from this study and increase the sustainability of the tea supply in the long term.

8.5.3 Increase Awareness of Supply Chain Perspectives

As explained in Chapter 5, the tea supply chain is complex by nature; it does not just consist of producing teas, selling them through auctions and exporting them. The supply chain should be viewed from end to end: this perspective is missing due to the fragmented nature of the Sri Lankan tea supply chain. There are complex issues such as

identifying the customers, designing the supply chain and developing competitive strategies aligned with corporate strategies and sustainable supply chain strategies. This requires managers to have sound knowledge of supply chain management concepts and theories so that they can integrate these concepts to create a long-term sustainable strategy. This includes introducing a customer-focused supply chain strategy that is linked with corporate strategies and sustainable strategies. Having knowledge only of a specialised function – such as distribution or production – is not enough to manage a supply chain effectively and efficiently. Employees should be educated and trained to have a wider knowledge in their operations from end to end (this is where wider knowledge of supply chain management is crucial). Education and research is the best way to develop people's capacity to meet the challenges in the supply chain.

Investing in people not only develops them but also increases their loyalty to the firm, and hence its employees retention. This is valid not only for managers but also for lower-level employees such as labourers. Introducing such programs to promote education in the sector is recommended to increase the performance and long-term sustainability of the industry.

8.6 RESEARCH CONTRIBUTION

The main contributions of this research can be categorised into four areas: theoretical, methodological, practical and policy.

8.6.1 Contribution to Theory

The fundamental objective of this study was to identify the influencing factors on a sustainable tea supply chain in Sri Lanka. Specific research objectives and research questions were set up based on the literature review. The main contributions of this project can be presented aligned with these objectives and questions. This research directly contributes to the knowledge in the supply chain management field, specifically in areas such as supply chain mapping, sustainable supply chain management, agri-supply chains and sustainability concepts.

The overall theoretical contribution of this research is related to enhancing the understanding of sustainable supply chain concepts in the tea supply chain within the

Sri Lankan context. Furthermore, the concepts developed in the current research contribute to filling the gap in the sustainable supply chain management and sustainable agri-supply management fields. However, it should be noted that supply chain management theories come mostly from borrowed theories such as resource-based-theory, including competitive advantage theory, economic theories, system theory and agency theory. Hence, this research contributes to these theories to some extent even though they are not specifically explored, as they are outside of the scope of this research.

More specifically, first research objective mainly focuses on developing supply chain maps for Sri Lankan tea supply and tries to define the term “sustainable supply” focusing on tea supply chain. As explained in Chapter 2, tea supply chain has not been explored enough from the supply chain management and sustainability perspectives. The mapping process introduces the link between the concepts of supply chain mapping and supply chain design. The concepts and models developed for the tea supply chain are an added contribution to the agri-supply chain research. The current research shows that there are different supply chain maps for different product types within the same supply network: i.e. one size does not fit all, but a given channel appears flexible enough to accommodate different products and product types. It provides insight to partners in agri-supply chains, specifically to the firms in the Sri Lankan tea supply chain. The tea supply chain maps developed will help industry operators and policy-makers to identify bottlenecks and implications in the chain.

The mapping process reveals that the tea supply chain is fragmented: stakeholders in the tea supply chain focus on individual performance, and there is a lack of integration between the stakeholders. This has been a main reason for deteriorating performance in the industry. This study indicated that it benefits all stakeholders to look at the industry as a system rather than focusing on individual operations and performance, which can be considered as a contribution to agency theory and system theory.

Research Questions 2 and 3 are related to influencing factors on sustainable tea supply chain management. This research identified 18 factors that influence sustainable tea supply, particularly in Sri Lanka. This contributes to agri-supply chain management and sustainable supply chain management theory. Better understanding of the effect of these

factors helps to expand the knowledge in the agri-supply chain management and sustainable supply chain management fields. Furthermore, managing these factors would enhance competitive advantage in the global tea market, as they can be used as a guide to develop better supply chain management strategies.

Development of such strategies stresses the need for resources and capabilities along the tea supply chain, which includes both internal and external supply chains in the tea industry. This is particularly true for the tea supply chain, mainly because the tea industry is a resource-intensive industry and the study shows that lack of focus on managing resources effectively and efficiently has been a significant reason for Sri Lankan tea's losing its competitive advantage in the global market. It has adversely affected the long-term sustainability of the tea supply chain.

For example, even though there is a strong acceptance for Sri Lankan tea due to the perceived quality implied by the "Ceylon Tea" brand name, the industry could have used this rare resource to obtain premium prices in the global market. However, Sri Lankan producers do not use the brand name effectively to achieve a competitive advantage in the market. These empirical results provide real-life examples in these theoretical areas and show that complete understanding of these theories is important to achieve long-term sustainability, especially in the Sri Lankan context.

8.6.2 Practical Contribution

One major practical contribution of this research is that it provides insights to industry stakeholders into the fragmented nature of the tea supply chain structure, and it can encourage them to operate the industry using supply chain management theories and concepts. The concepts and models developed from the study will provide a foundation to managers in the tea industry and can be used to enhance their operations to achieve long-term sustainability. They will be able to look at the industry from a different perspective, so that they can understand the importance of supply chain management perspectives on the tea industry, because application of better supply chain management provides opportunities to increase competitive advantage in the global tea market. The operators can use the influencing factors identified from the research to develop strategies and policies to create more tangible benefits.

This study provides insight to managers in the tea industry regarding the challenges that exist in the industry and how they affect the long-term sustainability of their business and operations. These findings will further shed light on formulating corporate strategies to align with sustainability and supply chain management strategies to overcome challenges and to achieve competitive advantage while increasing long-term sustainability. This study also shows that even though there are resource limitations and policy restrictions, focusing on the triple-bottom-line – socio, economic and environment – can enhance the performance of the firm, because integrating these three aspects provides opportunities to use limited resources effectively and efficiently, increasing not only the performance of the individual firm but also the benefits for all stakeholders in the supply network.

8.6.3 Contribution to Policy-Makers

With regard to the policy implications, the research findings provide some insights into the challenges in the tea industry in Sri Lanka. Government officials and the policy-makers in the sector can use these findings as a foundation to develop strategies and policies to enhance the tangible and intangible benefits for industry operators and customers in the sector. This, in turn, will not only increase the performance of the industry, but also help to expand operations, which would improve the national economy while increasing the opportunities to enhance the long-term sustainability of the sector.

8.6.4 Methodological Contribution

Supply chain management research has mainly employed quantitative research using deductive approaches and a positivist paradigm. There has been a greater need for qualitative research, as business operations are complex and subjective, and quantitative research cannot capture the real essence of a business. Even though qualitative research approaches have begun to appear in supply chain management literature, there is still a lack of explorative research in areas such as agri-supply chains and sustainable supply chain management. This research fills some of this gap using a qualitative research approach in which it uses the tea industry as a case study and explores the case using an inductive approach, as explained in Chapter 4.

This research also uses multiple data-collection methods such as in-depth focus-group discussions and interviews and secondary data, while the data analysis was carried out using qualitative methods such as coding and content analysis: this can be considered as an added contribution to research methodology.

According to the literature, the use of focus-group discussions is rare in the supply chain management field. This research uses focus-group discussions as the main source of data collection, in addition to other methods as explained in Chapter 4 and provides a contribution in the use of focus-group analysis within the supply chain management context. This study, then, can be considered as offering multiple methodological contributions to the supply chain management research arena.

8.7 RESEARCH STRENGTHS

This research focuses on a complex large industry that operates globally. It has considered all important stakeholders in the tea industry to understand the operations along the entire tea supply chain. It has helped the researcher to identify the major factors and concerns that have an impact on the sustainability of the tea industry. Despite the complexity and the scale of the industry, using multiple data-collection methods such as focus-group discussions, individual interviews, field visits and secondary documents has helped the researcher to increase the richness of the findings as well as their validity and reliability, as the researcher could examine this complex industry from different perspectives.

8.8 RESEARCH LIMITATIONS

Even though the research has successfully answered the research question and contributed to sustainable supply chain management in the agri-supply chain, it nevertheless has some limitations, particularly with regard to the sample size and the time frame. The number of stakeholders involved in the tea sector is fairly large, and the limited time and resources prevented the researcher from including a larger sample. The sample covered only four geographical areas in the country, which may also be a limitation as the influencing factors might vary depend on the geographical region. The study adopted a cross-sectional design, where data was collected in three different time

frames. Hence the findings may have not captured the changes between collections. However, this limitation was minimised by conducting a number of focus-groups and interviews until data saturation occurred.

Another limitation was that this research did not directly include the final consumers and the input suppliers, mainly because it was evident that the producers did not know who their customers were, as they regarded the exporters or the brokers as their ultimate customer. Therefore this would have required more research that was outside the scope of this study. Although many large-scale tea producers were aware of some of the supply chain management concepts, the other participants' lack of knowledge in supply chain management concepts and terms was another limitation, particularly in the case of tea smallholders and private tea producers.

8.9 RECOMMENDATIONS FOR FUTURE RESEARCH

Even though the specific research questions identified for this study were answered, based on the findings of this research, several possibilities are suggested for future research:

- (1) Use of a longitudinal design and a large sample to minimise the limitations explained above would provide more information on the facts identified and would help to determine whether the factors identified from this research are applicable to the whole sector.
- (2) The research can be further expanded by including the input suppliers and final consumers in the supply chain.
- (3) The current research uses an inductive approach, where it focuses only on developing theory (for example identifying the influencing factors). The research can be extended to use an abductive approach (see Section 4.2) with a mixed-research approach to verify and generalise the influencing factors identified from the inductive approach. For this purpose a survey can be used to collect data and quantitative analysis conducted to generalise the findings.
- (4) This research can be expanded to determine the relationship of the influencing factors identified in this study and to measure their impact on the performance of the agri-supply chain, using the conceptual model developed (Figure 7-10) in Chapter 7.

- (5) This research can be expanded to other agri-supply chains, such as rice, rubber and coconut, to see how the supply chain structure and governance factors affect other agri-supply chains.
- (6) This research can be expanded further to identify potential supply chain management strategies that can be implemented to increase the long-term sustainability of the tea supply chain or any other agri-supply chain.
- (7) Even though this research lightly touches theories such as system theory, agency theory, game theory, resource-based theories and economic theories that are related to supply chain management; they have not been explored deeply, as they were outside the scope of the research. However, this research can be expanded to study the relationship of these theories more deeply to reflect their impact on the research topic.

CHAPTER 9

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APPENDIX 1: SRI LANKAN TEA EXPORT

Table I-1: Export Volume by Destination ('000 Kg)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Middle East Countries	137,208	126,356	142,864	148,015	153,592	149,484	164,225	147,752	163,594	152,229	147,813
Iran	17,759	6,047	6,622	10,784	12,066	9,009	11,508	9,849	13,909	23,319	41,043
Iraq	14,986	13,887	20,391	24,948	28,101	32,254	32,111	28,625	31,306	32,102	23,488
Israel	2,614	2,330	2,122	2,084	2,395	1,835	2,019	1,580	1,691	1,748	1,632
Jordan	8,297	11,473	14,353	12,057	9,479	5,930	14,038	13,408	17,719	7,313	9,434
Kuwait	3,054	2,753	2,337	3,012	2,959	2,926	7,925	10,227	12,047	9,273	7,402
Syria	30,146	28,674	28,852	27,670	30,670	27,649	26,434	29,499	28,297	28,869	24,741
Saudi Arabia	10,193	10,488	9,405	9,921	7,440	8,587	7,188	4,798	4,488	5,201	4,699
Turkey	16,341	19,215	25,789	17,241	13,803	14,817	15,380	15,904	19,586	19,279	23,163
UAE	31,334	27,992	30,293	38,180	44,644	44,221	45,417	31,177	32,018	22,575	11,887
Other	2,484	3,497	2,700	2,118	2,035	2,256	2,205	2,685	2,533	2,550	324
CIS Countries	70,151	72,562	74,684	71,078	79,579	70,904	69,177	60,876	77,272	83,672	75,053
Russia				57,648	66,207	56,725	50,817	45,711	50,833	54,211	49,231
CIS Countries	70,151	72,562	74,684	13,430	13,372	14,179	18,360	15,165	26,439	29,461	25,822
European Union	33,834	34,558	32,548	30,407	28,412	31,403	28,900	25,176	26,730	26,012	23,904
Finland	6,164	6,031	6,040	6,379	3,027	6,455	3,544	2,410	664	357	1,041
France	1,364	1,176	1,217	1,143	1,206	1,059	1,185	1,024	990	1,013	1,029
Greece	2,531	2,577	2,407	2,893	2,306	2,572	6,363	5,081	6,307	6,436	5,926
Germany	5,702	5,933	6,003	5,273	6,203	5,747	2,276	1,997	2,080	2,575	1,085
Italy	1,654	2,082	1,997	1,448	1,428	2,059	1,873	1,762	3,329	1,707	1,806
Netherland	3,604	4,132	3,661	3,644	4,574	4,340	4,645	3,899	2,778	2,725	2,371
Poland	1,854	2,394	3,044	2,626	2,919	3,520	2,750	2,763	2,642	3,108	2,877

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
UK	7,647	7,098	5,410	3,867	4,802	3,167	2,511	2,428	2,072	1,594	1,943
Other	3,314	3,135	2,769	3,134	1,947	2,484	3,753	3,812	5,868	6,497	5,826
Other Industrialized Countries	16,190	17,871	18,360	17,150	20,362	18,825	19,434	17,530	20,173	20,488	18,111
Australia	3,293	3,329	2,967	3,035	2,842	3,139	3,252	2,980	3,205	2,838	2,905
Canada	1,224	1,472	1,512	1,317	1,582	1,108	1,189	869	891	817	721
Japan	7,293	8,159	9,095	8,544	11,006	10,310	10,767	9,577	11,374	11,823	9,754
New Zealand	883	1,120	1,002	948	1,022	861	1,019	909	1,083	870	960
USA	3,384	3,523	3,635	3,166	3,809	3,234	3,006	2,979	3,453	3,936	3,483
Other	113	268	149	140	101	173	201	216	167	204	288
Other Countries	34,532	46,995	31,877	42,210	45,469	41,137	37,869	38,378	40,265	40,612	55,063
Chile	6,280	5,592	6,224	6,827	7,223	6,417	6,972	6,160	6,522	6,668	6,582
Egypt	1,069	992	926	1,220	3,370	1,529	1,270	1,335	1,648	2,573	3,800
Hong Kong	3,644	3,752	4,107	4,661	4,735	4,770	4,991	5,153	5,194	5,189	4,417
Libya	5,470	19,524	1,581	10,845	5,428	9,409	7,530	8,130	11,356	7,422	16,514
Pakistan	3,161	3,184	2,998	2,950	3,521	694	1,357	1,645	979	1,473	4,487
Singapore	608	508	551	542	621	522	492	454	447	486	610
South Africa	1,405	827	1,085	1,007	1,354	813	576	955	1,164	1,459	1,861
Tunisia	6,312	4,907	6,245	5,899	7,992	5,596	4,778	3,501	808	2,034	21
Other	6,583	7,709	8,160	8,259	11,225	11,387	9,903	11,045	12,147	13,308	16,771
Total	291,915	298,342	300,333	308,860	327,414	311,753	319,605	289,712	328,034	323,013	319,944

Table I-2: Export Value by Destination (Million US\$)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Middle East Countries	291	275	325	360	370	479	620	592	688	659	604
Iran	33	30	52	67	74	109	41	37	51	85	186
Iraq	22	9	10	20	23	27	137	129	152	160	83
Israel	5	5	5	5	6	6	8	7	8	9	8
Jordan	21	27	26	24	21	19	49	49	64	32	36
Kuwait	7	7	6	9	8	9	24	31	40	31	23
Syria	63	58	61	64	75	90	110	129	123	125	104
Saudi Arabia	22	22	21	23	17	26	27	17	18	23	21
Turkey	40	46	65	46	36	49	57	61	77	78	90
UAE	73	65	73	97	104	136	157	120	142	102	51
Other	5	7	6	6	6	8	10	12	13	14	2
CIS Countries	164	173	177	187	215	244	289	251	342	395	350
Russia	-	-	-	148	170	188	202	179	220	251	223
CIS Countries	164	173	177	39	45	56	87	72	122	144	127
European Union	77	82	83	90	91	117	135	117	134	145	128
Finland	15	13	13	17	8	20	15	11	4	2	6
France	4	4	4	4	4	5	6	5	5	6	6
Greece	4	4	4	5	4	7	28	20	26	32	26
Germany	12	13	14	14	17	19	7	7	8	10	4
Italy	5	6	4	5	5	8	8	8	14	9	9
Netherland	7	8	7	9	10	14	18	17	15	16	14
Poland	7	9	13	12	14	19	17	16	17	19	16
UK	15	12	12	9	12	10	10	10	11	10	11
Other	8	13	11	16	17	15	26	24	34	41	36
Other Industrialized	55	63	68	70	81	90	102	95	120	126	115

Countries											
Australia	16	18	17	20	18	23	27	25	32	32	31
Canada	4	5	5	5	6	5	7	5	6	5	5
Japan	20	24	29	26	34	37	44	43	54	59	51
New Zealand	3	4	4	5	5	5	7	6	8	7	8
USA	12	11	14	14	17	19	16	15	19	22	19
Other	0	1	0	1	0	1	1	1	1	1	1
Other Countries	65	88	63	94	94	115	126	130	156	169	214
Chile	9	8	9	12	13	15	21	18	22	24	22
Egypt	2	2	2	3	7	5	5	5	7	10	14
Hong Kong	9	8	9	11	12	14	17	18	20	20	17
Libya	10	34	3	21	11	23	21	24	36	23	51
Pakistan	5	6	6	6	8	2	4	5	3	5	16
Singapore	2	1	2	2	2	2	2	2	2	3	4
South Africa	3	2	2	2	3	3	2	3	5	6	7
Tunisia	9	6	8	9	13	10	10	8	2	7	-
Other	16	21	22	28	25	42	44	46	59	71	83
Total	652	682	716	801	851	1,045	1,272	1,185	1,440	1,494	1,411

APPENDIX 2: WORLD TEA INDUSTRY IN SUMMARY

Country	Production			Export			Import			Export as a % from Production	Export Value			Import Value		
	Volume (Tonne)	% Share of Production	World Rank	Volume (Tonne)	% Share of Export	World Rank	Volume (Tonne)	% Share of Export	World Rank		US \$ (000)	% Share of Export Value	World Rank	US \$ (000)	% Share of Export Value	World Rank
China	1,640,310	35.13%	1	327,650	15.08%	1	59,845	2.87%	10	19.97%	1,075,004	14.01%	2	203,640	2.71%	13
India	966,733	20.71%	2	326,917	15.05%	2	22,303	1.07%	25	33.82%	901,976	11.76%	3	46,801	0.62%	31
Kenya	377,912	8.09%	3	306,713	14.12%	4	99,884	4.79%	6	81.16%	858,374	11.19%	4	168,741	2.24%	16
Sri Lanka	327,500	7.01%	4	323,013	14.87%	3	11,619	0.56%	36	98.63%	1,492,067	19.45%	1	35,560	0.47%	41
Turkey	221,600	4.75%	5	2,426	0.11%	43	8,290	0.40%	45	1.09%	11,179	0.15%	46	20,427	0.27%	58
Vietnam	206,600	4.42%	6	133,900	6.16%	5	-	0.00%	189	64.81%	204,018	2.66%	9	-	0.00%	191
Iran	162,517	3.48%	7	22,429	1.03%	16	56,422	2.70%	11	13.80%	17,608	0.23%	36	203,177	2.70%	14
Indonesia	142,400	3.05%	8	76,291	3.51%	7	20,872	1.00%	28	53.58%	170,251	2.22%	11	33,763	0.45%	42
Argentina	96,572	2.07%	9	87,045	4.01%	6	386	0.02%	116	90.13%	106,299	1.39%	15	2,941	0.04%	109
Japan	95,012	2.03%	10	3,523	0.16%	36	44,780	2.15%	14	3.71%	73,803	0.96%	19	245,565	3.27%	6
Thailand	73,320	1.57%	11	15,108	0.70%	22	4,315	0.21%	59	20.61%	28,351	0.37%	27	24,532	0.33%	52
Bangladesh	60,500	1.30%	12	945	0.04%	57	2,808	0.13%	68	1.56%	2,594	0.03%	61	5,553	0.07%	90
Malawi	52,000	1.11%	13	46,008	2.12%	10	129	0.01%	147	88.48%	86,362	1.13%	18	318	0.00%	153
Uganda	35,194	0.75%	14	55,652	2.56%	9	330	0.02%	125	158.13%	72,129	0.94%	20	451	0.01%	148
Tanzania	32,000	0.69%	15	27,133	1.25%	14	75	0.00%	156	84.79%	46,972	0.61%	24	131	0.00%	170
Myanmar	31,670	0.68%	16	569	0.03%	65	2,295	0.11%	76	1.80%	807	0.01%	78	7,282	0.10%	81
Rwanda	24,066	0.52%	17	21,011	0.97%	17	198	0.01%	138	87.31%	47,430	0.62%	23	180	0.00%	167
Malaysia	20,626	0.44%	18	5,358	0.25%	29	21,084	1.01%	26	25.98%	18,282	0.24%	35	47,748	0.63%	30
Zimbabwe	18,223	0.39%	19	11,221	0.52%	23	222	0.01%	134	61.58%	15,843	0.21%	37	1,304	0.02%	127
Nepal	17,438	0.37%	20	8,854	0.41%	25	366	0.02%	118	50.77%	19,448	0.25%	32	594	0.01%	143

Russia	270	0.01%	41	7,344	0.34%	28	191,286	9.17%	2		50,866	0.66%	22	663,918	8.83%	1
Afghanistan				-	0.00%	132	63,224	3.03%	8		-	0.00%	139	85,915	1.14%	24
Canada				59,463	2.74%	8	27,792	1.33%	20		112,999	1.47%	14	223,541	2.97%	10
Egypt				4,763	0.22%	30	100,449	4.81%	5		23,109	0.30%	30	312,206	4.15%	5
Germany				38,692	1.78%	11	59,883	2.87%	9		286,853	3.74%	5	237,751	3.16%	8
Kazakhstan				765	0.04%	61	29,968	1.44%	18		3,842	0.05%	57	126,860	1.69%	20
Morocco				546	0.03%	68	64,556	3.09%	7		11,269	0.15%	45	219,713	2.92%	11
Netherlands				20,653	0.95%	18	36,928	1.77%	15		251,278	3.28%	8	177,992	2.37%	15
Pakistan				1,194	0.05%	54	119,239	5.71%	4		4,278	0.06%	56	350,869	4.67%	4
Poland				17,301	0.80%	20	50,093	2.40%	13		147,587	1.92%	13	152,872	2.03%	18
Saudi Arabia				2,330	0.11%	45	34,419	1.65%	16		13,468	0.18%	39	242,040	3.22%	7
Spain				20,171	0.93%	19	9,781	0.47%	38		96,560	1.26%	17	46,716	0.62%	32
Sudan				2	0.00%	121	32,681	1.57%	17		2	0.00%	133	82,291	1.09%	26
Syrian				78	0.00%	91	29,918	1.43%	19		305	0.00%	90	144,830	1.93%	19
United Arab Emirates				25,032	1.15%	15	52,460	2.51%	12		192,245	2.51%	10	233,033	3.10%	9
UK				27,439	1.26%	13	156,743	7.51%	3		272,499	3.55%	7	473,169	6.29%	3
US				34,843	1.60%	12	200,719	9.62%	1		276,155	3.60%	6	595,394	7.92%	2
Others	66,505	1.42%		110,047	5.07%		470,675	22.55%			679,119	8.85%		2,102,262	27.96%	
Total	4,668,968	100%		2,172,429	100%		2,087,037	100%			7,671,231	100%		7,520,080	100%	

APPENDIX 3: TELEPHONE SCRIPT FOR PHASE ONE (POTENTIAL PARTICIPANTS FOR FIRST PHASE)

Hello, how are you?

My name is Pradeepa Jayaratne, a PhD student from University of Wollongong, Australia. I obtained your contact details from the Chamber of Commerce, Sri Lanka. I am contacting you to discuss about my PhD research which I am currently working on.

Is this a convenient time for you to discuss about this?

If the answer is YES

My PhD research is on Sri Lankan Tea Supply Chain. I am trying to identify the influencing factors and measure performance on sustainable supply on Sri Lankan tea supply chain. In addition to the mapping the tea supply chain is another objective of this research. The research will be conducted in two phases. At the first phase, I am planning to have focus group discussion and interviews with the main players in the tea supply chain. At the second stage I will be verified that results with each participant and try to collect the data to measure the performance on the identified influencing factors.

Your company has been identified as a potential participant for my research. The discussion would take around one to two hours and will be conducted at a place in Colombo. I am calling you to find out whether you agree to participate in the focus group discussions and interviews. If you are agreed I will send you the interview kit for your reference. Thereafter, we can decide an appropriate date and to meet.

If the Answer is NO

May I know a convenient time for you to call back?

Thank you very much for your cooperation.

APPENDIX 4: THE INVITATION BY EMAIL FOR FOCUS-GROUP DISCUSSION/INTERVIEWS

Dear Sir/Madam,

Re: PhD Research on identifying the influencing Factors for Sustainable Supply in Sri Lankan Tea Supply Chain (First Phase – Focus-Group/Interviews)

My name is Pradeepa Jayaratne. I am a doctoral student at the Sydney Business School, University of Wollongong in Australia. I am conducting a research study as a part of the requirements of my Philosophy of Doctor (PhD) Degree in Supply Chain Management.

My research tries to identify the factors influence on sustainable tea supply chain management and it tries to map the tea supply chain for both internal tea supply chain that involved large scale tea producers as well as external tea supply chain that includes small scale producers in Sri Lanka. The research will be conducted in two phases. At the first phase, I am planning to have focus group discussion and interviews with the main players in the tea supply chain. At the second stage I will be verified that results with each participant and try to collect the data to measure the performance on the identified influencing factors.

I am writing this email to kindly invite you to be a part of my research project. I am planning to conduct series of focus group discussions and semi-structured interviews with the participants from tea industry in Sri Lanka. The focus group discussions will be held at a mutually agreed place which is convenient for all participants while the semi-structured interviews are conducted at a place based on your preferences. The focus group discussion would take around 2 hours. We will give a prepared interview kit which contained the questions to get your opinions on the operations of tea supply chain. My supervisor and I will moderate the discussions. The interviews will be tape recorded or written down the notes to capture the correct information from your discussions. The information will be used only for the purpose of the research and we assure that the information will not be passed to a third party.

Even though we anticipate to have answers for all questions from you as it would greatly help on our research, you have the flexibility to skip any questions if you feel uncomfortable. You can even withdraw your participation at any time if you feel uncomfortable. The information of all participants is confidential. The results of the research will be published in the PhD Thesis, educational journals and academic conferences. However, analysis and results would not reveal identity of either yours or your organization. Furthermore, please not that there is no financial burning on your company for being a participant of this research.

If you have any inquiry or clarifications please feel free to contact me at

Email : mdrpj946@uowmail.edu.au

Tel : +61 2 4298 1501

If you have any inquiry with respect to your rights as a research participant, you may contact

University of Wollongong Ethics Officer

Ethics Unit,

Level 1, Building 20 Communications Centre

Email: rso-ethics@uow.edu.au

Phone: +61 2 4221 3386

Thank you very much for your time and consideration. If you are interested to participate on this study please inform me, so that I can send you further details to carry forward the research.

Thank you,

Yours Sincerely,

Pradeepa Jayaratne

PhD Student,

Sydney Business School

Building 232

Innovation Campus

North Wollongong NSW 2522

Australia

APPENDIX 5: THE INVITATION BY EMAIL FOR SECOND STAGE WHO HAVE NOT PARTICIPATED IN THE FIRST PHASE

Dear Sir/Madam,

Re : PhD Research on Identifying the influencing Factors for Sustainable Supply in Sri Lankan Tea Supply Chain (Second Phase)

My name is Pradeepa Jayaratne. I am a doctoral student at the Sydney Business School, University of Wollongong in Australia. I am conducting a research study as a part of the requirements of my Philosophy of Doctor (PhD) Degree in Supply Chain Management.

My research trying to identify the factors influence on sustainable tea supply chain management and it tries to map the tea supply chain for both internal tea supply chain that involved large scale tea producers as well as external tea supply chain that includes small scale producers in Sri Lanka. The research will be conducted in two phases. At the first phase, I am planning to have focus group discussion and interviews with the main players in the tea supply chain. At the second stage I will be verified that results with each participant and try to collect the data to measure the performance on the identified influencing factors.

I have already completed the first phase data collection and analysis. Based on the first stage data I have developed a supply chain model and have identified some influencing factors for sustainable tea supply chain management. At this stage I wish to verify the results and the supply chain model and I am planning to collect more data to measure the performance of the identified information.

I am writing this email to kindly invite you to be a participant of the second stage of my research project. For this purpose I would like to meet you at a time convenient for you. The meeting would take around 30 minutes. The interviews will be tape recorded or written down the notes to capture the correct information from your discussions. The information will be used only for the purpose of the research and we assure that the information will not be passed to a third party.

Even though we anticipate to have answers for all questions from you as it would greatly help on our research, you have the flexibility to skip any questions if you feel uncomfortable. You can even withdraw your participation at any time if you feel uncomfortable. The information of all participants is confidential. The results of the research will be published in the PhD Thesis, educational journals and academic conferences. However, analysis and results would not reveal identity of either yours or your organization. Furthermore, please not that there is no financial burning on your company for being a participant of this research.

If you have any inquiry or clarifications please feel free to contact me at

Email : mdrpj946@uowmail.edu.au

Tel : +61 2 4298 1501

If you have any inquiry with respect to your rights as a research participant, you may contact

University of Wollongong Ethics Officer

Ethics Unit,
Level 1, Building 20 Communications Centre
Email: rso-ethics@uow.edu.au
Phone: +61 2 4221 3386

Thank you very much for your time and consideration. If you are interested to participate on this study please inform me, so that I can send you further details to carry forward the research.

Thank you,
Yours Sincerely,

Pradeepa Jayaratne
PhD Student
Sydney Business School
Building 232
Innovation Campus
North Wollongong NSW 2522
Australia
Tel : + 61 4 2543 5022 (Australia)
Email: mdrpj946@uowmail.edu.au

APPENDIX 6: THE INVITATION LETTER AFTER OBTAINING THE CONSENT

Dear Sir/Madam,

Re: PhD Research on identifying the influencing Factors for Sustainable Supply in Sri Lankan Tea Supply Chain

Thank you very much for agreeing to be a participant on my data collection on my PhD research. I am herewith sending the following documents relevant to this project.

1. Consent Form
2. Researchers Information
3. Interview Kit

As I informed in my previous letters (attached herewith for your convenience), I am planning to conduct series of focus group discussions/interviews with the participants from tea industry in Sri Lanka. In order to finalize the data collection schedule, please sign the attached consent form and return to me at your earliest possible. I have herewith attached self-addressed stamped envelope for your convenient. I will inform the date and time as soon as I finalized the schedule.

Please note that even though we anticipate your participation, you can withdraw your participation at any time if you feel uncomfortable. Furthermore, please note that there is no financial burning on your company for being a participant of this research. If you have any enquiry or clarifications please feel free to contact me at

Email : mdrpj946@uowmail.edu.au

Tel : +61 2 4298 1501

If you have any inquiry with respect to your rights as a research participant, you may contact

University of Wollongong Ethics Officer
Ethics Unit,
Level 1, Building 20 Communications Centre
Email: rso-ethics@uow.edu.au
Phone: +61 2 4221 3386

Thank you very much for your time and consideration.
Yours Sincerely,

Pradeepa Jayaratne
PhD Student, Sydney Business School

APPENDIX 7: CONSENT FORM FOR PARTICIPANTS

Consent form for Participants

For the CEO, Owner, or Top-Level Manager

RESEARCH PROJECT: IDENTIFYING THE INFLUENCING FACTORS IN SUSTAINABLE TEA SUPPLY IN THE SRI LANKAN TEA INDUSTRY

Researcher: Miss Pradeepa Jayaratne

I have been given information about “*Identifying the Influencing Factors in Sustainable Tea Supply in the Sri Lankan Tea Industry*” and discussed the research project with Pradeepa Jayaratne who is conducting this research as part of a PhD degree supervised by A/P Nelson Perera and Dr. Lee Styger at the Sydney Business School, University of Wollongong, Australia.

I have been advised of the potential risks and burdens associated with this research, and have had an opportunity to ask Pradeepa Jayaratne any questions I may have about the research and my participation. I consent to participate in an interviews and discussions to be conducted by Pradeepa Jayaratne. I understand that anonymous data from the interview will be reported in Pradeepa Jayaratne’s PhD thesis and may also be used in publications based on this research. I understand that my contribution will be confidential. I also understand that apart from one-hour to two hours interview session, there are no potential risks or burdens associated with this study.

I understand that my participation in this research is voluntary, I am free to refuse to participate and I am free to withdraw from the research at any time and that I do not have to give any reasons for withdrawing. My refusal to participate or withdrawal of consent will not affect my treatment in any way my relationship with the Sydney Business School or my relationship with the University of Wollongong.

If I have any enquiries about the research, I can contact Pradeepa Jayaratne (+61 4 2543 5022 or +61 2 4298 1501 and email: mdrpi946@uowmail.edu.au) and/or A/P Nelson Perera (+61 2 4221 4028 and email: nperera@uow.edu.au) and/or Dr. Lee Styger (+61 2 423 824 880 and email: lstyger@uow.edu.au) or if I have any concerns or complaints regarding the way the research is or has been conducted, I can contact the Ethics Officer, Human Research Ethics Committee, Office of Research, University of Wollongong, Email: rso-ethics@uow.edu.au Phone: +61 2 4221 3386

By signing below I am indicating my consent to:

- Participate in this research. I understand that the interview dialogue will be based on the research scope as mentioned in the research title above.

☐

Yes

☐

No

- Allow the data collected from my participation to be used primarily for a PhD thesis, and also be used in summary form for journal publications, and I consent for it to be used in that manner. I understand that that no information will be included which would identify me or my company.

☐

Yes

☐

No

- Allow the interview dialogues to be voice recorded by (*please tick the box*)

☐

Yes

☐

No

Signed

Date

.....

...../...../.....

.....

Name (please print)

APPENDIX 8: PARTICIPATION INFORMATION SHEET

For the CEO, Owner, or Top-Level Manager

RESEARCH PROJECT: IDENTIFYING THE INFLUENCING FACTORS IN SUSTAINABLE TEA SUPPLY IN THE SRI LANKAN TEA INDUSTRY

PURPOSE OF THE RESEARCH

This is an invitation to participate in research conducted by a PhD candidate at the University of Wollongong. The purposes of this research are to map the tea supply chain in Sri Lanka, identifying the influencing factors on the sustainable tea supply chain, analysing when and how these factors affect the sustainable tea supply, establish the performance measures of the tea supply chain and establish the factors that have an impact on the future sustainability of tea supply.

INVESTIGATORS

Pradeepa Jayaratne	A/P Nelson Perera	Dr. Lee Styger
(PhD candidate)	(Principal Supervisor)	(Co-Supervisor)
Sydney Business School	Sydney Business School	Sydney Business School
University of Wollongong	University of Wollongong	University of Wollongong
mdrpj946@uowmail.edu.au	nperera@uow.edu.au	email: lstyger@uow.edu.au
Office: +61 2 4298 1501	Tel. +61 2 4221 4028	Tel : +61 2 423 824 880

METHOD AND DEMANDS ON PARTICIPANTS

If you choose to participate, we would like to have an interview with the CEO, owner or top-level manager who has experience of business operations. You can decide whether the interview dialogue will be tape-recorded or not. You do not have to answer every question during the interview session if you do not want to. Typical questions in the interview include; Influence on sustainable supply, Strategic position, risk in supply chain, role of stakeholders in tea supply chain, characteristics of tea supply chain, performance metrics, how innovation help on tea supply chain, fair trade and corporate social responsibilities

POSSIBLE RISKS, INCONVENIENCES AND DISCOMFORTS

Apart from the time you spent for focus group discussions/interviews which would be around one to two hours, we can foresee no risks for you. Your involvement in this research is voluntary. You may withdraw your participation and/or your data from this research before starting the Focus Group Interviews or before publishing the results. Refusal to participate in this research will not affect your relationship with the researchers or the University of Wollongong.

FUNDING AND BENEFITS OF THE RESEARCH

The researcher is funding this research independently. The research is expected to provide information the influencing factors on sustainable tea supply in Sri Lanka Tea Supply Chain. The results of this research will provide insight knowledge to the managers in the tea industry to achieve long term sustainability in the global tea market. The government and operators can use the influencing factors to develop strategies and policies to make more profits and tangible benefits. Furthermore, it is possible to use the same factors as a basic to improve the supply chain of other main exporting agricultural products in Sri Lanka such as rice, coconut, rubber and spices. Confidentiality of this study is assured, no information will be reported which would identify you

ETHICS REVIEW AND COMPLAINTS

This study has been reviewed by the Human Research Ethics Committee (Social Science, Humanities and Behavioural Science) of the University of Wollongong. If you have any concerns or complaints regarding the way this research has been conducted, you can contact

University of Wollongong Ethics Officer

Ethics Unit,

Email: rso-ethics@uow.edu.au

Phone: +61 2 4221 3386

Thank you for your interest in this study.

APPENDIX 9: INTERVIEW GUIDELINE

RESEARCH ON INFLUENCING FACTORS FOR MAINTAINING SUSTAINABLE SUPPLY WITHIN THE SRI LANKAN TEA INDUSTRY PHASE 1: FOCUS GROUP DISCUSSIONS/ INTERVIEW KIT¹⁹

Interview Details

Interview	
Date:	
Time	

Interviewers	
Name	

Interviewee:	
Code	

Introduction	
<p>(Lead-up work will have established the Subjects' initial willingness to be interviewed, a scheduled interview time slot, and the forwarding of a "Project Information Sheet")</p> <p>(Introduce yourselves) I'm Pradeepa Jayaratne from Sydney Business School, University of Wollongong in Australia who is doing a PhD research in Supply Chain Management, specifically focus on identifying influencing factors on Sustainable Tea Supply in Sri Lanka.</p> <p>(Introduce your supervisors) Prof. Nelson Perera and Dr. Lee Styger who are from Sydney Business School, University of Wollongong are my supervisors. Dr. Lee Styger is also joining my focus group discussions and interviews.</p> <p>We are here to conduct discussions/interviews to gather preliminary information required to complete this PhD research as</p>	

¹⁹(Modified from Diagnostics Report for Sustainable Supply Chain Management -How Healthy is your Supply Chain developed by Dr. Lee EJ Styger)

<p>Introduction</p> <p>mention in our information sheet.</p> <p>Have you had a chance to read the information sheet (if you haven't, would you like us to give you a brief overview)?</p> <p>We are gathering information on the main influencing factors that effect on sustainable tea supply in Sri Lanka so that these results can be used to improve the performance of the tea supply chain in Sri Lanka. The information collected would solely use for academic purposes. The research will focus on internal and external tea supply chains. To identify the influencing factors for internal supply chain will be studies using large scale tea producers whereas to identify the influencing factors on external supply chain, we would use small scale tea producers, tea brokers, exporters, processors and logistics service providers. The project will have two stages where at the first stage we undertake pilot focus group discussions and interviews and at the second stage we would very the results we identified at the first stage and collect more data to measure the performance of the relevant factors identified.</p> <p>We will involve all critical players in this chain and exclude potential competitors. We're very interested to hear your comments as an integral part of this supply chain.</p> <p>Before starting the discussions on each question, we would give a brief introduction on the supply chain management concept in each question to give a general knowledge and to have a common language on the subject.</p> <p>Is there anything that you would like to clarify before we start?</p>	
<p>Confidential Agreement</p> <p>The study team has signed a "Confidentiality Agreement" which states that your input will be treated in the strictest of confidence. The information you supply will be aggregated with other data to ensure anonymity. (Show a copy of agreement).</p>	
<p>Recording</p> <p>Would you mind if our discussion is recorded on tape for transcription later? This will ensure that all of your comments are recorded accurately and will save time during the interview. You can ask me to turn the tape recorder off at any time e.g if</p>	

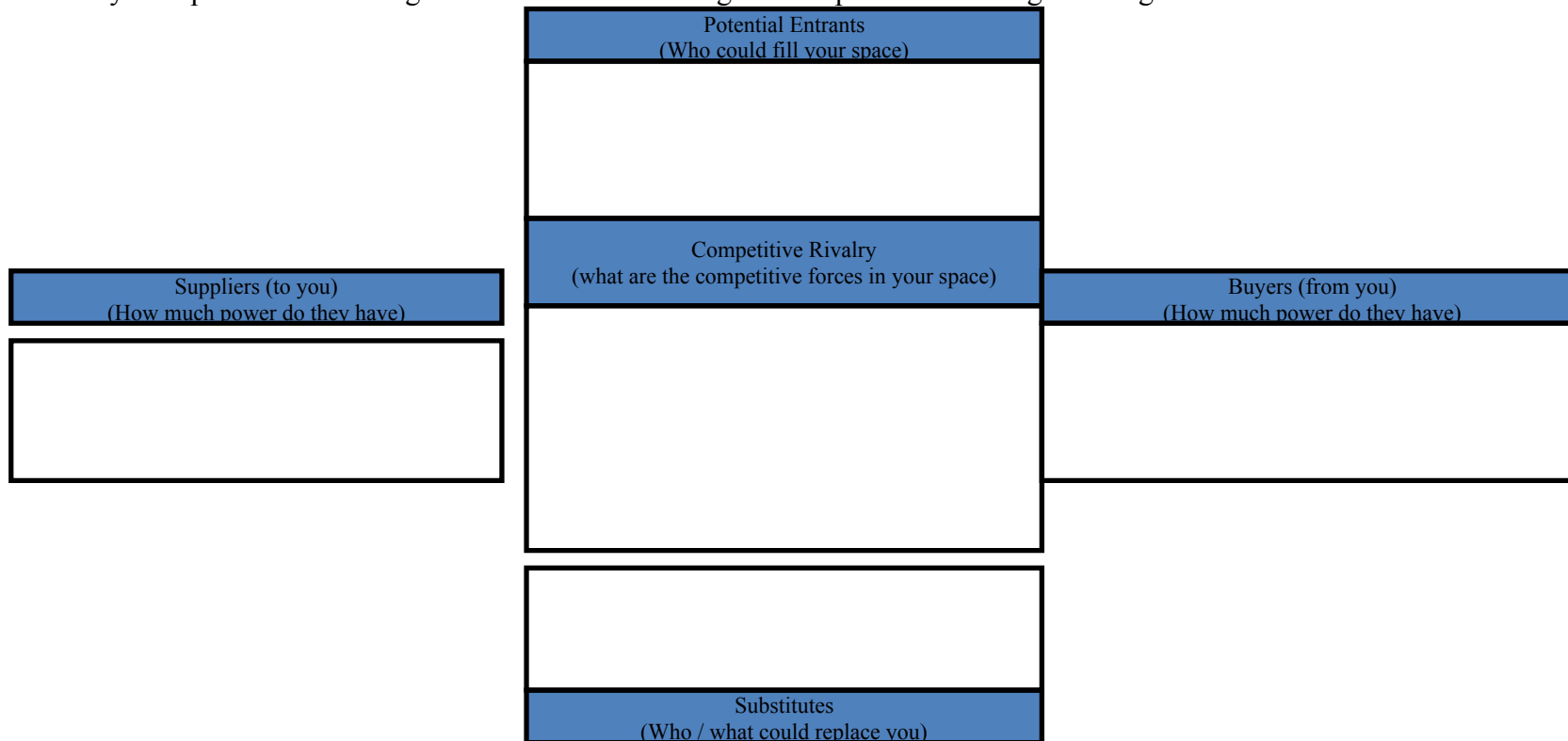
Introduction	
you wish to share some information that you would rather not have on tape. Would you also mind if we took some general photographs of your workplace?	
Consent If you are now willing to proceed, would you mind reading this Consent Form carefully and sign it at the bottom. (Sign two copies: take one copy and leave one copy for interviewee) Are you happy to start? Is it OK to turn the Tape Recorder on (Turn on Tape Recorder).	

1 Analysing Strategic Positioning and Market Trends

1.1 Can you explain your Resources, Competencies and Capabilities

	Resources		Competencies
	Tangible	Intangible	
Threshold Capabilities (What you need just to be in the game)			
Capabilities for Competitive Advantage (What you need to win)			

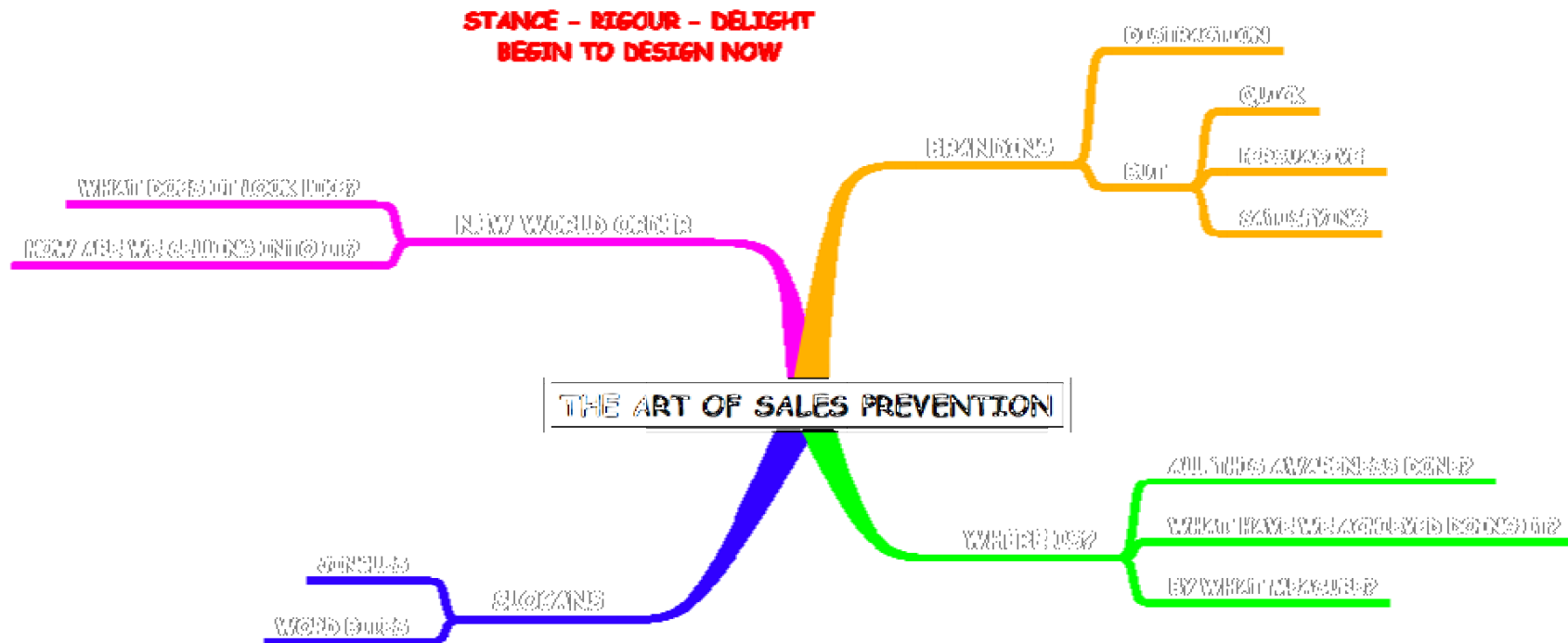
1.2 Can you explain the following Five Forces on achieving the competitive advantage in the global tea market?



1.3 Product Plat forming

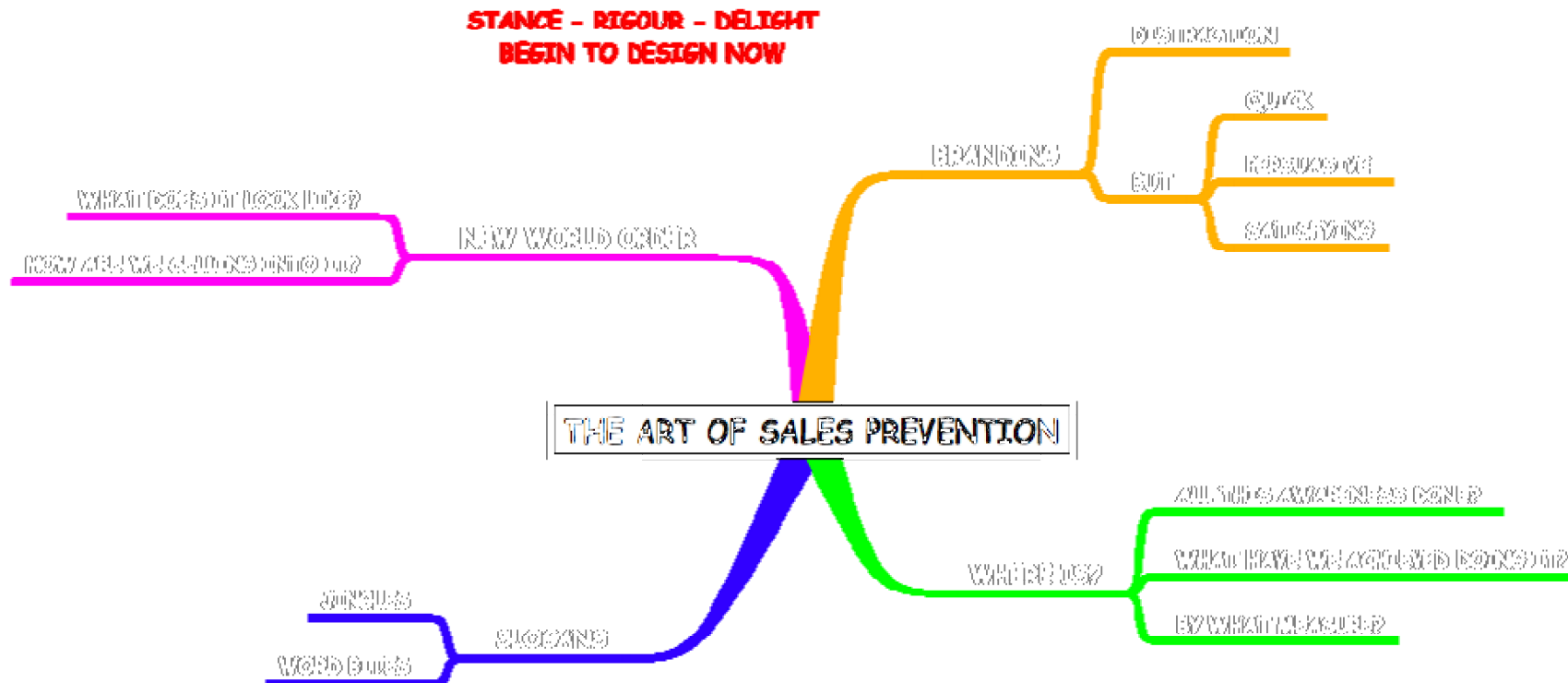
1.3.1 What are the key attributes of your Customers?

1.3.2 Explain how you are performing against the following measures



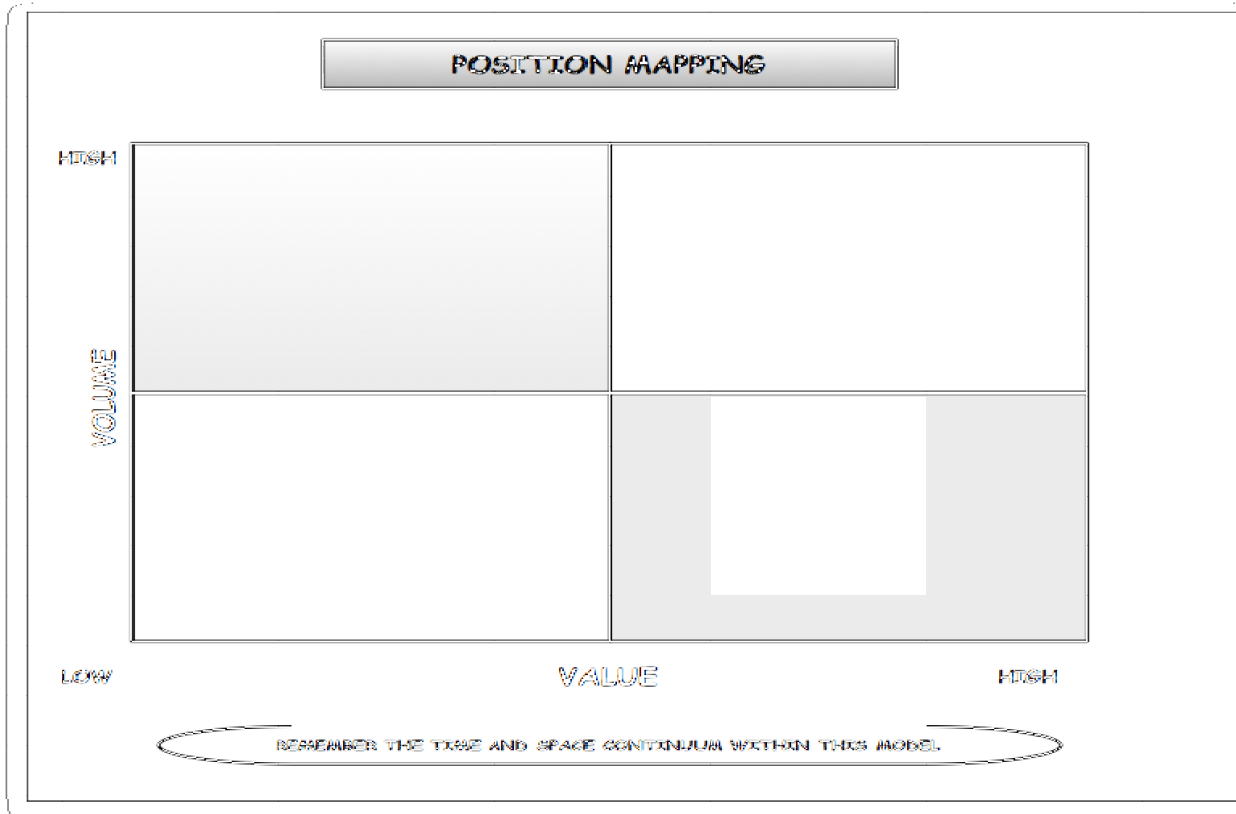
1.3.4 Explain how your suppliers are performing against these measures

1.3.4 Explain how your suppliers are performing against these measures



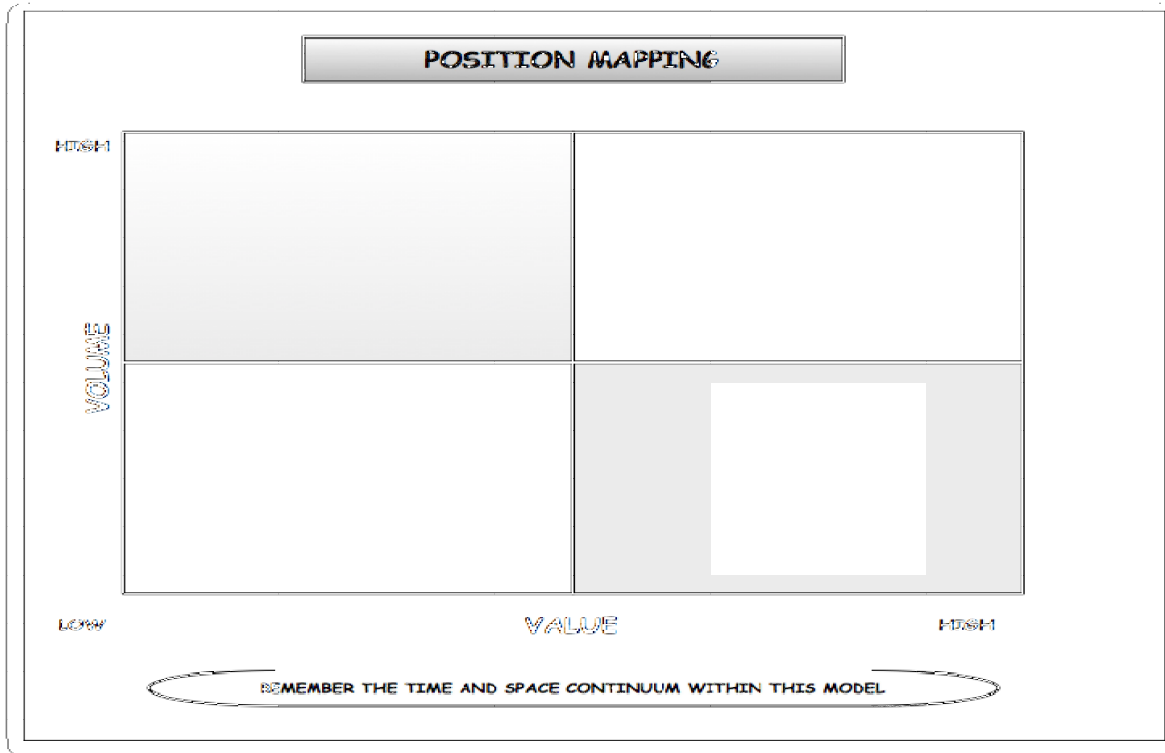
1.4 Identifying the Ideal Market Position (Strategic Positioning)

1.4.1 Explain where you are positioned by your suppliers?



1.5 Realignment of Current Position to Future Position

1.5.1 Explain how you move from where you are to where you need to be.



2 Analysing Supply Networks, Supply Competency and Capability

2.1 Explain who are the main stakeholders and what are their main roles in the conventional tea supply chain

2.2 Can you map your supply chain

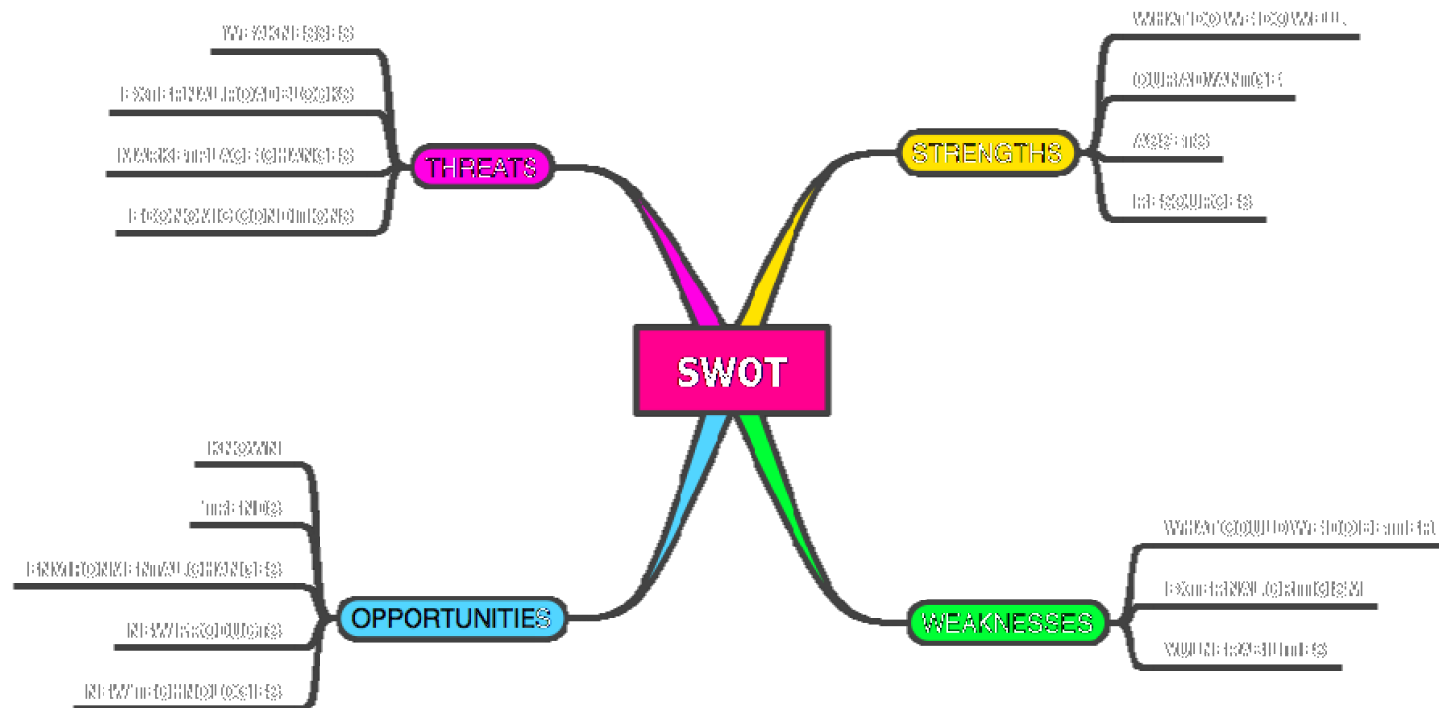
2.3 What are the main characteristics of your supply chain with respect to the activities in tea production and marketing?

Main Characteristics	Why it is an important Characteristic?

2.4 Can you re-draw your Supply Chain

2.5 What are the changes have taken place in operating your tea supply chain during last two decades

2.6 SWOT Analysis



2.7 Could you approximately give the percentage of customers who paid you on time and who doesn't pay on time (Determining Best Customers and Business Blockers)

Customers Who Have Demand But Don't Pay	Customers Who Have Demand & Pay

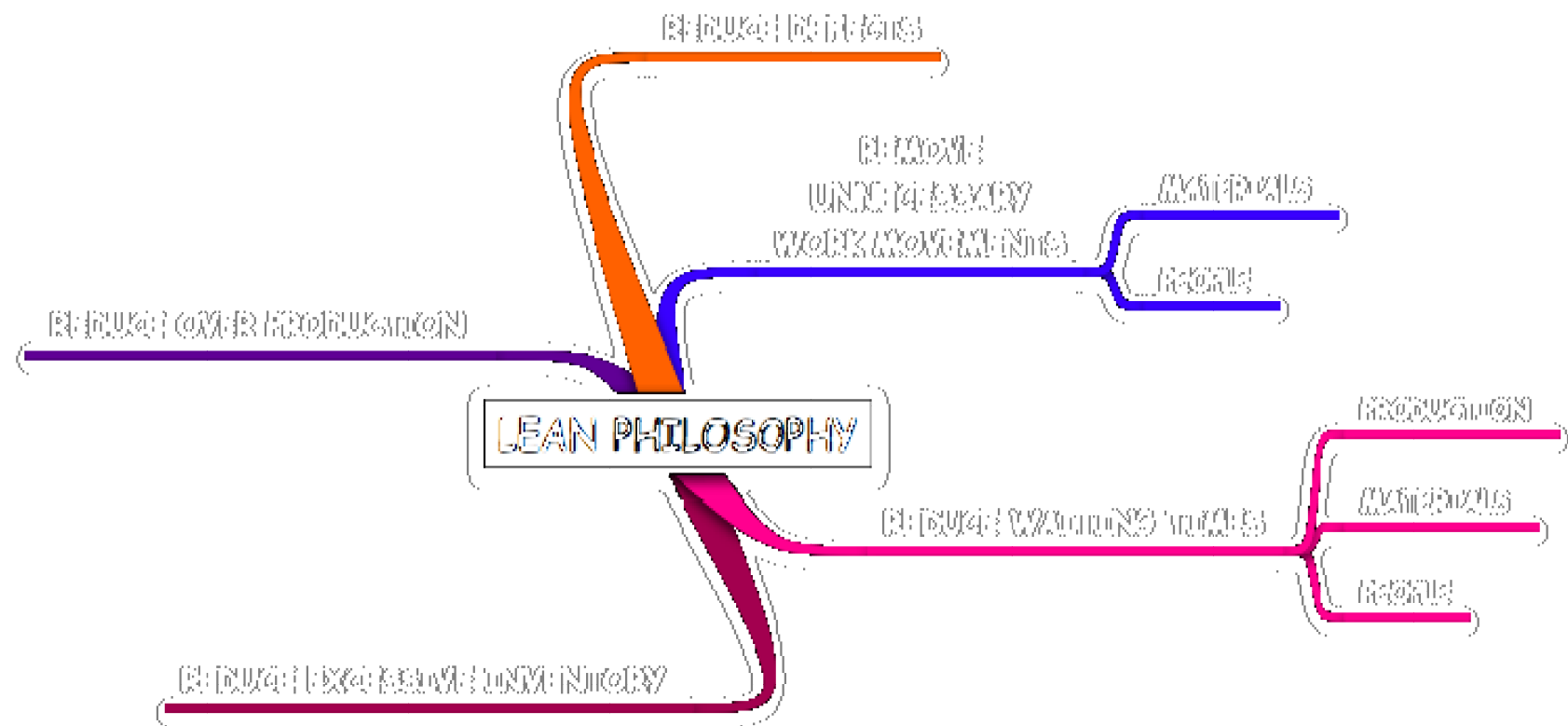
2.8 Explain how you manage your Cost, Shareholder Value and Performance

	Objective	Measures	Targets	Initiatives
<u>CUSTOMERS</u> To achieve your success how should you appear to your customers (Find out by measuring lead times, quality, performance and service, and costs. Second, what must your company excel at)				
<u>INTERNAL BUSINESS PROCESS</u> To satisfies your customers and shareholders what business processors must excel (Determine the processes and competencies that are most critical, and specify measures, such as cycle time, quality, employee skills, and productivity, to track them.)				

	Objective	Measures	Targets	Initiatives
<u>LEARNING AND GROWTH</u> To achieve your vision, how did you sustain your ability to change and improve (Can your company continue to improve and create value? Monitor your ability to launch new products, create more value for customers, and improve operating efficiencies)				
<u>FINANCIAL</u> To succeed financially, what did you do (How has your company done by its shareholders? Measure cash flow, quarterly sales growth, operating income by division, and increased market share by segment and return on equity, how you manage your cost)				

2.9 How you manage transaction and interaction capability within the Supply Network

2.10 Developing LEAN Principles - A Quality Focus
2.10.1 Explain how you adopt lean principles to in your supply chain



2.11 Please explain the following Performance Matrices, the improvement actions and sustaining actions you have taken

		<i>Current Performance</i>	<i>Improvement Action</i>	<i>Sustaining Action</i>
1	On time delivery (to commit date)			
2	Order fulfillment lead time			
3	Cash to cash cycle time			
4	Total supply chain management cost			

Supply Chain Rules			
		<i>Current Performance (1-10)</i>	<i>Sustaining / Improving Action</i>
1	Establish & Manage Rules		
2	Assess Performance		
3	Manage Data		
4	Manage Inventory		
5	Manage Capital Assets		
6	Manage Transportation		
7	Manage Supply Chain Configuration		
8	Manage Regulatory Compliance		
9	Process Specific Elements		

3 Sustainable tea supply in tea supply chain

3.1 Moving to Sustainable Supply

		<i>Yes / no</i>	<i>How / why</i>
1	Is your supply chain right - on time - every time		
2	Do you audit and understand your actual customer requirements		
3	Do you audit and understand why your customers buy from you		
4	Do you audit and understand the current legitimate capacity of your supply chain - what is it		
5	Do you audit and understand the constraints of your supply chain		
6	Do you audit and understand the points at which your supply chain could be attacked		

3.2 Explain what are the main environmental, economic social factors that influence on managing a sustainable tea supply?

	Important issues you	Why?	What have you done to overcome the issues
Environmental			
Economic			
Social			

4 Analysing the Potential Risk Inherent within Supply Networks

4.1 Explain what the potential Immediate Risks on sustainable tea supply, demand/distribution, processing and planning

	Description of the Risk	Severity (1-10)	Probability (%)	Impact on the Supply	Preventative Action	Responsible Person
1						
2						
3						
4						
5						

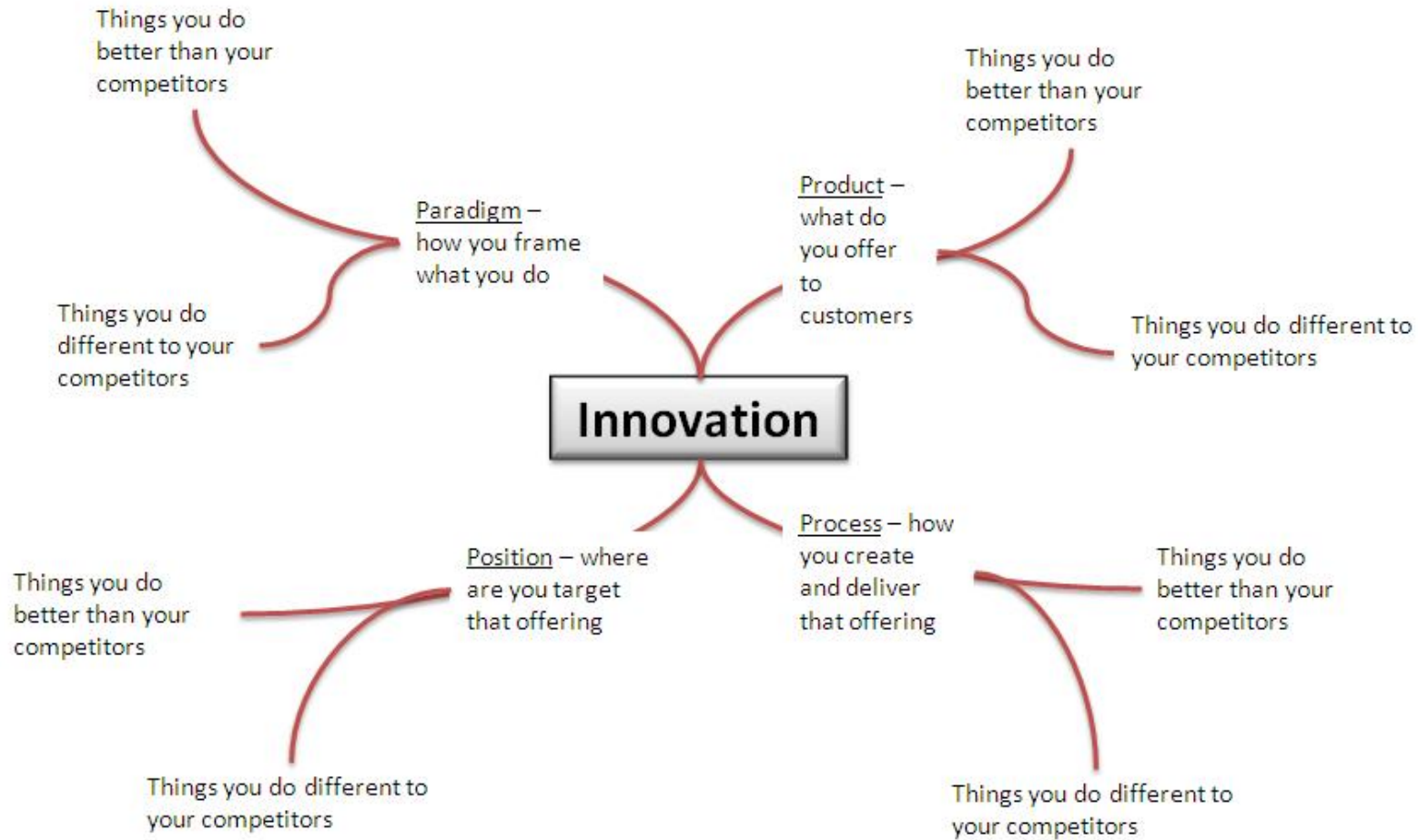
4.2 Explain what the potential future Risks on sustainable tea supply, demand/distribution, processing and planning

	Description of the Risk	Severity (1-10)	Probability (%)	Impact on the Supply	Preventative Action	Responsible Person
1						
2						
3						
4						
5						

4.3 The Supply Chain Sanity Check Pro-forma

The Question	The Answer
What are we trying to do	
Why are we trying to do it	
How are we trying to do it	
How do we know it's working	
How could we improve it	
How do we know we have improved it	

5 Insight into Innovation and technology



- A Rating of Organisational Innovation
- A Rating of Customer Innovation
- A Rating of Competitors Innovation
- Capability in Getting New Products to Market
- Skills to Implement Innovation Strategy
- Customer Focused Innovation
- Differentiated Innovation within the Business Process

6 Fair Trade & CSR

- 6.1 What do you think about producing tea under the fair trade standards?
- 6.2 Explain what have you done to increase the fair trade in tea industry?
- 6.3 Explain the key requirements that your buyer consider when purchasing your leaf/tea
- 6.4 Which problem do you consider most significant in negatively affecting farming and operations with implementing fair trade?
- 6.5 Which problem do you consider most significant in positively affecting farming and operations with implementing fair trade?
- 6.6 What are the most important benefits in fair trade in tea supply chain?
- 6.7 Explain what can you do to increase the number of farmers offering their leaf to the fair trade chain

APPENDIX 10: SEMI-STRUCTURED INTERVIEWS WITH IMPORTERS/ BUYERS/ DISTRIBUTORS/ RETAILERS IN AUSTRALIA

1. What are the main characteristics of retailing and marketing beverage and especially tea?
2. What kind of tea do you buy/sell? How long have you been in the business?
3. How do you procure your products? Contract or wholesale market?
4. Do you use written contracts, verbal contracts? How can you enforce them? How do you deal with risk? What are the most important risks?
5. Who are your suppliers? How do you choose your suppliers? What are the main parameters?
6. What are the main key success factors of successful suppliers?
7. What is the relative importance of the above mentioned parameters in your decision making?
8. What are the relationships of players in tea supply chain? How do you establish the relationship?
9. How do you know about suppliers? How do suppliers know about you?
10. What are the most important factors that influence your decision making in terms of procuring and marketing tea?
11. What is the way fresh tea gets to arrive to consumers? Can you explain the distribution channel?
12. What kind of information do you (you or other actors in the supply chain on your behalf) keep about activities and applications of inputs (when tea arrives to you or even before)?
13. What are the general standards required for the products? Quantity, quality, frequency, variety, packing, safety? What are the specific requirements for the products that you trade?
14. What are the main limitations faced by suppliers to enter and stay in the supply chain?
15. What opportunities are offered by your business to small farmers? What benefits?
16. What are the motivations of your suppliers for selling to your business?
17. What is the volume and value of tea that you buy/sell? What is the forecast for the next five years? How do you expect that the tea industry will evolve?
18. What recommendations do you have for constructing 'best practice' models to enhance the competitiveness of the tea sector?
19. What role should play institutions, organizations and private sector to construct these models?
20. How important are the environmental and health and safety issues (for those that produce and market tea) in your decision making?
21. What are the main changes that have taken place in the tea supply chain in the last 10-15 years?
22. What are the drivers for changes in the tea supply chain?

23. What is the relative importance of these drivers?
24. How have these changes affected the procurement and marketing of tea?
25. Any Other comments or specific experiences that you would like to share?

APPENDIX 11: DECLARATION OF PROFESSIONAL EDITING ASSISTANCE



Professional Editorial Assistance for Theses

Students seeking professional editorial assistance for the development of their thesis are required to follow guidelines set out by UOW's Research Division:

<http://www.uow.edu.au/research/rsc/supervisor/UOW017263.html>

Candidates must also sign the following declaration and have it signed by their supervisor and the editor doing the work.

Declaration

1. Professional editorial work undertaken in the preparation of this thesis has been done according to UOW's Editing of Research Theses by Professional Editors Policy.
2. The requirements for using professional editorial assistance were discussed with the principle supervisor beforehand.
3. Professional editorial intervention was restricted to: Language and Illustrations and Completeness and Consistency as defined by the current Australian Standards for Editing Practice (ASEP).
4. Where a professional editor provided advice on structure, they gave exemplars only and did not undertake a structural re-write themselves.
5. Material for editing or proofreading was submitted in hard copy, or where an electronic copy was submitted to the editor, their mark-up was done using Track Changes and the file returned in a locked PDF format only.
6. The name of the editor and a brief description of the service rendered, in terms of Australian Standards for Editing Practice, has been included as part of the list of acknowledgements or other prefatory matter. Where the professional editor's current or former area of academic specialisation is similar to that of the candidate, this too has been noted in the prefatory matter of the thesis.

Acknowledged by:

Candidate's Name: Mahawattage Dona Ranmali Pradeepa Jayaratne Ranmali

Thesis title: Identifying the Influencing Factors In Sustainable Tea Supply in the Sri Lankan Tea Industry

I declare that I have complied with the above conditions:

Signed: _____ Date: _____

Editor's Name: Laura E. Goodin

I declare that I have edited/proofread this thesis in compliance with the above conditions, as instructed when engaged by the candidate.

Signed Laura E. Goodin Date: 19 March 2014

Supervisor's Name: _____

Signed: _____ Date: _____