

**School of Management**

**Analysis of Linking Farmers to Markets for Carrots, Cabbages and  
Snow Peas in Aileu Vila, Maubisse and Hatubuilico, Timor Leste**

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**This thesis is presented for the Degree of  
Doctor of Philosophy  
of  
Curtin University**

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## **Declaration**

This thesis contains no material that has been accepted for the award of any other degree or diploma at any universities.

To the best of my knowledge and belief, this thesis contains no material previously published by any other person except where due acknowledgement has been made.

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## Abstract

Increasing participation of small farmers into higher value markets has been recognized by governments and international agencies as an important factor for economic development and poverty reduction in many developing countries. Access to market for small farmers is one of the strategies to reduce poverty as this can enhance agriculture-based economic growth and increase rural incomes. In Timor Leste, the majority of the population depend on agriculture as the main source of income. However, agricultural productivity is very low and there is a lack of market opportunity for farmers to sell their produce. This contributes to the low income of many small farmers in this country. In an attempt to deal with this issue, in the last five years the government of Timor Leste has been focusing on improving agricultural productivity. However, most of the agricultural programs and projects mainly concentrated on the enhancement of agricultural production, with little regard for linking farmers to markets. To increase farmers' income and reduce poverty in Timor Leste, it is important to increase agricultural production and strengthen the production- marketing link. The reason is that increasing production alone will not necessarily generate more income for farmers. If there are no markets, there are no incentives for farmers to increase production. Therefore, linking farmers produce to markets is necessary.

The objective of this study is to analyse the supply chain for horticultural produce with the view of analysing mechanisms for linking farmers to markets in Aileu Vila, Maubisse and Hatubuilico, Timor Leste. The research used mixed methods approach.

The result of the study showed that linking farmers to markets by strengthening supply chain linkages has increased the production volume and quality of horticultural products. In addition, farmers who participated in the supply chain were able to access inputs, performed better crop management practices, paid more attention to quality products and utilised recommended standards and packaging. They were better able to meet market requirements, thus, the market for their produce was assured.

Factors that led to the success of current models of linking farmers to markets (LF2M) include marketing strategies used to market the product, focusing on existing products which have potential market domestically or internationally, choosing products that represent an economic opportunity to increase farmers' income through diversification and external support for funding and assistance. The cases of linking farmers to markets reviewed showed how an integrated approach involving small farmers as cooperators with the support of NGOs, international agencies and the private sector helped establish small, profitable well-

managed business enterprises, promoting value addition, diversifying product offerings and catering to demand-driven markets based on market analysis and growth. Programs that linked farmers to markets had a positive impact on participant farmers as it gave farmers better access to the high end market. Moreover, the marketing risk they faced was reduced, their crop production increased and they had better access to technical advice. The net profit received by farmers was higher which means increased farmers' income, thus contributing to poverty alleviation. Factors that contributed to the effectiveness of LF2M programs in Timor Leste included access to markets, access to technical advice and improvement of the skills of farmers.

The linkage initiatives offered farmers an opportunity for both domestic and export markets for their produce. As a newly independent country, the initiatives of LF2M seem to be an effective way of improving the income of small farmers and reducing some of the problems they faced. To accelerate economic growth in the country, there is a need to modernize agricultural production, requiring markets for both inputs supply and for the sale of products and services. To increase income and reduce poverty and unemployment in the country, Timor Leste's farmers need to be more market-oriented, changing from subsistence farming to semi-commercial or commercial farming. This means further focus on both production and marketing. This will not only benefit farmers in rural areas but also contribute to the development of the country as a whole in terms of job creation, providing market opportunities and improving GDP. Given the large number of farmers in Timor Leste, having successful LF2M models would contribute in meeting the country's goal of poverty alleviation.

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## Acronyms and Abbreviations

ADB	=	Asian Development Bank
DAFF	=	Department of Agriculture, Fisheries and Forestry, Australia
AMCAP	=	Ainaro and Manatuto Community Activation Project
APAARI	=	Asia-Pacific Association of Agricultural Research Institutions
ARP	=	Agriculture Rehabilitation Project
ASC	=	Agriculture Service Centre
AVRDC	=	Asian Vegetable Research and Development Centre
BPRE	=	Bureau of Postharvest Research and Extension
CAFOD	=	Catholic Agency for Overseas Development
CARE	=	Cooperative for Assistance and Relief Everywhere
CCT	=	Cooperativa Café Timor
CCO	=	Cooperativa Café Organico
CDEP	=	Centro Desenvolvimento Economia Popular
CIP	=	Centre for International Potato
CPI	=	Consumer Price Index
CPL	=	Centro Producto Local
CRF	=	Chemical Residue Free
DAI	=	Development Alternative Incorporated
DEFRA	=	Department for Environment, Food and Rural Affairs, UK
DSP	=	Desenvolve Seitor Privado (Private Sector Development)
ECM	=	Error Correction Model
Escudo	=	Portuguese currency
ETTA	=	East Timor Transitional Administration
EUREPGAP	=	European Retailer Partnership for Good Agricultural Practices
FAO	=	United Nations Food and Agriculture Organization
FFTC	=	Food and Fertilizer Technology Centre
FFV	=	Fresh fruit and vegetable
GDP	=	Gross Domestic Product
GDPRD	=	Global Donor Platform for Rural Development
GoTL	=	Government of Timor Leste
GTZ	=	Germany Agency for Technical Cooperation

HARC	=	Himalayan Action Research Centre
IMF	=	International Monetary Fund
IPM	=	Integrated Pest Management
ICA	=	International Cooperative Alliance
ICAR	=	Indian Council of Agricultural Research
ICRAF	=	International Centre for Agro-Forestry Research
IFAD	=	International Fund for Agricultural Development
ISO	=	International Organization for Standardization
JICA	=	Japan International cooperation Agency
KIT	=	Koninklijk Instituut voor de Tropen (Royal Tropical Institute)
L2FM	=	Linking Farmers to Markets
MAFF	=	Ministry of Agriculture, Fisheries and Forestry, East Timor
MDG	=	Millennium Development Goal
MOU	=	Memorandum of understanding
NASC	=	National Agriculture Science Centre
NCBA	=	National Cooperative Business Association
NGO	=	Non-Governmental Organization
NSD	=	National Statistic Directorate
OECD	=	Organization for Economic Cooperation and Development
QDA	=	Qualitative Data Analysis
REPELITA	=	Rencana Pembangunan Lima Tahun
RDTL	=	Republic Democratic of Timor Leste
Rupiah	=	Indonesian currency
SAPT	=	Sociedade Agricula Patria e Trabalho
SGP	=	Small Grant Program
SIDA	=	Swedish International Development Agency
SME	=	Small and Medium Enterprise
SOGES	=	School of Global Environmental Sustainability
TLHS	=	Timor Leste Household Survey
TROCAIRE	=	Irish Charity Working for a Just World
UK	=	United Kingdom
UN	=	United Nations
UNDP	=	United Nations Development Program

UNFPA	=	United Nations Population Fund
UNOPS	=	United Nations Office for Project Services
UNTAET	=	United Nations Transitional Administration in East Timor
USA	=	United States of America
USAID	=	United States Agency for International Development
VOC	=	Vereenigde Oostindische Compagnie
WFP	=	World Food Program

# Chapter 1

## Introduction

### 1.1 Background

The forces of economic liberalization and globalization have had a dual effect on small farmers and small to medium agribusiness both in developed and developing countries due to the advent of new prospects as well as new challenges. As a result, many smallholder farmers have found themselves excluded from emerging markets. The increasing domination of supermarkets and processors has favoured suppliers who can guarantee high volumes, consistent quality and involvement in long-term contracts. However, regardless of the difficulties faced by small farmers, some case studies reveal successful, mutually beneficial involvement between the commercial sector and smallholder farmers, such as the case of small vegetable farmers delivering to the supermarket in South Africa (Louw et al. 2006). In addition, one of the biggest threats to farmers moving their production base away from subsistence agriculture is competition from imported produce. However, this should not be viewed as a threat, but rather as a means by which discipline and market forces are injected into a sector that must change and adapt to be able to compete.

Farmers in East Timor are also affected by the forces of globalization and economic liberalisation as the government has adopted a free market system. Timorese producers are subject to strong competition, both internationally and in the domestic markets, particularly since the country is located in one of the most economically dynamic regions - Southeast Asia.

Geographically Timor Leste is a small country, although it is very rich in natural resources such as oil and gas. The economy is mainly agriculture, 'contributing the largest share to GDP, employing almost three quarters of the workforce, providing over 70 per cent of the population with their main sources of livelihood and offering the largest potential exports and trade' (Saldanha & Costa 1999, p. 35; MAFF 2004). The agricultural market in Timor Leste has undergone a period of significant change

since independence. During the Indonesian time (Lundahl & Sjöholm 2005), producers enjoyed relatively cheap agricultural inputs such as fertilizer and seeds and a guaranteed purchase price, particularly for domestic rice which created an artificial market for the crop. After independence and the withdrawal of the system, Timorese producers have been challenged with obtaining agricultural inputs at an affordable price and finding markets for any surplus they produce while competing with imported products which are high in quality and are readily available. It is therefore important for the country to adapt and re-focus its efforts to develop a functional marketing environment. This will also require Timor Leste's producers and government officials to adopt new habits and thinking in developing agricultural production and marketing.

In addition, creating an enabling environment in Timor Leste is necessary as this will allow producers to decide what to produce and how to market their products better. This will also contribute to the development of a framework for agricultural policy in Timor Leste based on global best practices. Based on this environment the government would stand as facilitator for the development of agriculture instead of a position of dominant decision maker and provider of agricultural inputs and services.

Meanwhile, the purchasing power of the majority of the Timor Leste population is a decisive factor in the decision on whether to expand agricultural production of a particular crop. Following independence, many foreigners coming into the country had an impact on the increase of imports of goods including agricultural products. However, besides the short-term increase in demand, there is no indication of domestic market expansion as the basis for increased domestic demand is very small and additional supplies can only be added slowly to the market. However, according to deBoer et al. 'the analysis of regional markets and Timorese production conditions indicates potential opportunities to export horticulture products to Australia and Singapore' (deBoer et al. 2004, p. 3). Meanwhile, a study conducted by USAID in 2006 also indicated that the domestic demand for local vegetables was higher compared to imports. For example, the demand for local vegetables was 33.4 t per month and imports was only 4.7 t per month (DSP/USAID 2006).

There are some market characteristics in Timor Leste which are typical of a transitional economy (Larsen 2007, p.5). These include strong import competition resulting in low prices, production dependence on imported input supplies, and domestic produce of inferior quality and high marketing costs, making it cheaper to import than purchase domestically produced products from rural areas. Therefore, to be able to compete with imported products there is a need to improve local production and quality to meet local demand.

Some of the areas that need to be considered in the development of horticulture production in Timor Leste are Aileu Vila, Maubisse and Hatubuilico. These areas have the potential for commercial vegetable production because of their location, the experience of farmers in growing vegetables, extensive fertility of lowland and upland areas, and favourable rainfall throughout most of the year. According to Winrock International (2006, p. 6) ‘the microclimate of these areas lends itself to year round production and/or partial year production of crops that have a high value in Australia and Southeast Asia during off seasons in these countries.’

Furthermore, the seasonality of rainfall has implications for marketing of agricultural produce. The main production period is October until April. This means that the main market, Dili, is likely to receive produce from areas along the northern coast which enjoy the best transport links. Later in the year, the eastern districts and southern districts will likely have the advantage as they will have access to more water and, in the hills, there is also the advantage of cooler weather, making the production of vegetables possible the whole year round. Although there are seasonal peaks and troughs of production for all produce, there is never a period when there is no produce in the market. Nonetheless, it is important that these areas are developed based on crops that are suitable and appropriate for the region.

Carrots, cabbages and snow peas are vegetable crops that grow well in this region and farmers are already producing these crops in higher altitude areas within one to two hours by road from Dili. These crops are relatively easy to produce, pack and transport. They also have a high demand in the domestic and export markets, especially for snow peas. As stated by deBoer et al. (2004, p.3.), ‘the existing market

in Australia for imported snow peas of all types is estimated to be about 14 t per week’.

However, the core problem or issue inhibiting increased production of horticulture products is the lack of marketing opportunities (Rahim 2007). Because of the lack of access to markets, farmers do not have the motivation to increase production. In addition, farmers have to deal with issues of low productivity, unavailability of inputs and poor supplies and services. Current agricultural projects in Timor Leste are targeting improvements to many aspects of the system of agriculture such as irrigation and seeds, and since 2002 there is relatively little attention on initiatives focusing on linking farmers to markets and service providers.

Successful development of these areas, especially in the horticulture sector, will require support from both the government and the private sector. Marketing policy, for example, is important because it transforms the commodity in time, space and form. Thus, marketing enables a person with some land to move from semi-subsistence to growing produce regularly for sale. ‘This will increase farmers’ income so that farmers form a growing market for the domestic industry as well as earning foreign exchange to pay for essential imports’ (Abbott 1993, p.68).

This study will look at the value chains for horticulture produce as, worldwide, there is an increasing concentration in processing and marketing and others in all parts of the production-distribution chain (Johnson & Hofman 2004). Therefore, ‘traditional practices in which the product is produced, without farmers having a definite idea in advance of when the product is needed, to whom they will sell to, and at what price they are going to sell their product, is being substituted with higher coordination between farmers, processors and others in the supply chain’ (Shepherd 2007, p.13). By getting involved in this coordination, farmers can plan to produce more to meet the demand of the buyers instead of depending on markets to absorb what they produce and, in the end, this is expected to increase farmers’ income.

Based on the core problem above, this study will analyse the supply chain of horticulture products in Timor Leste and consider various ways of more effectively

linking farmers to markets, including how the government can act as a facilitator to close the gap between producers (or farmer groups), the private sector and the consumers, including supermarkets in Dili and other potential markets outside Dili.

## **1.2 Objectives**

The overall objective of this study is to analyse the supply chain for horticultural produce with the view of analysing mechanisms for linking farmers to markets in Aileu Vila, Maubisse and Hatubuilico – Timor Leste. The specific objectives are:

- i) To map the supply chain for carrots, cabbages and snow peas;
- ii) To examine current models of linking farmers to markets;
- iii) To assess the effectiveness of various models of linking farmers to markets in Timor Leste;
- iv) To identify policies and strategies that will improve market linkage of small farmers in Aileu Vila, Maubisse and Hatubuilico.

## **1.3 Research problem**

As potential areas for horticultural production, Aileu Vila, Maubisse and Hatubuilico have the comparative advantage in terms of agronomic and climatic conditions. These include the higher rainfall distribution (above 320 cm); favourable temperature (around 12 – 17°C); fertile soil condition and good altitude which is more than 800 m above sea level (MAFF 2004). This shows that there is a favourable condition for developing horticulture in this region and that the market is available to absorb the products as there is high demand for local vegetables domestically. Based on this, it is important to further develop the horticulture industry, in particular taking into consideration the linkage between producers and markets.

However, one typical marketing problem that arises is that buyers, including supermarkets and processors, always question insufficient supply, while farmers complain about lack of markets. It is clear that there is an issue in terms of linking farmers to markets. Perhaps buyers have not been too active in seeking out new supplies while farmers are unable to identify new markets and perhaps lack the ability to take advantage of identified markets through value-adding activities, such as sorting, grading and packaging. Conversely, small farmers are usually not organized, but sell their small produce individually to traders at the local markets. Furthermore, there are no consistent linkages with traders. Often they have no bargaining power with the buyers. Buyers usually do not pay higher prices for better quality and traders also commonly mix different varieties, giving no incentive for farmers to upgrade their product.

It is clear there are poor linkages between producers in Aileu Vila, Maubisse and Hatubuilico with the buyers, especially with supermarkets and restaurants in Dili. In addition, there is poor information flow from producers to the markets and vice-versa. As a result, producers do not know what is in demand in the market in terms of timing, quantity and prices. Thus, there is strong competition internationally. Producers are not ready to compete with imported products in terms of quality, quantity and availability of the product in the market. Furthermore, small local markets are unable to absorb surplus production. Meanwhile, agricultural growth is driven almost entirely by market demand from outside Timor Leste which is dominated by readily available and good quality products. Currently, potential commercial customers need to be convinced that the local market can deliver the quality and the quantity they require. Hence, there is a need to study these marketing aspects in detail. The research problem this thesis is investigating is on how farmers and markets for horticulture product can be linked more effectively in Timor Leste. What features of the current supply chains for carrots, cabbage and snow peas and the ingredients will lead to successful linking of farmers to markets in Timor Leste?

## **1.4 Conceptual framework**

The agricultural sector has long been recognized as an important sector and plays a significant role in the development process within many developing economies (Pingali 2006). In the past, the agricultural sector's role was often seen as providing labour and a production surplus to the industrial sector. However, many governments and aid donors have also recognized that the development of agriculture is a more difficult process than had been expected and that greater emphasis has to be placed on understanding the processes of agricultural change and rural development (Langham & Retzlaff 1982). In addition, Joshi et al. (2007) found that there has been a trend towards more commercialized farming, greater private-sector participation and a re-defined role of the government.

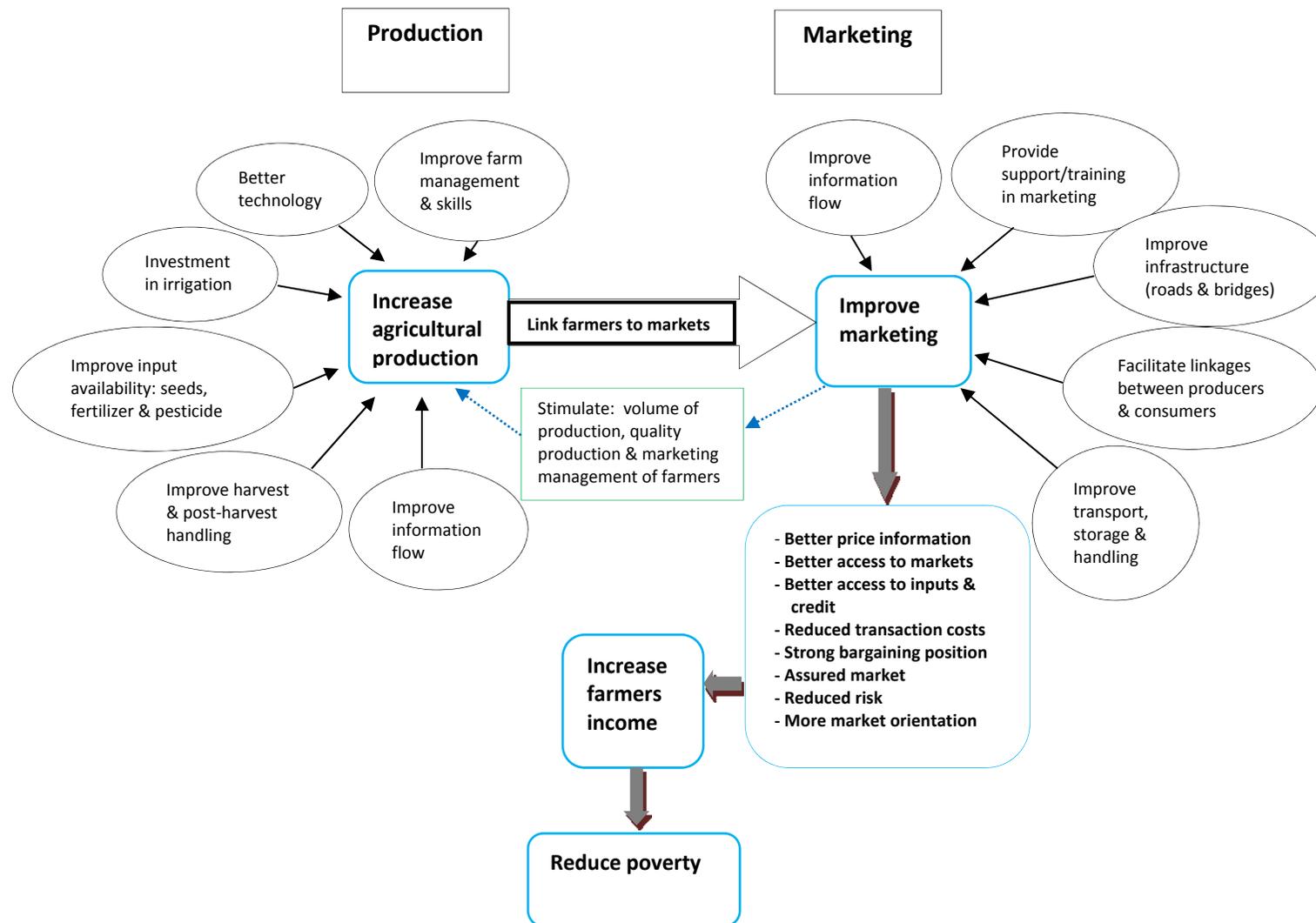
Successful experience from the Asia-Pacific region indicated that the agricultural sector could be used to mobilize and foster economic growth in the first stages of economic development and be transformed from a subsistence to a market-based system (Joshi et al. 2007). To accelerate economic growth, there is a need to modernize agricultural production, requiring markets for both inputs supply and for the sale of products and services. The strengthening of the existing markets and development of new markets can be done through the improvement in infrastructure, improvement in access to information, reduction in transaction costs and promoting competition (Burch et al. 1996).

One of the problems faced by small-scale farmers in many developing countries is the lack of marketing opportunities. Some government programs and aid donors are still concentrating on how to increase agricultural production without facilitating the marketing of farm produce to the market. This is likely to have an impact on farmers in terms of cash for buying inputs or reinvesting on farm and other basic necessities for the family. Increasing production, while at the same time linking production to the markets in a sustainable way, will help farmers improve the productivity and quality of their crops (Mancero 2007; Rao et al. 2004; Simmons 2003). This will lead to the increase of farmers' income, reduce unemployment and, hence, reduce poverty in rural areas.

In the case of Timor Leste, agriculture is the main activity and the majority of its population depends on this sector. However, most farmers still practice subsistence farming. In addition, the rate of poverty and unemployment is high, in particular in rural areas which account for about 40 and 46 per cent respectively (World Bank 2005). To reduce poverty and unemployment in the country, Timor Leste's farmers need to be more market-oriented, changing from subsistence farming to a semi-commercial, or commercial, farming. This means further focus on both production and marketing. Farmers have resources, primarily land and labour, but they lack inputs, capital, technical knowledge and access to markets, and are also faced with a lack of infrastructure such as rural roads and transportation (Shepherd 2007; Silva 2005).

To overcome these problems and, hence, help them move from subsistence to semi-commercial farming, linking farmers with the markets is important. This may involve government bodies and the private sector in the implementation of the linkage approach, such as linkages through agribusiness firms, cooperative, leading farmers, processors and vertical coordination. By participating in these linkages, farmers are likely to get more benefits. Many empirical studies have shown that by linking small-scale farmers to the markets, they will benefit from it (Berdegue et al. 2008; Swinnen 2007; Simmons et al. 2005; Patrick 2004; Danielou et al. 2003). Benefits include the availability of inputs and credits, assistance and risk reduction. Furthermore, their production, productivity, and the quality of the product will also improve, as there is an assured market for the products. These can make a significant contribution to poverty reduction and reducing unemployment (Berdegue et al. 2008).

To increase the income of farmers and, therefore, reduce poverty in Timor Leste, there is a need to develop agriculture in an appropriate manner. This includes increasing agricultural production (production) and then linking production to markets (marketing). Linking production to marketing will increase farmers' income and will lead to poverty reduction in Timor Leste, as indicated in Figure 1.1 below.



**Figure 1.1: Conceptual framework of linking agricultural production and marketing and poverty reduction**

## **1.5 Research approach**

This study was conducted in Aileu Vila, Maubisse, Hatubuilico, Dili and Baucau, Timor Leste. The population includes producers of carrots, cabbages and snow peas; buyers (supermarkets, restaurant, hotels, and institutional buyers); and other downstream buyers such as traders and retailers.

For producers, data was collected through surveys of a random sampling of a total of 800 producers. The interviews, using complete enumeration, were also conducted with the managers of supermarkets; managers of restaurants/hotels; and traders. Meanwhile, rapid rural appraisals was carried out which included a site visit and semi-structured interviews with community leaders, government agencies, and local and international NGOs to ascertain institutional structures, the resource base and organizations in the area. Data gathering methods employed include face-to-face interviews, rapid rural appraisals, desk top research of current and related literature and a survey of supply chain actors.

For this study, three types of questionnaires were employed. These include producers, traders, and buyers questionnaires. Data analyses used are qualitative and quantitative, including case study analyses of the existing market linkage initiatives in Timor Leste. In addition, value chain mapping was conducted to develop a description of the horticulture value chain, and identify potential high value markets.

## **1.6 Structure of the thesis**

This thesis is comprised of nine chapters. The first chapter provides an introduction to this research including the background, objectives, research problem, conceptual framework and the research approach used for the study. Chapter 2 introduces general information about Timor Leste. The chapter includes a discussion of the economic development which has occurred since Portuguese time, Indonesia and after the independence, income and poverty, the contribution of agriculture to Timor Leste's development, government policies supporting agriculture development and programs geared toward the development of agriculture in Timor Leste. Chapter 3 is

devoted to a literature review of linking farmers to markets. Specifically, this chapter focuses on various types of linkages, advantages and disadvantages, empirical examples and whether these types of linkages are appropriate to be used in Timor Leste. The types of linkages discussed include vertical integration, cooperatives, contract farming, linkages through domestic traders, linking farmers through supermarkets and linkages through exports. Here supply chain and value chain are also considered. Chapter 4 presents a review of approaches and methodologies for analysing supply chains. The topics covered include qualitative and quantitative research methods and the mixed method research approach. Chapter 5 presents the research methodology used in the study and includes the site selection, population and sample size, study and questionnaire design, data required and data collection method, data analysis and ethical considerations of the study. Other topics which are also presented include supply chain mapping, marketing margin analysis and cost and return analysis.

In Chapter 6 the results of the supply chain analysis for carrot, cabbage and snow pea is presented. The topics discussed in this chapter include site description, farmer's characteristics, and farm production and marketing. In addition, the supply chains are discussed and explored in-depth including the value chain introduced by Zero Star and World Vision and the traditional supply chains. This is then followed by a discussion and conclusion and implications. Chapter 7 is devoted to the discussion of current models of LF2M in Timor Leste. Six case studies on market linkages are presented. This includes Zero Star, World Vision, Cooperativa Café Timor (coffee cooperative), Timor Global (agribusiness firm), Agriculture Service Centre and Cooperativa Haburas Fronteira (local cooperative). The issues discussed include the background of the stakeholders, the distribution systems and the challenges faced.

Chapter 8 discussed the effectiveness of LF2M programs for carrot, cabbage and snow pea. The main issues presented include the effectiveness of the value chain and other models introduced and the critical success factors. A detailed discussion of the impact of LF2M initiatives stressed, followed by the problems and constraints faced. Finally, Chapter 9 presents the summary, conclusion and recommendations of the study.

# **Chapter 2**

## **Timor Leste: Background and Issues**

### **2.1 Introduction**

This chapter describes information related to Timor Leste in general and, in particular, economic issues from the Portuguese time, to Indonesian time, to post-independence. How development occurred for each period will be presented in this section. In addition, income and poverty issues in Timor Leste will be briefly discussed and, government programs and strategies used to deal with these problems will be outlined. The contribution of the agricultural sector to the Timor Leste economy is discussed in this chapter, followed by a discussion on rice, coffee, horticulture and livestock. Finally, government policies supporting agricultural development in the country will be considered, especially production and marketing policies.

### **2.2 General information about Timor Leste**

Timor Leste is a newly independent country. This country has a long history of colonization as it was colonized by the Portuguese for about 350 years and then by Indonesia for 25 years. After the 1999 referendum, 78 per cent of the population chose independence for the country and, in May 2002, Timor Leste was formally recognized by the United Nations as an independent country with the name Republic Democratic of Timor Leste (RDTL).

Timor Leste, a half island off Timor located in Sunda archipelago to the Northwest of Darwin, Australia, is small in both magnitude and population. The Timor Leste territory comprises not only the eastern side of the island but also the enclave of Oecusse in the western half of Timor, Atauro island, and Jaco islet, totalling around 15 000 km<sup>2</sup>. The north of Timor Leste is bordered by Ombay strait, the west is

bordered by the West Timor province of Indonesia, the east is bordered by Arafura Sea and the south is bordered by Leti Islands. Administratively, Timor Leste is constituted of 13 districts, 65 sub-districts and 442 villages. One third of the country, particularly in the west, is composed of mountains and about one third of the region is hilly. In addition, low plateaus and coastal lowlands are situated in the central and eastern part of the country (MAFF 2004).

In terms of the seasons, Timor Leste has only wet and dry seasons. The dry season usually ranges from March to October and the wet season lasts from November to February. For the majority of the year the weather is very dry, while the climate is warm, humid and tropical. An estimated rainfall of about 150 – 250 cm occurs in the south coast, in particular, during the wet season, with temperatures of about 26°C. In altitudes of more than 1300 m, the climate is cool with an even distribution of rainfall of more than 300 cm (Keefer 2000).

According to RDTL (2011) ‘the total population of Timor Leste is around 1.1 million people with 70.4 per cent classified as living in rural areas. The annual population growth rate is 2.4 per cent and population density is 71.5 persons per km<sup>2</sup>. Approximately 44 per cent of the population live under the poverty line and the current literacy rate is estimated to be 50 per cent (Lundahl & Sjöholm 2005; Rahim 2007).

### **2.3 Timor Leste economy**

The economy of Timor Leste is mainly composed of agriculture and the petroleum sector, with the latter contributing significantly to the development of the country. In addition, from Portuguese colonization until Timor Leste achieved its independence, the economy mainly concentrated on the agricultural sector. In 2011 the government investment strategy is expected to focus strongly on major infrastructure, skills and other structural gaps, seeking to generate increased and sustainable private sector investment as a means to enhance job opportunities and reduce poverty for the people of TimorLeste.

### 2.3.1 Portuguese time

During Portuguese time (1930s), Timor Leste was described as a less developed and remote region characterized by large degradation to the environment (Metzner 1977; Thomaz 1974; Ormeling 1957; Felgas 1953; Duarte 1931). Prior to the nineteenth century, sandalwood became the main economic activity in the region and this motivated Portugal to occupy and colonize the country.

During the beginning of the twentieth century, the governor of Timor Leste established *Sociedade Agricola Patria e Trabalho* (SAPT) - kind of company supported by government with the aim to monopolize the trade and production of coffee. To achieve this, they forced the population, particularly those who were rebellious, to grow coffee and coconut (Saldanha & Costa 1999). By 1975, activities such as exporting coffee, importing goods into the country, and wholesalers were dominated by SAPT.

Between 1925 and 1936, the government introduced what is called, ‘plantation experiences’ with the objective of intensifying the plantation of coffee. This activity resulted in the emergence of two districts that became the major centres of coffee: the Ermera and Liquica districts. The development of coffee exports from 1925 to 1950 is shown in Table 2.1 below.

**Table 2.1: The evolution of coffee export in Timor Leste from 1925 to 1950**

Year	Quantity (t)	Share of export (%)
1925	1.60	80.4
1930	2.30	91.0
1935	0.80	75.0
1940	0.90	80.2
1945	0.95	81.2
1950	1.40	77.8

*Source: Felgas 1953*

According to Thomaz (1974), between 1960 to 1975 the Portuguese government introduced economic policies aimed at developing the welfare of the Timorese natives, and this was called ‘the ethical economy’. The author also considered this

policy as the responsibility of the white people. Saldanha and Costa (1999) argue that the establishment of the foundation of a modern economy occurred in this period where infrastructure, the promotion of trade, and financial institutions were created. This resulted in the improvement of economic indicators as shown in Table 2.2. For example, GDP at market price grew by three per cent per capita per year; the volume of trade rose by 12 per cent; and exports of coffee, rubber and copra grew by 1.5 per cent (Hill & Saldanha 2001).

**Table 2.2: Selected economic indicators of Timor Leste, 1960 – 1972**

Year	Population	GDP per Capita * (Escudos)	Expenditure Per capita (Escudos)	Primary School Students **	Trade Volume*** (t)	Livestock ****
1960	517 100	2098	161.3	6076	98.6	727 572
1965	555 700	2225	207.1	18 488	150.5	636 029
1970	609 500	2639	332.4	32 397	302.8	794 219
1972	626 500	2930	414.1	57 574	326.2	848 000

*Source: Saldanha 1995a*

*Notes: \* 1983 constant prices; \*\*state, Catholic Church, and military \*\*\*export and import; \*\*\*\*cattle, buffalo, horse, sheep and goat;*

Export and taxes are the source of revenue during that period, although it only covers 50 per cent of total expenditure. In addition, the colonial government also developed agriculture through the opening of new land to cultivate paddy, improvements in irrigation systems in potential areas for agriculture, and through the introduction of new seed varieties for paddy, such as IR-5 and IR-8 which had grown well in Timor Leste (Saldanha & Costa 1999). Furthermore, to stimulate the growth of tourism during that era, the government built an airport in Baucau which can accommodate large planes and that complies with international standards.

### **2.3.2 Indonesian time**

Since the invasion of Indonesia from 1975 to 1980, much infrastructure was destroyed by the war. This includes buildings, roads and markets that were built during the Portuguese time. During this period, economic activities practically

stopped. From 1980 to 1995, the Indonesian government promoted economic growth and development in the territory. As a result, the economy slightly improved again. By 1990, there was an improvement in the roads in most of the areas in the territory, as well as improvement in education, health and agriculture (Pedersen & Arneberg 2001).

High economic growth, increase in trade, livestock and schooling was the result of a rapid increase in government expenditure per capita. In addition, the share of agriculture in gross domestic product decreased from 44.5 to 31 per cent, respectively from 2003 to 2004 (Saldanha & Costa 1999). Meanwhile, there was an increase in the share of industry, trade and finance from 12.4 to 15.7 per cent in 2004. Table 2.3 shows some economic indicators in Timor Leste from 1980 – 1994.

**Table 2.3: Selected economic indicators of Timor Leste between 1980 and 1994**

Year	Population	GDP per Capita* (Rupiah)	Expenditure Per capita (Rupiah)	Primary School Students**	Trade Volume*** (t)	Livestock****
1980	555 350	111 803	51 243	68 709	9500	N/A
1985	605 300	142 843	19 630	111 223	39 520	398 206
1990	747 557	180 727	130 326	115 850	283 376	571 395
1994	827 727	203 000	N/A	125 013	N/A	695 439

Source: BPS 1995

Notes: \* 1983 constant prices; \*\*state; \*\*\*export and import; \*\*\*\*cattle, buffalo, horse, sheep and goat; N/A = not available

The table above shows that from 1980 – 1994 the population increased by about 33 per cent. Meanwhile, at the same time GDP per capita also increased by approximately 45 per cent. In terms of trade, the volume increased dramatically, with only about 10 t in 1980, to around 280 000 t in 1990.

The impact of economic development attracted more people from other provinces in Indonesia to migrate to Timor Leste looking for jobs in the public sector. This resulted in an inequality in the distribution of income between Timorese people and migrants and, therefore, further contributed to the political instability in the region. As a result of this, investors were scared to invest in the territory (Alesina & Perroti 1996).

According to Brahmna and Emanuel (1996), there were four stages of programs in relation to the occupation and development of the territory. The first stage became known as the rehabilitation phase (1976 – 1977) which was aimed at making inventories and rehabilitating the condition in the territory after the war. The second stage was the consolidation stage (1977 – 1978) and, during this stage, efforts were made to consolidate some long-term structures within the economic sectors. The third stage was the stabilization stage (1978 – 1982) which involved establishing the general foundations for the development of the territory. Finally, a stage of ‘short term development’ (1982 - 1984) was launched with the aim to develop physical structures in all districts and sub-districts in the territory. This included opening up more land for agriculture through expanding infrastructures in rural areas. The final step was to confirm that the territory was included into the Indonesian system of the Five Year Development Plan, known as *Repelita*.

From 1984, the territory took part in the Five Year Development Plan. The objective was to integrate development into the strategic planning for the territory. During this period, the focus was heavily concentrated on the development of the agricultural sector. As agriculture was dominant amongst all sectors in the economy within that period, the Indonesian government considered agriculture as a main priority for development (Rio 2001). Table 2.4 shows the distribution of GDP by industrial origin in the territory from 1983 – 1994.

**Table 2.4: Timor Leste: distribution of GDP by industrial origin, 1983 – 1994 (% , market price)**

<b>Sector</b>	<b>1983</b>	<b>1994</b>
Agriculture	44.50	30.90
Mining & quarry	0.53	1.00
Manufacturing	1.30	3.00
Utilities	0.63	0.60
Construction	12.30	18.00
Trade, restaurant & hotel	7.90	9.20
Transport & communication	5.20	8.60
Banking & finance	3.20	3.50
Administration & defence	20.80	21.20
Services	3.70	4.00

*Source: BPS 1983 and 1994*

As part of the Indonesia, the territory was always among the nation's poorest regional provinces. Its per capita regional product was only around 30 – 36 per cent of the national average. However, its economic growth was quite strong. In the period 1983-1997, the economy of the territory grew faster than the national average (Hill 2000).

Shepherd (2009) pointed out that there were some benefits for the Timorese people of being part of the Indonesian integration and development. This included access to education for all Timorese and the availability of agricultural extension workers for each village. However, Aditjondro (2001) claimed that the development also favoured non-Timorese groups and businesses, particularly strengthening military control over the territory.

### **2.3.3 Post-independence**

The Timor Leste economy has been shaped by the Portuguese and Indonesian systems. During Portuguese colonization, income was chiefly derived from plantations such as coffee and coconut, while the economy in general stagnated. During the Indonesian period, however, Timor Leste's economy relied less on agriculture and more on expanding urban-based services. As a result, agriculture's contribution decreased from about 60 per cent to 25 per cent from 1981 to 1999 respectively (UNDP 2002).

When Timor Leste declared its independence in 2002, it was a country characterized by widespread poverty. As stated by Lundahl and Sjöholm (2005) and Hill (2000), Timor Leste was one of the poorest countries, both in the East Asian region and throughout the world. Per capita income after 1999 was less than US\$350 (UNDP 2006). Owing to its tragic history which culminated in the unfortunate events of 1999, Timor Leste achieved its independence with minimum preparation in economics, politics, and legal institutions (Hill 2000). For the first few years after independence, there was a strong effort from international aid agencies to put

institutions in place and launch a number of programs with the aim of reducing poverty in the country.

Planning Commission (2002) indicated that GDP per capita was somewhere in the range between US\$412 to 452 in 2000 and 2001, and that the economy had not managed to recover from 1999 events. A GDP growth of an estimated 15 and 18 per cent in 2000 and 2001 was not enough to put the economy back to the 1997 level (Planning Commission 2002a) because of the very large economic crisis in 1999. In addition, the economy in Timor Leste was completely dominated by subsistence agriculture, with the majority of the population living in rural areas, and agriculture being the main source of income in no less than 90 per cent of all villages. Because of this, the agriculture sector still became the main labour market, employing almost 74 per cent of the total labour force (Planning Commission 2002a).

One of the important crops that affected the lives of around a quarter of the total population is coffee. This crop is the main export product for Timor Leste besides petroleum. As described by Hill (2000), coffee in particular was said to have good prospects for growth, with exports worth US\$50 million or more per annum.

Timor Leste had no industrial sector when it declared its independence. Hill (2000) pointed out that the cash that flowed into the country had been directed mainly to the service sector of the economy in the capital city. The economic growth in real non-oil GDP fell in 2002 and 2003, with 6.7 and 6.2 per cent respectively (see Table 2.5). While in 2004, positive growth is indicated, both in 2004 and 2005, with 0.3 and 2.3 per cent (IMF 2005a). Meanwhile, as a result of higher public investment financed by petroleum fund, the effect on the non-oil GDP was that it was expected to grow at five per cent in 2006 (ADB 2007). The non-oil sector includes agriculture, the public sector and the United Nations, and non-private sector activities.

Timorese employment statistics show an estimated rate of employment of 43 per cent, against 20 per cent on average for urban areas (World Bank 2005) and around 20 000 new comers each year are added to the labour force (IMF 2005a). In addition, because Timor Leste is an open economy, Timorese people need to be

ready to compete both internationally and in the domestic market for goods, services and others.

Through good fiscal management, the growth of the economy of Timor Leste had become positive in the financial year of 2004 – 2005, and the country has achieved macroeconomic stability (World Bank, 2007). Its real GDP grew at an average of 5.2 per cent and this was mainly driven by agriculture and some expansion of private activity in construction and services. However, due to civil unrest in 2006, GDP declined by about six per cent. In 2007, the real non-oil GDP growth had risen again by an average of nine per cent annually (IMF 2010) and this was dominated mostly by the public sector which contributed about 45 per cent of the non-oil GDP (World Bank 2010).

The key to Timor Leste prosperity after gaining independence is the reserve petroleum. In the middle of 2007, the total savings from petroleum was around US\$1.4 billion and each month approximately US\$100 million was added as new revenue (Lundahl & Sjöholm 2005). Because of this, the majority of the income in the state budget until 2010 was still dependent on oil funding and this financing continues to be high, with a share of almost two thirds of income (UNDP 2011). However, contributions from donors were around US\$129 million to various projects in 2010 (see Table 2.5). In addition, since 2007, the growth in public expenditure has been significantly faster, reaching 59 per cent of the non-oil GDP in that year, 106 per cent in 2008 and 101 per cent in 2009. The investment of the private sector was very small, with an average investment of only 4.6 per cent of non-oil GDP in the period from 2002 to 2007.

**Table 2.5: The economic indicators in Timor Leste from 2007 to 2010 (US\$ million)**

	2007	2008	2009	2010
GNI at current prices (US\$ million)	1 728	2 915	2 198	2 704
Non-oil GDP at current prices (US\$ million)	398	499	590	627
Real non-oil GDP growth(% change)	8.4	12.8	12.2	6.1
Public expenditure	66	120	103	100
Government revenues	382	551	342	338
Donor assistance	N/A	236.4	309.5	129
Capital	15	39	38	28

*Source: MoF 2009; UNDP 2011*

Meanwhile, additional government expenditures in 2009 have highlighted the promotion of rural development through the creation of mini-markets to encourage the sale of food and locally produced goods, and on facilitating access to micro-credit for cultivation and development of small-scale businesses in the rural sector. More detailed economic indicators in Timor Leste from 2007 to 2010 are shown in Table 2.5 above.

The main priority of the government elected in 2007 was to solve the political and security crisis in the country. This is important because increased stability will contribute to reviving the stagnant economy and help to solve social problems in the country (Lundahl & Sjöholm 2005). In the future, the main source of economic growth and the creation of jobs should come from the private sector. Nonetheless, because of the unpreparedness and unreadiness of the private sector to take over, for now the government has to perform this role. Table 2.6 shows the sectoral share of non-oil GDP, including the United Nations. It appears that the presence of a large number of United Nations employees, police and defence personnel in the country contributed to the economy of Timor Leste. Since 2002, the contribution of non-oil GDP gradually decreased, although from 2006 it suddenly increased (RDTL 2010).

**Table 2.6: Percentage shares of real non-oil GDP, 2002 – 2008**

	2002	2003	2004	2005	2006	2007	2008
Non-oil GDP (excluding UN)	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Non-oil GDP (including UN)	121.3	113.6	109.5	105.4	108.0	116.4	115.7
Agriculture, forestry & fishery	33.1	33.1	33.5	33.5	35.7	31.1	31.4
Industry	19.0	19.0	15.4	16.0	13.9	17.0	17.9
Services	47.9	47.9	51.1	50.5	50.4	51.9	50.7
United Nations	21.3	21.3	9.5	5.4	8.0	16.4	15.7
Government sector	29.0	29.7	30.0	31.3	32.2	35.1	34.8

*Source: RDTL 2010*

## 2.4 Income and poverty in Timor Leste

Timor Leste is among the poorest countries in East Asia and was ranked 142 of 177 countries worldwide in 2006. The 2010 Global Human Development Report, places Timor Leste into the medium human development category, with a ranking of 120 of the 169 countries (UNDP 2011). With a total population of more than one million people, 44 per cent of its population live below the poverty line, compared with 25 per cent of urban dwellers; poverty incidence is about 30 per cent in the east region and 46 per cent in the west (World Bank 2003a). Poverty is defined in terms of income levels; i.e., the population who earned less than one US dollar a day (World Bank 2003). This means that poverty which is affecting two in five persons is predominantly rural and higher in the west than the east. According to SOGES (2009), among rural households poverty tends to be worse in the highlands, which explains why poverty and other indicators of well-being are worse in the central and western regions than in the mountainous east. In addition, most of the population earned less than one US dollar per day and two fifths of the population is unable to fulfil basic necessities such as food and non-food needs (Hill & Saldanha 2001).

According to Pedersen and Arneberg (2001), between 1993 and 1997 Timor Leste experienced a decrease in the rate of poverty. However, in 1998, the percentage rate of poor households increased after economic contraction. This characteristic also occurred to other poor countries in the world where the majority of the labour force

were employed in the agriculture sector, as the income generated from agriculture is low due to low productivity. A report from IMF (2007) showed that the percentage of poverty increased from 39.5 per cent in 2001, to 41.5 per cent in 2004, and the percentage of the population who only lived on one dollar per day also rose from 20 per cent to 21.5 per cent in 2001 and 2004 respectively (Table 2.7). However, recent statistics from GoTL (2011) showed that from 2007 to 2009, a total of 96 000 people or nine per cent of the population got out of extreme poverty.

**Table 2.7: Labour and poverty indicators for 2004 and 2010**

	2004	2010
Population (000)	923	1 066
Labour force (000)	289	262
Employment (%)	98.2	90.2
Government	5.8	6.0
United Nations & NGOs	3.2	0.7
Private industry	3.2	3.5
Self-employed	10.7	10.0
Subsistence farming	75.3	70.0
Poverty incidence (per cent below threshold)		
National poverty line	41.5	41.0
USD 1 per day	21.5	N/A

*Source: IMF 2007; NSD & UNFPA 2011*

Since the majority of people live in rural areas, it is clear that poverty is an overwhelmingly rural phenomenon. As reported by the World Bank, one in two people live without safe drinking water and three in five without sanitation facilities. The youth illiteracy rate is 23 per cent and adult illiteracy rate is 52 per cent (World Bank 2003a). During the Indonesian time, many people worked in the public sector. However, after independence the number of public servants was drastically reduced as a result of the disappearance of some previous jobs. Nowadays, most families depend on farming (World Bank 2003b), while some can earn an income through small scale businesses.

In terms of infrastructure, the majority of the population, particularly in rural areas, remains untouched, even with the very basic infrastructure (TLHS 2002). A study done by ADB (2005) showed that 44 per cent of the paved roads and 89 per cent of unpaved roads were in poor condition. Thus, communities' access to facilities such

as schools and health, as well as their ability to trade, has been severely limited by lack of accessibility to vehicle-passable roads. However, as the government declared 2009 the year of infrastructure, since then, there were little improvements in those infrastructures. This is because the government has prioritized expenditure on road improvements, given the additional importance of road repair and maintenance in providing short-term employment in rural areas (Ministry of Planing & Finance 2009). As infrastructure is closely related to the growth of farm productivity and employment of rural non-farming, it is important to provide basic infrastructure to the communities as a whole so that they can improve their production and access to markets. This, in turn, will result in increase in income and in poverty reduction.

The poverty assessment conducted by the World Bank concluded that households that are better linked to the market have lower poverty rates (World Bank 2003a). Since independence, a large capital investment programme was put into the country, but subsistence agriculture in Timor Leste is still likely to persist for the foreseeable future. This is because while most of the interventions concentrate on how to increase crop production to fulfil food security of the population, there is lack of activities or programs that focus on how to distribute farmers produce to the market. As a result farmers continue to grow conventional crops to fulfil their family necessities rather than producing for the market. According to Saldanha and Costa (1999) the government policy agenda needed to give high priority to the following areas: poverty reduction in rural areas, the development of rural income security and generating rural development. In addition, Timor Leste faces a combination of sluggish growth, rising inequality between the rich and the poor, and a rapidly expanding population. Unless measures are taken to stimulate growth outside the petroleum sector, non-oil GDP growth will at best keep up with population growth, seriously limiting Timor Leste's chances to achieve the poverty reduction target set in the millennium development goal (MDG) by 2015 (SOGES 2009). However, in the areas of education, health and gender, the government is making steady progress toward achievement of the MDGs. Moreover, signs of optimism are evident with the increasing government expenditures introduced since 2007 on non-oil GDP and the significant increase in national consumption which will potentially reduce poverty levels. Thus, given the government's policies of the transfer of investments to the

groups of people who are vulnerable, subsidising of food prices and job creation available through programs funding intensive labour employment in the areas of infrastructure development, the poverty level in the country has greatly improved since 2007. For example, from 2007 – 2009 the labour schemes funded by the government employed around 40 000 Timorese annually, and the packet referendum infrastructure development program for 2009 created about 64 000 short-term jobs in the rural sector (UNDP 2011). As a result of this, it is estimated that the economy will grow at 12.2 per cent in 2009, with an average per capita income of non-oil economy increasing from US\$398 annually in 2007, to US\$499 in 2008 and US\$599 in 2009.

## **2.5 Agriculture in Timor Leste**

Agriculture plays an important role in the economy of Timor Leste. Approximately 80 per cent of the population depends on agriculture as a main source of livelihood. This sector has the potential to contribute towards job creation and increase the income of poor farmers in rural areas.

### **2.5.1 Background**

The land area in Timor Leste that is suitable for crop and livestock production is about 600 000 ha. Of this area, only 40 per cent is cultivated (Sendall 2006; MAFF 2004; Saldanha & Costa 1999). The estimated area planted is 121 000 ha for maize, 91 000 ha for cassava, and 39 000 ha for rice. Other enterprises include coffee and grazing, estimated at 89 000 ha. In addition, the land in Timor Leste is generally not used intensively. If the use of land can be intensified and managed in effective and efficient ways, this will potentially lead to an increase in crop and livestock production. Current agricultural production is still dominated by low-input/ low-output subsistence farming systems, with each household cultivating a range of crops. The estimated proportions devoted to different uses of land in Timor Leste is shown in Table 2.8.

**Table 2.8: Area occupied by different land use in Timor Leste**

<b>Land use</b>	<b>Area</b>
Villages	1.0
Irrigated rice fields	3.0
Rain fed rice fields	4.0
Plantations	3.0
Mixed farming	2.0
Light forest	76.0
Bush lands	9.0
Others	2.0

*Source: Costa et al. 2003*

To ensure food security, farmers have tried to diversify their farming system. This was done in response to the climate, soils and a large variety of land reforms (MAFF 2004). According to Rola-Rubzen et al. (2010b), the farming system in Timor Leste can be classified broadly into rainfed subsistence agriculture / upland food crops (maize, cassava, etc.); irrigated crop production (mainly rice); commercial crops (coffee, coconut, etc.); and livestock. As most farmers are subsistence farmers, the large proportion of their production is for family consumption and the small surplus that they generate is sold (GoTL 2003). In addition, farmers usually employ family and communal labour, own small sizes of land, use basic tools on their farm, and rely heavily on rain water to cultivate crops. Crop production is restricted by the limited irrigation, low fertilizer use and recurring climate features. The average size of a house garden of 0.25 ha (MAFF 2004) and also fruit trees and animals can be found in almost all rural areas.

Agricultural production in Timor Leste is comprised of a variety of overlapping systems. One household can engage in more than three farming activities. For example, in a year they can grow maize, paddy rice, vegetables, legumes and tubers. Rice and maize are two important staple foods in Timor Leste, but the percentage of households growing maize are larger compared to paddy rice. The production of these crops in 2009 about 135 000 t of maize and 121 000 t of paddy rice as shown in Table 2.9.

**Table 2.9: Production of crops and percentage of household growing various crops in Timor Leste in 2009**

<b>Crops</b>	<b>Production (t)</b>	<b>Household growing crops (%)</b>
Maize	134 715	55.4
Cassava	37 302	51.4
Sweet potato	12 791	N/A
Rice (all ecosystems)	120 775	24.7
Potato	1922	N/A
Mungbean	2193	N/A
Peanut	6259	N/A
Coconut	7966	41.7
Soybean	1818	N/A
Candlenut	740	N/A

*Source: MAFF 2010; NSD & UNFPA 2011*

A study done by Larsen (2007) estimated that Timor Leste does not produce enough of the main commodities to feed itself, let alone produce a surplus for export. Therefore, there is an urgent need to increase agricultural production and productivity in Timor Leste to satisfy local demand, and produce a surplus for export.

From 2007 – 2009, the total area under rice cultivation increased by 45.2 per cent and this resulted in an increase in output of 73.8 per cent (UNDP 2011). For maize, the area cultivated increased by 17.5 per cent with the output rising by 21.8 per cent during the same period. Coffee production rose from 10 000 t in 2009 to 25 600 t in 2010 (ADB 2011). In addition, to further boost the agriculture sector in Timor Leste in the future there needs to be a significant improvement in crop productivity, the provision of information on the market, investments in value-added and export commodities, the development of processing industries, the creation of small-scale rural industries based on enhancing existing skills, diversification of cultivation, and a reduction in the sector’s vulnerability to food shortages (UNDP 2011). Increased economic activity within the agricultural sector, particularly trade, will provide employment and additional income across the country.

### **2.5.1.1 Rice**

Rice is the second staple crop after maize for the majority of the population in Timor Leste. Traditionally, rice was not a part of the Timorese diet until Indonesian occupation of the country. Since that time, it has become the preferred staple for households and will be eaten at least once a day, if domestic stocks or finances allow (Rahim 2007).

Ministry of Planning and Finance (2005) estimates that the number of households involved in the production of rice was approximately 23 per cent which represents 36 700 ha of production (FAO/WFP 2007). The main rice producing areas concentrated in Viqueque, Bobonaro, Manatuto and Baucau which account for about 77 per cent of the total production. The average area of rice cultivation per farm is 1.2 ha (Care International 2004) and the yield average is 1.8 t of paddy per ha. During the Indonesian time, more than 1500 ha were under intensive cultivation, with farmers applying modern technologies, and this resulted in a yield increase up to three t/ ha (Larsen 2006). During the 2006 rainy season, however, there was only some 300 ha under intensive cultivation and this impacted the lower economic return for farmers.

The total of wet land rice is about 47 000 ha (MAFF 2004), virtually all of which produces only one crop per year. There are some 420 irrigation schemes in total; however, only around 10 schemes have good water storage which has the potential to produce two crops per year. From 1994 – 1998, the average production of paddy rice was about 68 000 tons, while in 2001 the production was only around 58 000 t (MAFF 2004). However, despite the effect of El Nino that occurred in 2002/2003, there was an increase in the production of rice of about 12 per cent (FAO/WFP 2007). With the use of improved seeds and fertilizers, in addition to continued rehabilitation of irrigation schemes, from 2006 – 2009 rice production in Timor Leste increased by about 22 per cent (RDTL 2011). The details of paddy production, rice consumption and rice import in Timor Leste from 2006 – 2010 is shown in Table 2.10.

Even though the production of rice has increased, farmers are still facing difficulties in selling their produce to the market. One reason is that there is an improvement of the distribution networks for imported rice in Dili and also in the upland communities (RDTL 2011; Care International 2004). As a result, rice producers' access to the market was affected. Additional reasons are that most rice producers do not conduct post-harvest processing, particularly packaging, and unfamiliarity with the new distribution system. Therefore, they have difficulties competing with imported rice.

According to MAFF (2004) there was considerable room to improve rice production in Timor Leste by improving crop management. This included improved varieties, improvement in seedbed preparation, transplanting and water management. Any improvements in production require better development of market linkages so that extra production can be marketed in the correct locations at the right time. As Rahim (2007) comments, there is a disparity between the value of rice crop depending on where it is grown and, therefore the yield achieved, and the farm gate price of the rice. In recent years, Vietnam and Thailand are the two countries that mostly import rice to Timor Leste. The country's dependence on food imports, particularly cereal, has risen from 20 per cent in 1990 to 30 per cent at present (Fang 2006).

**Table 2.10: Rice production, consumption and rice import in Timor Leste from 2006 – 2010**

<b>Year</b>	<b>Paddy Production (t)</b>	<b>Rice production (50% milling)</b>	<b>Rice consumption (TLHS 95 kg/cap/yr.)</b>	<b>Rice import (t)</b>
2006	55 414	27 707	92 055	64 348
2007	60 424	30 212	94 240	64 028
2008	77 418	38 709	96 520	57 811
2009	120 775	60 387	98 895	38 508
2010	75 000	37 500	101 365	63 865

*Source: RDTL; IMF 2011*

The National Commission for Research and Development (2008) pointed out that there was an increase in the demand for rice due to the increase in population, as well as an increase in the level of income. However, this commodity is still in short supply for most of the year. Despite an increase in the production of paddy rice, it is still far from yearly consumption needs, estimated at about 63 000 t.

The current government in Timor Leste has promoted the production of rice throughout most of the country, in particular rice potential areas. With the improvement of some of the irrigated areas there is the potential to introduce other high value crops, such as fruit and vegetables. In addition, success in increasing of rice production depends upon effective extension programs, timely input supply, and access to credit and support for mechanization programs. It is also important that post-harvest losses are reduced through improvement in milling efficiency and storage.

### 2.5.1.2 Coffee

Coffee has traditionally been the main commercial agricultural crop grown by farmers in Timor Leste since the Portuguese time. The coffee crop has traditionally been a zero input crop and this has effectively made it an organic crop, which has allowed farmers to access a niche market. The total area for plantation crops in Timor Leste is about 109 000 ha (MAFF 2004). Coffee alone accounted for about 52 000 ha (2006) and was mostly concentrated in highland areas such as Ermera, Liquica, Manufahi, Aileu, Ainaro and Bobonaro. Ermera district is the coffee production centre in Timor Leste with a total area of about 28 000 ha, or 58 per cent of the total area of coffee plantations, and 70 per cent of Timor Leste coffee is produced in this district. The total area planted, total production and productivity of coffee in Timor Leste from 2000 to 2009 is shown in Table 2.11.

**Table 2.11: Total area, production and productivity of coffee in Timor Leste from 2000 – 2009**

<b>Year</b>	<b>Total area (ha)</b>	<b>Production (t)</b>	<b>Productivity (t/ha)</b>
2000	43 978	9546.6	0.21
2001	45 672	9546.6	0.20
2002	49 324	9786.6	0.20
2003	49 873	9895.4	0.20
2004	50 784	10 050.0	0.20
2005	52 348	10 069.6	0.20
2006	51 989	10 122.2	0.20
2007	52 079	12 785	0.25
2008	52 182	14 009	0.27
2009	53 816	10 123	0.19

*Source: MAFF 2010*

Currently, coffee producers organized by the United States based National Cooperative Business Association (NCBA) control the production and marketing of coffee. Since this arrangement, the producers formed a processing and sales cooperative known as Cooperativa Cafe Timor (CCT) with the NCBA and production has increased year by year (Rio 2001). Most of the coffee production in these areas is dominated by small-scale estates compared to large-scale estates. In addition, the production of CCT coffee has grown in line with the increasing demand for organic coffee. For example, the total production of CCT coffee in 2007 was 7000 t; in 2008 this was increased to 18 300 t (CCT 2011).

As a dominant commodity export for Timor Leste, in 2002 coffee provided US\$4.8 million in export earnings (MAFF 2004). Pomeroy (2001) estimated that the domestic market for coffee was only 50 t per year, and this means that most coffee was exported. The destination countries for Timor Leste coffee include USA, Australia, Portugal, Japan and others. The total export of coffee from 2004 – 2009 is shown in Table 2.12. The highest volume export was in 2008, reaching around 12 000 t of coffee beans and the lowest occurred in 2006 with total exports of only 2.8 t.

**Table 2.12: Total export of coffee from Timor Leste from 2004 – 2009**

Year	Total export (t)
2004	7.7
2006	2.8
2008	12 042.9
2009	5199.9

*Source: MAFF 2010*

During the Indonesian time, the concentration was more on how to harvest coffee in large volumes and grade and send it to Java for processing and blending. With the emerging cooperative organization such as CCT, a premium was paid for good quality cherries and the quality of local processing was improved (Saldanha & Costa 1999).

According to Robinson (2007) there is significant scope to expand the coffee business by increasing crop yields further through proper cultivation techniques,

lifting marketing efforts and improving transport infrastructure. A survey of coffee farmers conducted by the World Bank concluded that most farmers were ready to invest more effort in coffee, as it can increase their income. In addition, almost all coffee farmers were ready to join the cooperative if this institution can facilitate access to better facilities and markets for their produce.

### **2.5.1.3 Horticulture**

The agriculture sector still remains a minor contributor to national GDP. One of the significant opportunities for growth is moving into high-value crops, such as vegetable and fruits (MAFF 2004). Experience from other countries reveals that economic development will lead to a change in consumer demand toward high-value agricultural commodities (Dunn et al. 2011; Minten et al. 2009; Gulati et al. 2007). Therefore, in the medium and long run, there should be significant scope for market-oriented production of fruits and vegetables.

In the case of horticulture in Timor Leste, especially in the potential production areas, farmers still manage more than one vegetable crop, even though there is no market demand for most of the crops that they grow. Despite the climatic conditions, soil, temperature and elevation of these areas being favourable for horticulture development, most farmers are still subsistence farmers, with traditional farming systems and lack of marketing opportunities.

DeBoer et al. (2004) assert that Timorese production conditions indicate potential opportunities to export horticulture products, particularly snow peas, to Australia and Singapore. In contrast, Rahim (2007) claims that export horticulture is not feasible at the present time and is unlikely ever to be profitable. Given the infrastructure, government policies and other requirements related to export, such as the phytosanitary certificate in place, horticulture product has the potential to export in the future.

The potential areas for horticulture in Timor Leste include Ermera, Aileu, Maubise and Hatubuilico. The cropping pattern in these areas is mid-November for planting of major crops, with vegetables planted during March – April towards the end of the monsoon when temperatures start to decrease. The peak harvest occurs in early June to mid-August. The horticulture crops that are grown in Timor Leste are shallot, garlic, potato, carrots, cabbage, beans, cucumber, tomato, red pepper, mustard greens, kidney bean, eggplant, Siam squash and others. Recently, a private sector project lead by USAID introduced new varieties of vegetable crops which are in high demand in Timor Leste markets. These include Chinese cabbage, kale, cauliflower, Japanese cucumber, purple eggplant, cherry tomatoes, tomatoes (red crown), carrots and Italian parsley. In addition, the yields of most of the vegetable crops in Timor Leste are very low (see Table 2.13). For example, beans were planted in an area of about 6000 ha with total production of around 3500 t. Thus, crop productivity for beans is less than one ton per hectare. This is due to poor farm management practices, use of local seeds and lack of inputs for production. Meanwhile high yielding vegetable crops include mustard, pumpkin, cucumber and spinach. The yields of these crops are 6.6 t/ ha for mustard, 6.3 t for pumpkin and 6.4 t for cucumber (USAID 2009). Details of the production of selected horticulture crops in Timor Leste in 2007 are shown in Table 2.13.

**Table 2.13: Vegetable production in Timor Leste in 2007**

<b>Crop</b>	<b>Area planted (ha)</b>	<b>Total production (t)</b>	<b>Productivity (t/ha)</b>
Shallot	414.9	1183.9	2.85
Garlic	325.7	734.0	2.25
Beans	6025.4	3680.5	0.61
Tomato	91.5	161.8	1.8
Cabbage	354.6	283.7	0.8
Carrot	89.0	62.3	0.7
Snow pea	131.5	34.2	0.3
Mustard	416.2	2739.2	6.58
Potato	952.8	800.2	0.84
Chilly	74.9	261.6	3.49
Lettuce	47.1	25.1	0.53
Bitter melon	38.9	52.7	1.35
Pumpkin	225.2	1416.7	6.29
Cucumber	91.4	582.7	6.37
Spinach	129.8	486.8	3.75

*Source: MAFF, 2009*

From 2002 – 2007, the government established vegetable and fruit production centres which facilitated the selection of seeds and nurseries, for a total of 22 000 plants of fruit and vegetables in an area of about 700 ha (MAFF 2007). The government also provided assistance through conducting farmers field schools and integrated pest management in the horticulture production centres and through the provision of assistance and support to communities to produce more fruits and vegetables.

Although the vegetable crops mentioned above grow well in the region, Timor Leste still imported some vegetable products into the country with a total value of US\$4.5 million in 2007 (RDTL 2011). The vegetable products imported include cabbage, carrots and onion. Large quantities of carrots and potatoes are imported into the country. For example, in 2010 total carrot imports were about 1500 t and potato 1000 t. The reasons for the high volume of import of these products are the high demand, unavailability of the product in the domestic market and poor product quality of locally produced vegetables. Thus, most of the production is based on seasonal factors more than market demand. Table 2.14 shows details of fruits and vegetables imported into Timor Leste in 2010.

**Table 2.14: Quantity of fruit and vegetables imported into Timor Leste in 2010**

<b>Commodity</b>	<b>Quantity (t)</b>
Carrot	1666
Potato	1149
Garlic	886
Soybean	845
Onion	786
Shallot	485
Chilli	137
Cabbage	86
Apple	36
Orange	31
Tomato	24

Source: *RDTL 2011*

#### 2.5.1.4 Livestock

Livestock is one of the most important sectors in the economy of Timor Leste. Animals such as buffaloes, horses and pigs are very important in defining status amongst Timorese communities. For example, if someone in the community has more than ten buffaloes, this person will be seen to have a high status (Saldanha & Costa 1999). When farmers are facing difficulties in terms of cash, they can sell their animals at any time if needed. Because of this, animals are considered to be important assets, especially when coping with any cash uncertainties that may arise, including the need for the schooling of children, a lack of staple food in lean seasons or to fulfil family traditions, such as funerals. From a social point of view, Costa et al. (2003) argue that cattle are more valuable than other animals; however, they are not easy to sell.

Rahim (2007) commented that livestock production in Timor Leste was still a kitchen garden activity, with animals being allowed to breed at random and their progeny being culled when protein was required by the family, or when cash was needed through local market sales. Animals such as water buffalo were normally used as draft animals and also in the *rencah* system of land preparation for rice. Meanwhile, chickens and pigs are the most readily tradeable livestock found at markets. In terms of space, 30 per cent of the total agricultural land is available for grazing. However, only about one third of this is currently being used (MAFF 2006a). Farmers normally graze their animals in common pastures freely; whether the graze is native or introduced does not matter, as long as it is providing a cheap source of feed for their animals.

Furthermore, the management aspect of livestock in Timor Leste is poor in terms of animal health, shelter, feeding, and reproduction. The reason for this is because raising animals, generally, is not the primary source of generating livelihoods (Saldanha & Costa 1999). Farmers still raise animals in traditional ways and this means grazing in open natural pasture and the animals penned during the afternoon after some days grazing. Even with an example provided by Catholic Mission in Lospalos and Dili on how to raise and feed animals with supplements, there is almost

no improvement in this sector. The estimated total population of livestock in Timor Leste from 2004 to 2008 is presented in Table 2.15.

**Table 2.15: Livestock population in Timor Leste from 2004 – 2008**

<b>Livestock</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
Beef cattle	133 577	136 382	139 426	142 354	145 343
Dairy cattle	64	64	64	64	64
Buffalo	95 921	97 552	99 210	100 897	102 216
Goats	126 977	129 517	132 107	134 749	137 444
Sheep	38 965	39 495	40 087	40 688	41 298
Horse	63 234	63 803	64 377	64 956	65 541
Pig	331 895	345 171	358 978	373 337	388 270
Chicken	659 066	685 429	712 456	741 360	771 014

*Source: MAFF 2010*

Based on the climate and general vegetation in Timor Leste, Saldanha and Costa (1999) argued that livestock production has comparative advantages compared to other sectors. This is demonstrated by the export of cattle to Indonesia, with a potential value of US\$25 million, exceeding the value of coffee exports of US\$7 million (MAFF 2006a). Similarly, RDTL (2011) stated that there is strong potential to increase cattle exports to Indonesia and also to substitute the import quality of beef products. An increase in cattle production may be able to take advantage of the demand for beef in Indonesia which is growing by 6 – 8 per cent per year. Conversely, it is estimated that around 200 t of beef are imported to Timor Leste each year from Australia.

In the future, it is expected that the industry can move ahead with better management, including feed and rearing methods, health control and improved breeding systems. In terms of economic viability, according to Saldanha and Costa (1999) there is a strong case for expanding the livestock industry.

## 2.6 The importance of agriculture in the Timor Leste economy

The Timor Leste economy is largely dominated by subsistence agriculture. However, this sector is very important for the economy and the life of the majority of Timorese people. From an estimated 153 212 rural households, 247 733 people are involved in agriculture (MAFF 2008), among whom more than a half are subsistence farmers.

In terms of the economy, agriculture contributes about 35 per cent to the GDP and about 90 per cent for foreign exchange; while in terms of employment more than 80 per cent are employed in this sector (Lundahl & Sjöholm 2005; Costa et al. 2003). In addition, in 2008, agriculture's share from non-oil GDP was about 30 per cent (National Commission for Research and Development 2008) and the share was mainly derived from the production of industrial crops, in particular from coffee. Rahim (2005) added that it was estimated that agricultural production provides the sole income for up to 80 per cent of rural households.

Livestock, fishery, and forestry industries play an important role in subsistence and in cultural maintenance; however, they are not well developed and, therefore, their contribution to GDP is comparatively small compared to other sectors, as shown in Table 2.16. For example, on average, in 1993 and 1998 one third of non-oil gross regional product in Timor Leste emanated from agriculture, over 20 per cent from government services, and a little less from construction, transport, telecommunication and trade (World Bank 2002b).

**Table 2.16: Agriculture's contribution to rural GDP, 1993 and 1999**

<b>Sub sector</b>	<b>1993 Share (%)</b>	<b>1999 Share (%)</b>
Food crops	64.0	60.2
Non-food crops	20.0	27.0
Livestock	13.0	8.0
Forestry	1.0	2.8
Fisheries	2.0	2.0
Total	100	100

*Source: ETTA & UNDP 2001*

The most important cash and export crop is coffee, a crop grown by around 40 000 farmers, which means that it affects the lives of around a quarter of the total population. According to Lundahl and Sjöholm (2005), during the Indonesian period (1995 – 1998) Timorese export amounted to some 12 – 14 per cent of the gross regional product on average. Agricultural products dominated with coffee accounting for about 60 per cent, supplemented by some food crops, livestock, and forestry and fishery products. In 2000 and 2001, however, these exports dropped drastically, to no more than 2.5 per cent of GDP (Planning Commission 2002a).

In addition, Timor Leste’s exportable products, prior to the 1999 referendum, included coffee (4250 t), copra (770 t), cattle 4000 head, sandalwood (244 t) and candlenuts (484 t) (Rego & Siriwardana 2006). Meanwhile, in 2009 the quantity of coffee exported increased to about 5000 t and cattle decreased to about 910 head as shown in Table 2.17 below. Other commodities exported on a small scale include spices, oilseeds and dry beans.

**Table 2.17: Timor Leste export of agricultural product from 2009 – 2010**

<b>Commodity</b>	<b>2009</b>	<b>2010</b>
Coffee (t)	5199.9	5129.0
Copra (t)	517.1	998.1
Cattle (head)	910	N/A
Buffalo (head)	76	N/A
Candlenut – oil (L)	34 000	24 000
Candlenut (t)	459.4	501.9

*Source: MAFF 2010*

In 2004, Timor Leste’s high-quality, organic coconut oil-processing plant began production and export to Australia. This is the largest new source of formal private sector employment in rural areas since independence; the plant employs 200 workers and buys from 1000 small coconut growers (World Bank & ADB 2007).

Furthermore, as half of the labour force still works in the agriculture sector and most of the poor are still concentrated in rural areas, changes to the structure and policy within the country in the future will have an impact on real income and growth,

poverty alleviation, and environmental issues (Costa et al. 2003). Rio (2001) asserted there will be a substantial impact on rural poverty caused by the influence of agricultural growth on rural incomes and food availability. This, in turn, strongly affects the overall economic growth in the country.

## **2.7 Government policies supporting agricultural development in Timor Leste**

As a key sector for rural development, increased agricultural productivity and improved rural livelihoods will lead to increased demand for other goods and services in rural areas, and this will further encourage the growth of the private sector. According to the National Commission for Research and Development (2008), the government of Timor Leste has decided to shift the sector from subsistence towards market-oriented agriculture, shift from small and fragmented production areas towards zoning of areas for specialized production and establish irrigation infrastructure to improve agricultural production. To achieve this, the government has created policies and regulations that will support agricultural production and marketing as described below. The aim is to improve production and productivity, thereby enabling the sector to serve as a driving force for economic growth and social progress in the medium and long term.

### **2.7.1 Production-related/targeted**

According to Saldanha and Costa (1999), the goals of government policy should include achieving food security, improving the production of crops and livestock for niche markets, the promotion of internal markets and alternative income generation, and the improvement of the system of swidden farming, particularly in the upland areas. Based on this, the government needs transitional policies in assisting the development of agriculture consistent with the country's long-term goals.

As an important sector that contributing to the livelihoods and economy of Timor Leste, agriculture also needs to provide its contribution to fulfil the objectives of the Strategic Development Plan and the Millennium Development Goals (RDTL 2011; MAFF 2004). This vision, based on the Strategic Development Plan, states that by 2020 there will be sustainable, competitive and prosperous agricultural industries in Timor Leste. This will support the improvement of living standards for the majority of Timorese people. In addition, the Timor Leste strategic development plan clearly defines the goals of the agriculture sector, which include improvement of national food security, the reduction of rural poverty, supporting the transition from subsistence to commercial farming, and promoting sustainability and the conservation of Timor Leste's natural resources (RDTL 2011).

According to RDTL (2007) there are a number of agricultural and rural development policies and programs that the government needs in order to increase production. These policies are:

- Technological investment towards agricultural mechanization;
- Optimization of the production of rice, corn, coffee, coconut, vegetables and other crops;
- Subsidy for fertilizers and basic equipment for farmers, as well as the promotion of organic fertilizer production;
- Promotion of farming seeds centres at regional and district level;
- Promotion of farmers and water users associations;
- Reinforcement of technical training in fishing and aquaculture;
- Development of aquaculture based on fresh water, brackish water and sea water;
- Improved veterinary services;
- Investment in reproduction and vaccination to increase the number of animals;
- Development of pastures;
- The promotion of agricultural research and information.

An increase in agricultural production and productivity will enable this sector to serve as the driving force for economic growth and social progress in the medium-to long-term development.

### **2.7.2 Marketing-related/ targeted**

During the Indonesian time, the economy of agriculture in Timor Leste province was heavily regulated and controlled by government. Rice imports, for example, were controlled to maintain the price, both at farm level and in the market (Fang 2006). The policy used was to control international trade, access to an unlimited line of credit, more rice procurement, and extensive logistical facilities.

After independence, Timor Leste adopted a free economy, and inputs such as fertilizer and machinery was imported at world prices (Sendall 2006; Lundahl & Sjolholm 2005). However, the environment towards free trade does not equip the government to intervene (Care International 2004). Under the new trade arrangements, quantity restriction is removed and there is an equal access for all traders to import rice. Fang (2006) maintained that free trade policy had a negative impact on the rural poor as food producers, and a positive impact on the urban poor as food consumers.

Current policies and programs, in particular those aimed at marketing, stressed that production should be oriented towards the market, while ensuring food security (National Commission for Research and Development 2008). The focus here is to establish an internal market that will guarantee the flow of farmers' produce and self-sufficiency in food in the medium-term to the creation of external niche markets. To achieve this, the government has established policies and programs aimed at fostering market development for agricultural products (RDTL 2011; RDTL 2007). This includes:

- Production and promotion of products able to be commercialized in the regional and international market;

- Sustained procurement of the best services for the development of agriculture through infrastructure improvement such as roads, transport, markets, and processing and extension centres;
- Development of fishing industries and fish processing, conservation and transformation;
- Establishment of small and medium agricultural-livestock industries;
- Encouraging the development of value-added products;
- Establishing market links and transport systems;
- Develop the fish export market;
- Formulate and promote domestic rice and pricing policy, including national long-term rice storage facilities.

## **2.8 Programs geared towards agricultural development in Timor Leste**

At present, the agriculture sector still remains far below its potential contribution to national GDP (MAFF 2004). However, there is significant scope for accelerated growth, spurred by expansion of production, through the cultivation and use of more land, higher cropping intensity and higher yields on existing land through improved agricultural practice, more efficient irrigation management and higher use of inputs, and moving into high-value crops such as vegetables and fruits, value addition to agricultural, forestry and fisheries commodities through processing, and so on.

Government programs supporting agricultural development include the rehabilitation of irrigation schemes, distribution of tractors to farmers, free land preparation (ploughing), distribution of new seeds for paddy, maize, vegetables and other crops, distribution of fertilizers and chemicals, regular animal vaccination, introduction of integrated crops management, and training to farmers (RDTL 2011; National Commission for Research and Development; MAFF 2008; RDTL 2007). Through the Agriculture Rehabilitation Project (ARP), JICA and MAFF, 21 538 ha or 59 per cent of the total area of non-functional irrigation schemes was rehabilitated. To increase the production of agricultural crops, in 2008 the government facilitated free ploughing for farming land with the target of achieving 20 000 ha of land ready for planting. Another program supporting farmers to increase their crop production is

the distribution of 2906 tractors (hand tractors and medium and large tractors) to farmers around the country.

MAFF reports from 2002 - 2007 also show that programs which have been implemented for the development of agriculture include the release of seven new varieties of crops; the establishment of four agricultural research centres; the establishment of three coffee processing centres; the distribution of fisheries equipment to around 5000 fisherman in the entire region; the exportation of around 9000 t of coffee, 6000 cattle, 50 t of candlenut oil and 100 t of mungbean; the establishment of nursery and seed production centres of horticulture; the distribution of 2000 kg of horticulture seeds and 200 silos; and the establishment of market information systems in Dili, Baucau and Bobonaro (MAFF 2007).

Some of these activities resulted in the increase of the production and productivity of some of the crops. For example, the data from MAFF (2007) indicated that the production of maize increased from 0.8 t up to 1.4 t/ ha, and paddy rice from 1.8 t/ ha to 2.1 t/ ha; potato productivity almost doubled, rising from an average of 2.04 t/ ha in 2009 to 4.7 t/ ha in 2010; under the fisheries program, 14 fish ponds were built across four districts to promote fish farming; and, under the coffee, industrial and agro-business program, the production of coffee increased from 250 kg to 500 kg per ha in 2010 (Secretary of State's Press Release 2011).

## **2.9 Concluding remarks**

After a long period of colonization, Timor Leste finally became a newly independent country in the twenty-first century. Since independence in 2002, the country remains one of the poorest countries in Southeast Asia. However, government policies and reforms have significantly contributed to the improvement of the conditions of Timorese people. This was demonstrated through the increase in public spending by the government in addressing some of the most immediate needs of the country and to spur economic growth.

The increase of agricultural production, continued improvement in rural livelihoods, improvement of basic education and vocational training, and the decrease in poverty, are some of the successful outcomes of government programs in recent years. However, as a new nation, Timor Leste still faces critical challenges. These include shortage of skilled human resources; institutions that are still young; high expectations about tangible progress in people's livelihoods; widespread poverty; rural-urban and regional imbalance; and post-conflict mentality. In addition, a major concern faced by the government is how to reduce social problems and promote the integration of the unemployed in the national productive sector. These are important factors affecting economic growth and, therefore, contributing to significant improvements in the well-being of the people of Timor Leste, as well as a way to fight social exclusion.

The influence of agricultural growth on rural incomes and food availability will continue to have substantial impact on rural poverty and will strongly affect overall economic growth. Hence, the recent rapid economic growth, combined with relatively long periods of stability, will hopefully provide a strong foundation for sustained economic development in the future.

The next chapter presents a review of literature on linking farmers to markets (LF2M). The main issues discussed include the importance of LF2M, pathways for linkages, and the role of supply chain and value chain in LF2M.

# Chapter 3

## Linking Farmers to Markets: A Review of Literature

### 3.1 Introduction

This chapter is devoted to a review of literature to provide a theoretical background of previous studies in relation to linking farmers to markets. It introduces the concept of market linkages, particularly in relation to the importance of linking farmer to markets, the advantages and disadvantages of the linkages, environment where the linkages can work, and opportunities provided for developing market linkages. In addition, the types of market linkages are also addressed with focus on cooperatives, contract farming, supply chains and other models. Studies on market linkages are then presented at the end of the chapter.

### 3.2 Understanding market linkages: why link farmers to markets?

Most of the poor in developing countries still depends on agriculture for their livelihoods both directly and indirectly, and the majority of them constitute small-scale farmers. However, the productivity and quality of most of the agricultural products produced by small farmers in these countries are very low. This is due to the low skills of farmers, poor crop management, lack of inputs and lack of access to credit and information. In addition, growing populations in developing countries continue to create demand for agricultural product, in particular, fresh produce and processed horticultural products. Meeting market requirements necessitates having assured quality and safety in both domestic and export supply chains (APO 2006).

To increase production, quality and safety of the product, it is important to link farmers to markets (LF2M) by engaging them in the supply chain. LF2M will solve some of the problems mentioned above and hence increase their income. As stated by Shepherd (2007) the opportunity for small farmers to increase their incomes relies

on their capability to be involved successfully in the market place. Thus, enhancing farmers' access to markets should be a key part of the strategy to promote rural development and poverty reduction (Fisher & Qaim 2011).

### **3.2.1 Importance of linking farmers to markets**

A global food and agriculture market system has now transformed from a direct linkage between stakeholders such as farmers, traders, agro-industry and consumers concerning complex interactions between and among those stakeholders (Huvio et al. 2005). As incomes increase, food consumption is changing (Shepherd 2007; Chen et al. 2005). Because of this, attributes such as quality and product safety are in greater demand by consumers. For smallholder farmers, these trends offer considerable threats and challenges (Shepherd; Hazell; Onumah et al. 2007). However, in some cases this may also present opportunities.

As a result of consumer demand, globalisation, increased cooperation between transnational companies and advances in new technologies, the nature of global agriculture and agribusiness has rapidly changed (Downey 1995). Golleti (2004) asserts that changes in demand have resulted in a change in the composition of diet and also the preferences for food characteristics. Because of this, there is an increasing competition for farm business and pressure on the survival of many farmers (Napier 1996). Furthermore, the rapid expansion of population also contributed to the high increase in the demand for food by end consumers, in particular in urban centres. Other factors that contributed to the rapid changes in agriculture and agribusiness include an extended process of liberalisation. This involves a rapid and profound transformation process within the agri-food system both for international trade and national economies (Weatherspoon & Reardon 2003; Reardon & Berdegue 2002).

According to Lemeilleur and Tozanli (2006), the new challenges faced by local producers in production and marketing are influenced by the configuration of the

urban food supply. This supposedly offers new market opportunities for smallholder farmers, however smallholder farmers were not well prepared for the changes that occurred. Despite the opportunities provided, this also created high barrier entry for new marketing channels. To anticipate the changes mentioned, Dunne (1999) argued that governments, industry groups and individual producers need to reassess the effectiveness of strategies and structures associated with marketing agricultural products. The aim is to determine whether they are still appropriate in the new environment.

Globalization, access to technology and trade, promises new opportunities for growth and income generating activities for rural households, particularly in developing countries. For example, participation in international trade allows those countries to access big markets for their produce and exploit specialization in production and economies of scale (Stamoulis & Zezza 2003). The positive impact of globalization for smallholder farmers includes access to new opportunities and information, improved linkages between local and international markets and rapid dissemination of agricultural technologies (APAARI 2008; World Bank 2004). In reality however, globalization is not favourable to small-scale farmers (World Bank 2004). The reason is that with the increase in competition, smallholder farmers are not able to participate in the global market place in an effective way due to the lack of capital, lack of information and lack of skills.

Linking farmers to markets is one of the approaches of helping small-scale farmers to participate more effectively in the market place and assist poor producers to increase their output. Through the linkage, farmers will benefit in terms of accessibility to the market, access to inputs and access to credit. This in turn will contribute to the increase of their income and reduce poverty in rural areas. As stated by IFAD (2003a), improved market access is of crucial and immediate importance to small-scale farmers and rural poor households. This is also proving that the improvement of market access can enhance agricultural-based economic growth and increase rural incomes. In addition, to support an agenda on 'agriculture for development' it is important to enhance smallholder competitiveness, facilitate market entry, improve market access and establish efficient value chains (World Bank 2008).

In broad terms, linkages are defined in a number of different ways. It can be defined by financial transactions; by the channels where transactions occurred; by how they are linked together and by the spatial distribution of transactions. Indeed the term linkage stresses more about the physical connection between producer and consumer (White 2005) which also involves financial transactions, such as the purchasing and selling of goods.

According to IFAD (2003a, p.5), 'markets are where, as producers, farmers buy their agricultural inputs and sell their products; and where, as consumers, they use their income from the sale of crops, or from their non-agricultural activities, to buy their food requirements and consumption goods'. It can be said that by preferences, farmers are producers and consumers, and also buyers and sellers. The involvement of farmers with agricultural markets is important for livelihood strategies, particularly small and poor farmers in rural areas.

Linking farmers to markets means connecting farmers and rural entrepreneurs to well-functioning and profitable agribusiness markets and value-added supply and marketing chains (NASC & ICAR; Shepherd 2007). This means the linkages involves modernization of agriculture and agriculture-markets and developing both forward and backward linkages of the agriculture-economy. This will also involve 'reorganization of agri-food products, distribution and marketing processes, linking consumer markets with rural entrepreneurs, building business partnerships with private sector, innovation application of information and communication technology and enhancing the supply and uptake of rural finance' (ADB 2005, p.19). The aim is to enhance the effectiveness of the agri-food sector and rural economies. Involvement in the process of linking farmers to markets means there will be a long-term relationship in the business. For example, farmers can be linked to the buyers through extension workers and this can be done by identifying buyers such as traders, and then facilitating them to meet with farmers. This is one of the simplest ways of creating linkages. In addition, the more complex way of linking farmers to markets is through activities carried out NGOs and other institutions to find markets for certain products and facilitating farmers in supplying those markets (Shepherd

2007). Big contracting farming arrangements for example, may involve long-term investment, both for the companies and the farmers.

According to Shepherd (2006), the reasons why farmers need to be linked to markets are because the production push focus is no longer viable, and small surpluses for ad hoc sales are not a realistic approach in the long-term. Therefore, farmers need to respond to what is in demand by the market. Traditionally, farmers try to produce what they can and hope buyers will be ready to buy their products at a reasonable price. In the production driven approach, farmers are unaware of what is required by consumers and this resulted in poor economic outcomes. In addition, what farmers produce needs to be based on what is in demand by the market. It is not just about producing the product and then trying to find the market. This kind of strategy will not respond to the changing market environment which is more competitive. Producing according to market demand is important as, nowadays, there is an increasing understanding that the market is an important part of the production (Shepherd 2007). As a result, production support activities must be based on market demand.

Meanwhile, development institutions recognize that it is not enough to encourage farmers to grow new crops by providing inputs, credit and extension services in promoting livelihood diversification. This has been shown to be unsuccessful because it fails to recognise the importance of market demand and the chain (FAO 2006) by which the product will be distributed to consumers. To take into consideration market demand, Shepherd (1997, p.15) affirmed that ‘emphasis needs to be placed on how to develop sustainable linkages for farm outputs between farmers and private sector traders, exporters, retailers and agro processors.’

Research and development organizations also realised that among the pressing challenges facing agriculture is how to improve access to markets and improve the skills and capacity of resource poor farmers to diversify their links to the markets. Improving access to markets is essential as there is potential growth in the demand side for high quality and safe food. These food safety requirements must take into consideration the developing country and urban markets (Narrod et al. 2007).

Linking farmers to markets is the key for increasing income and alleviating poverty of resource poor farmers, particularly in the Asia-Pacific region (NASC & ICAR 2007). More effort needs to be paid to agricultural research and development (APAARI 2008) in terms of changing traditional farming strategies of small-scale producers to more innovative farming, which will lead to better farm incomes. One approach is to facilitate linkages between farmers and markets. For such approach to be effective, priority attention must be on institutional arrangements and support services, policies, access to technology and information, building the capacity of producers and market identification.

### **3.2.2 Advantages and disadvantages of linking farmers to markets**

The impact of small farmer's participation in high value markets is diverse. The contract farming literature, for example, provides some impacts of the participation of small-scale farmers in high value markets (Maerterns & Swinnen 2007; Minten et al. 2005; Humphrey et al. 2004; McCulloch & Ota 2002; Key & Runsten 1999; Glover & Kusterer 1990). Meanwhile, there are on-going debates on pro-poor agricultural development and growth about whether small-scale production is feasible for the opportunities created by the markets (Hazell 2007; Humphrey 2006; Pelupessy & van Kempen 2005; Wheaterspoon et al. 2001). People who support smallholder farmers argued that small-scale farmers have potential advantages compared to large-scale commercial producers, especially on lower costs and the superiority of local knowledge (Lipton 2006; Poulton et al.; Pingali et al. 2005; Dorward 1999). This indicates how the market for high value products provides profit opportunities for strengthening small-scale farmer's income.

The positive impacts of participation in linking farmers to markets generally are related to income, employment, improved access to credit and assistance (Humphrey et al. 2004; Grosh 1994; Hayami & Otsuka 1993; Glover & Kusterer 1990). Some studies offer further analysis on the farm and regional spillover, food security and business development of the markets (Govereh & Jayne 2003; Von Braun et al.

1989; Kennedy & Cogill 1987). Another positive impact includes access to input supply, assured market for the product, risk faced is reduced, improved access to research, extension and technology (Maertens & Swinnen 2007; Shepherd 2006; Minten et al.; Simmons et al. 2005; Rottger; Humprey et al. 2004; Simmons 2003; Eaton & Shepherd 2001; Key & Runstein 1999; Glover 1994; Runstein 1992). For example, through involvement in the linkages, agribusiness firms may provide assistance, inputs, forward payments and forward price guarantees. The aim of this is to reduce some of the risk faced by farmers.

Furthermore, engaging in linking farmers to markets will also improve farmer's skills and knowledge, increase bargaining capacity of farmers, advance payment, access to transport and logistical facilities and transform the production system from traditional to a more profitable farm enterprise (Mancero 2007; Shepherd 2006; Rao et al. 2004; Glover 1994). For example, small-scale farmers will have better access to transportation which is generally provided by the stakeholders to transport their produce. They will also have access to logistical facilities, such as cool storage and warehouses. Thus, linking farmers to markets will contribute to income stability, increase the bargaining capacity of farmers and improve market intelligence. Apart from these advantages, suppliers can also benefit through better planning and predicting the schedule of production, coordinating the deliveries and undertaking promotions together (Danielou et al. 2003; Eaton & Araujo 1994; Glover & Kusterer 1990).

These advantages will lead to an increase in production and productivity, and improvement in the quality and availability of the products as demanded by the market. This, in turn, will contribute to the increase of farmer's income, employment opportunities and poverty reduction in rural areas.

Empirical studies reveal that smallholder farmers participating in high-value export production through contract farming experience major benefits (Swinnen 2007; Patrick 2004; Simmons 2003), both directly and indirectly. The direct benefit is in terms of enhanced income of farmers, and the indirect benefit is through improving access to credit and inputs, product quality and market access. As noted by Simmons

et al. (2005) through contract farming, agribusiness firms can use their knowledge and experience, expertise, transport and finance and others, to provide and facilitate farmer's access to new markets. These are necessary for the firms to sustain international trade relationships. In Kenya, farmers involved in the linkage, such as supply contracts, benefit not only for a market that is assured for them but also because their farming risk is minimized (Rottger 2004). In China, linking smallholder farmers with agri-processors through cooperatives improves the production and income of the farmers (Berdegue et al. 2008). Linking farmers to exporters in Mali showed that smallholders are able to increase their incomes by again exploiting their abandoned orchards for export (Danielou et al. 2003). As a result of this, they were able to reinvest and diversify their sources of income from cotton to mango, melons and tomato. In another study, an analysis of the poultry company contracting farmers in Lombok, Indonesia, showed there was an improved returns and capital for the firms, but that farmers were better off (Patrick 2004). Hence, from the development perspective, market linkage reduces absolute poverty in the region.

Apart from the advantages to the farmers, linking farmers to markets may also have advantages to agribusiness firms and consumers. These advantages include greater regularity of agricultural product supply to firms; access to land is facilitated; better access to credit and financial incentives (Shepherd 2006; Rottger 2004; Glover 1994); higher compliance of desirable quality and safety standard of the product and expansion of production (Shepherd 2006; Silva 2005); input and labour costs are reduced (Glover 1994); control over the production system in order to comply with the standard markets (Rottger 2004); and greater political and social acceptance (Shepherd 2006).

Despite the positive impact mentioned, there are also negative aspects of small farmer's participation in the market. Henson et al. (2008) noted that potential negative impact of smallholder participation in the linkages generally related to the institutional characteristics of supply chains and broader socio-economic and environmental impacts. In addition, the specialization patterns are more favourable to the traders than the farmers, and this can stop small farmer's involvement in the

relationship (Singh 2002; Little & Watts 1994). As most small farmers lack resources, they cannot afford to participate in emerging markets. This will have further implication on income discrepancies and social differentiation in the community (van der Meer 2006; Simmons et al. 2005; Singh 2002). As a result, the objective to achieve broader economic development would be reduced (Humphrey 2006; Reardon & Barrett 2000).

Other negative impacts include increased risk (Silva 2005; Eaton & Shepherd 2001) associated with monoculture practices, introducing new crops, indebtedness and marketing risk; unsuitable technology and crop incompatibility (Eaton & Shepherd 2001); inefficient management and marketing problems; and the contract arrangements that may fail, with no alternative market available (Simmons 2003). In addition, there could be price manipulation by the buyer or staff responsible for the procurement of the product. For example, as a result of easy access to credit, the risk of indebtedness is growing (Pasour 1998; Watts 1994). If there is less restrictions in access to credit, farmers might want to borrow, even though it is to pay for food consumption and other necessities. In the case of contract farming, inefficient management may result in the manipulation of quotas so that not all contracted production agreed to in the contract is purchased by agribusiness firms. In some cases, to minimize purchases, and at the same time honour the contract, management may be tempted to manipulate the standard of quality of the product. To influence the prices paid to farmers, firms might set up delivery schedules. This can occur when there is a quick change in prices and companies take this opportunity to adjust the schedule of delivery so that they can benefit from the volatility of the market.

The disadvantages for agribusiness firms are including high costs of transactions when dealing with a large number of farmers (Shepherd 2006; Silva 2005); it may create risk of misuse in terms of supplied inputs and of final products, loss of flexibility to seek alternative sources of supply and risk of undermining the corporate image (Silva 2005); misuse of inputs and final products happens when farmers use fertilizers in their subsistence crops, and also consume some part of the production or sell it to third parties; and traceable problems also arise when buying from many farmers (Shepherd 2006). For example, managing a business relationship with a

large number of partners require an investment, particularly with personnel, control and monitoring systems. Evidence in some of the literature regarding contract farming describes that agribusiness companies prefer to work with large farmers compared to smaller farmers (Sofranko et al. 2000; Key & Runstein; Coutler et al. 1999; Von Braun & Immink 1994). In addition, some researchers claim that the participation of small farmer's in a high value market will be limited by condition set by consumers and the supply chain as they demand timely and reliable distribution of the product with exact quality standards (Maxwell 2004). This, in turn, results in high transaction costs for farmers. Coudel (2003) notes however that there is no issue regarding supermarkets direct sourcing from producers' unions in Turkey. However, constraints arise when small producers face difficulties organising themselves around the unions (Lemeilleur & Tozanli 2006). The difficulties include the problem of how to coordinate, low skills, financial difficulties and others.

### **3.2.3 Factors that enhance linkages between farmers and markets**

There is no successful approach for linking farmers to markets where the institutional and political environment is not favourable (Shepherd 2007; Silva 2005; Simmons 2003). To be conducive, government should create a favourable policy environment (e.g., laws and regulations, security) so that any approach or program related to introducing linkages can function properly and satisfy all parties involved in the linkages, in particular, small and poor farmers.

For a policy environment, Shepherd (2007) suggests that for the private sector to function, governments need to create an environment which enables them to operate in a competitive way. For example, laws, regulations and policies (e.g., labour relations, land tenure, taxes, etc.) can create advantages for the linkages activities, such as contract farming, cooperative, vertical integration and others. GTZ (2003) commented that to create the conditions which encourage the private sector to structure its supply chains and to engage smallholder farmers, governments need to posit its function as 'enabler'.

In addition, the private sector plays an important role in agricultural development, including the role to invest in the area of infrastructure, service market development, technical transfer, and market information for smallholder farmers (Humphrey; Ruben et al. 2006). The private sector is also responsible for agricultural production and marketing (Shepherd 2007). Owing to its importance to development, therefore, the private sector should be provided with appropriate incentives and opportunities to link up with farmers. A good monetary policy that results in low rates of interest and stable exchange rates, for example, can provide an incentive to invest for the private sector (Shepherd 2007).

To contribute to a good design of agricultural policies, supportive government investment and well-functioning private sector and public market institutions are needed (Orden et al. 2004). This is important as government and private sector support requires taking advantages of the opportunities provided by the market and maintaining increased agricultural production and raising rural incomes. As Weinberger and Lumpkin (2007) posit, to enhance the domestic supply of agriculture produce, enabling market institutions are important to providing farmers with timely information on price and access to credit, and facilities related to post-harvest and technologies.

Two important types of facilitating policy relevant to linking farmers to the markets are adjustment of regulations and government's role related to enabling environments (Simmons 2003). Adjustment of the regulations, such as the reduction of specific import and export taxes, deregulating prices in food markets and implementing food safety standards, can contribute to reduction in transaction costs of farmers. Meanwhile, the enabling role of government includes training, research and provision of extension services. Indeed, commercial services providers can be undermined by the service provision provided by governments. For example, some governments are still competing with the private sector in the supply of inputs, despite the input sector in most countries being liberalized. The reason for government to intervene in service provision is that in some cases commercial services provider uses their market power to raise the cost of inputs. The implication of this is that the involvement sometimes translates into political interference and

government misuse and, in the end, this will have an impact on competition itself. Despite some countries adopting free market policy, however, the policy must ensure fair play and protect farmers and consumers' welfare.

A major contribution for investment in agriculture, particularly in facilitating the movement of farmers produce to the market, are the provision of adequate roads, transport, telephones and other telecommunication services (Eaton & Shepherd 2001). This is important because most small-scale farmers live in rural areas that lack access to roads, transport and telecommunication facilities and other infrastructure. Through these investments, transport costs will be reduced and market activities generated. As pointed out by World Bank (2008) and Shepherd (2007) the development of rural roads has the potential to facilitate farmer's access to the market and increase their income. An example from Vietnam demonstrated that road rehabilitation contributed to an increase in the variety and volume of fruit and vegetables sold in the market, and also encouraged participation in trade and services (ADB 2005). Similarly, in Georgia, an opportunity for female and off-farm employment has increased as a result of the rehabilitation and construction of roads in that country (der Walle 2007).

Another important issue that needs to be addressed in relation to market linkages is 'rural markets'. Eaton and Shepherd (2001) noted the absence of rural markets impacted to the raising of the costs of transaction and prevented smallholder farmers and traders from accessing markets and suppliers. Farmers need to travel long distances to district and other major markets to sell their produce. This resulted in an increase to the costs of marketing and decline in product quality. One of the solutions to solve this is that specialized services need to be available so that institutional support in relation to production, marketing and processing can be provided. This indicates how important rural infrastructure and services are to the establishment and facilitating of market linkage activities and the movement of information, goods and services.

From the point of view of the legal and regulatory framework in promoting farmers and agribusiness linkages development, governments should address some of the

legal issues (Shepherd 2006), including specific legislation related to farmer groups and cooperatives, regulations on the use of pesticides, standards of food and seed quality. The emphasis should be on creating legal and regulatory frameworks that will enable successful market linkages rather than government intervention which try to manage and control those engaged in production and marketing.

Furthermore, to achieve good results from activities in linking farmers to markets, governments should not only provide good policies, laws and regulations but also organise regular consultation with the private sector and with linking organizations (Shepherd 2007) such as NGOs and other agencies to identify and address concerns related to policy, laws and regulatory frameworks.

To expand farmer-market linkages, Abaru et al. (2007) suggested that governments should take the lead in accelerating private sector development and encouraging contract farming and value-addition. Approaches such as collective action, for example, can help farmers solve the cost of transaction and other constraints in participating in the market. Strategies such as this need to be supported by good government policies so that they can flourish and be widely practiced (Costales et al. 2006) for the benefit of small-scale and poor farmers and others in need.

To make it possible for smallholders to remain competitive, public-private partnerships are required. This kind of partnership is important because it plays a key role in creating farms and facilitating linkages which can satisfy market demand. For example, small scale farmers cannot fulfil the high food safety standards demanded by the markets as they lack capital, information and skills. This can be overcome through private-public partnerships, where the private sector can provide some commercial services, while the government can provide services that have public good benefits such as infrastructure or information.

### **3.2.4 Opportunities for market development**

Contributing to the challenges and opportunities faced by smallholder farmers is the growth in agriculture, vertical coordination development and other structural changes

in the supply channels in agriculture (World Bank 2008; Silva 2005; IFAD 2003b). On the one hand, this provides the chance for smallholder farmers to increase their income and offer market opportunities by participating in the rapidly growing markets which is caused by the increase in income, trade liberalization, urbanization, foreign investment and advances in technology (World Bank 2008; Silva 2005; IFAD 2003b). On the other hand, the changes also pose challenges to smallholder farmers due to the high value agricultural products that often involve higher costs of production, a greater procurement system and a greater production and marketing risk (Silva 2005; Reardon et al. 2004; Simmons 2003) as smallholder farmers cannot afford to cope with these changes.

In addition, the changes mentioned also expand market opportunities for smallholder farmers and agribusiness firms because they provide new opportunities to smallholder farmers, particularly for those who are able to access and compete successfully in the newly transformed markets. This will result to increased growth in agriculture and non-farming and, thus, provide greater employment and rural incomes. However, there are concerns raised related to how integrated supply chains for supermarkets and smallholder farmers share the opportunities provided by the modern procurement system with stringent food-safety standards (World Bank 2008).

The faster growing demand for high-value agriculture products, both for domestic and international markets, provides important opportunities for the agricultural sector in many developing countries. For example, during the last decade, consumer demand for horticultural products has increased substantially in most developed countries (IFAD 2003b). This has led to new opportunities for producers throughout the developing world. The reason is that producing high-value horticulture products in developed countries incurs high costs, especially for labour and heating for greenhouses. Because of this, they are looking for outside sources (Diao et al. 2007), particularly out-of-season products. For example, African countries have a comparative advantage in exporting horticultural products to Europe due to the tropical climates, counter seasonal patterns of production, and relative geographical proximity to Europe (Barrett et al. 1997; Islam 1990). In addition, most of the non-

traditional crops from Latin America are exported to North America, while products from Asia are distributed both to Europe and North American markets (Narrod et al. 2007). Deciding which market the product will be exported to depends on the cost of transport, market competition, and whether the food safety requirements of the product in the destination markets are adhered to.

As higher value and processed foods are now growing rapidly in many developing countries, this can benefit small farms with commercial orientation (Hazell 2007). This will offer robust domestic markets and smallholder farmers can take advantage of these markets. An example from India showed that non-traditional high value agricultural product produced by small farmer's accounts for more than half the total value of agricultural output (Hazell 2007). Most of these products were sold in the domestic market. In addition, the liberalisation of trade has contributed to the opening of new export opportunities for some of the high value products, and this provided new marketing opportunities for local producers (Lemeilleur & Tozanli 2006). Countries such as South Africa, Kenya, Ghana and Uganda have been successful in raising their exports of high value agricultural products in particular flower, fruits and vegetables (Hazell 2007).

For poor farmers, the opportunities provided by changes in the markets will work only when supplementary policies such as greater access to assets for smallholders, and strong producer organization to achieve scale and market power, are in place.

Thus, for smallholder farmers to become more involved in export market-oriented crop production, they need to be equipped with complete market information, access to credit and training, particularly in production and quality-control techniques (Dolan et al. 1999). Linking farmers closely to consumers provides new market opportunities which can lead to fulfilling consumer preferences for quality, quantity and food safety.

Making markets work better for poor people can mean increasing their integration (ADB 2005/M4P with national and global markets, both as consumers of goods and services, and also as producers of inputs to industrial processes and value chains.

Hence, the key to expanding market opportunities is through improvement of the competitiveness of agricultural products in the domestic, regional, and international markets.

### **3.3 Ways of linking farmers to markets**

Linking farmers to markets can be done through several ways. These include cooperatives, contract farming, marketing boards, linkages with domestic traders, linkages with exporters, agro-processors and retailers and linkages through leading farmers. The market linkage approaches mentioned were derived from the review of literature on linking farmers to markets done in the thesis.

#### **3.3.1 Linking farmers to markets through domestic traders**

A trader is a person who buys vegetables from the farmers and sells them to wholesalers or retailers on a regular basis as a middleman. Traditionally farmers interact with traders to sell their produce on a one-to-one basis, either at the farm gate or in traditional markets. Purchasing the product in traditional markets can be relatively efficient if there is enough quantity provided (Shepherd 2007) so that it can enable traders to achieve economies of scale and transport. Indeed, this can often be inefficient and contribute to high marketing costs which lead to exploitation of farmers by traders. Although traders often argue that they can only pay a particular price to cover the cost of transport and other marketing costs, this may not always be the case. Sometimes, traders use this as an excuse to get the products at a low price. As many East Timorese farmers lack information have low levels of education, they are often powerless and are thus open to exploitation. To reduce such marketing costs and exploitation, it is important for farmers to work together (Markelova et al. 2009). For example, the produce can be put together in one location so as to make it easy for traders to purchase and, at the same time, reduce their transport costs. According to Shepherd (2007), an approach like this can be successful if it is developed with an external catalyst, such as government extension staff, NGOs and

international agencies. The advantages of this linkage is that it involves a high level of trust between farmers and the trader; there is no need for formation of formal farmer groups and the training may be provided by traders (Shepherd 2007). However, the disadvantage is that farmers usually have to accept a short-term delayed payment and often there is a limited access to high-value markets. They are also often price takers, usually set by the traders.

An example of a successful market linkage under this model is demonstrated by a case study in Thailand whereby a trader maintained a close relationship with farmers by frequently visiting the field to observe quality and to make sure that farmers only supplied from their own plot (Wiboonpngse & Sriboonchitta 2004). In Vietnam, a trader who was able to buy from field collectors was able to improve the supply chain; and this can only be done by focusing on quality and cooperation around the chain (Cadilhon et al. 2005). By improving linkages, the returns of farmers increased, losses were reduced and their own profit as traders also improved. When linkages are enhanced farmers will increase their production and quality of their products according to what is demanded by the market. This means any activities (e.g., harvesting, grading, packing, handling & transporting) from production until the product reach consumer will be managed carefully to avoid any losses that may occur. For example, using crates and cool trucks to transport products from the farm gate to the market can significantly reduce losses. Enhancement of cooperation in LF2M resulted in an increased in returns both for farmers and traders. In Indonesia, the linkage between traders and farmers demonstrates a trader's capacity to work closely with farmers. They also initiated activities to address some problems faced by farmers, such as cash shortages and working capital. In this case, the NGO intervention is important as facilitator in providing training to the farmers. Similarly, linking farmers through domestic traders in Syria resulted to an improvement in profit for traders and the ability to guarantee enough quality and quantity of produce demanded by their customers (Abdelali-Martini et al. 2006). Farmers also benefited through their involvement through better access to markets and loans.

### **3.3.2 Cooperatives**

In the Macquarie dictionary, a cooperative is defined as a business owned and controlled by members (Butler 2009). It provides work or goods to the members at an advantageous price. An example of such includes contract farmers in Indonesia that negotiate their contracts as cooperative groups, rather than individuals who own and control farm business (Trewin, 2004). Over the century, cooperatives in most countries have played an important role, especially in agricultural industries (Bernard & Spielman 2009; Ortmann & King 2007; FFTC 2006; Develtere & Pollet 2005). In farm supply, for example, cooperatives have provided fertilizer and other inputs and, in marketing, cooperatives facilitate transport, storage and processing of farmers' products. The importance of marketing cooperatives has often been highlighted as a link between producers and consumers allowing farmers to participate in new market development (Bacon 2005; Trewin 2004). In addition, cooperatives in most countries have contributed to the fostering of technological innovations, achievement of modern agricultural production, self-sufficiency of main staple foods, strong farmers' household economy, democratic decision making processes and development and education (FFTC 2006).

Cooperatives are well-suited to the economic, social and institutional needs of many rural economies. For example, Costa Rican cooperatives are farmer owned and process about 40 per cent of the national coffee production (Wollni & Zeller 2007). Bacon (2005) and Varangis et al. (2003) found that cooperatives have played a vital role in providing support to farmers for processing their production and adopting quality standards. In India, the Anand cooperative provided a large economic contribution to the development of the dairy industry and had an important impact on India rural society (Abbot 1993). Cooperatives can also substantially reduce the cost of information gathering (Verhaegen & van Huylbroeck 2001), help to facilitate people in organising to take action in providing services (Crawford 1997) required by farming and rural communities. As self-organised institutions, they can respond to the members' needs and also foster self-reliant attitudes in the context of mutual aspirations and mutual action.

Rhodes (1993, p. 263) stated that: ‘a cooperative is a user-owned and controlled business from which benefits are derived and distributed equitably on the basis of use’. This makes it clear that cooperatives differ significantly with other firms because the cooperative users are also its owners. As users, they have the owners’ perspective that they can affect services and activities and, as owners, they have the additional perspective of users. International Co-operative Alliance (ICA) defines a cooperative as ‘an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise’ (Lewis 2006, p.3). The cooperative in this case is based on the democracy, equality, equity, values of self-help, self-responsibility and solidarity.

The common motivation behind the establishment of cooperatives includes increased bargaining power of farmers, advantages offered by government and, as members of cooperatives, farmers have the opportunity to pursue a particular business by acting together (Trewin 2004). An example from grain farmers in the USA shows that they can overcome their problems with elevator companies who transport their grains by forming a local cooperatively owned elevator. In this case, they cannot act individually because of the distance involved and they sell only to one, or a few, elevators. Meanwhile, the government support allows members to act together while, for other businesses, this is not permitted.

According to Rhodes (1993), by working together smallholder farmers can achieve some marketing objectives which they cannot achieve by working separately. Yet, if farmers are to be able to reach forward in the marketing procurement channels with a marketing program of their own, they must work together. It is only together that farmers can bargain on equal terms with a processor. An example from the Himalayan Action Research Centre (HARC) in India demonstrates how small and marginal farmers can improve their economic status by organising themselves into grassroots, collective institutions (Baptista 2005). Baptista also highlighted that such institutions require a broad range of capacity building services.

Cooperatives can reduce transaction costs and support the development and coordination of a commodity market. These can be done by investing in the processes of marketing infrastructure and services, guaranteed purchases and sales of a commodity to reduce the risk, lowering the costs of transactions, providing market power and establishing a collective reputation for quality product (Chowdhury et al. 2005; Padberg et al.1997; Jaffee 1995). In addition, Abbot (1993) argues that for cooperatives to be viable as well as independent, a large proportion of the funds should come from within the cooperative and its members. The reason for this is to maintain its integrity and manage the activities independently without any external intervention. Because most of the funds are derived from its members, cooperatives can easily manage to help its members gain access to assets, information and services.

To show how important the contribution of cooperatives are in supporting smallholder farmers, both in production and marketing, several examples are provided as follows. A study conducted by Zuhui in China shows that farmers' involvement with cooperatives improved their negotiation skills, the cost of transactions are reduced and the brand effect has pulled in Buyers (Zuhui et al. 2007). Further, cooperatives have contributed to the increase of farmers' share in the supply chain by hardening their negotiating power and assuring the quality of produce. As a result, farmers gain a larger share of the benefit. An example from Uttaranehal, India demonstrates how small and marginal farmers can improve their economic status by organising themselves into a collective institution (Baptista 2005). In addition, a case study in Hai Duong province in Northern Vietnam showed how collective action principles established through the institutional arrangements enabled smallholder farmers to make a profit and resolve some of the barriers faced, including market participation (Lapar et al. 2006). In Kenya, the involvement of small dairy producers in the market was made possible by dairy cooperatives. Chowdhury et al. (2005) noted that through the engagement of farmers in a cooperative, they can gain advantages, including cost reduction for transport, reduction of unit costs of collection, accessibility to inputs and provision of a strong bargaining position for producers. The impact of this is that it has improved market stability both for milk processors and small dairy farmers.

These examples provide a strong image of the role of cooperatives in helping farmers overcome their marketing problems in developing countries. Other roles are to provide new information and techniques to farmers, facilitating them to participate in markets and supply chains and representing smallholder farmers in negotiating with government (Zuhui et al. 2007). Indeed, a cooperative not only enhances farmers' security and competitiveness, but also improves their negotiation skills. This will increase marketing opportunities for farmers and also increase their income.

In addition, linkages through cooperatives offer more opportunities for adding value to products (Lapar et al. 2006). This includes the reduction on asymmetries of information, the minimization of the cost of transport and communication and addressing non-economic barriers. All these opportunities can be provided by institutional arrangements such as cooperatives. The experience of the cooperative in the Red River Delta region, Vietnam, shows smallholder farmers can produce for the market when they are well organised (ADB 2005).

Unfortunately, although there have been some successful cooperatives, Shepherd (2007) and Attwood and Baviskar (1988) noted that the track record of the development of cooperatives is sometimes disappointing. This is because the 'nationalization' of cooperatives becomes part of government bodies, often with a top hierarchical structure. Examples in some countries indicate that where there is a strong government-cooperative relationship, sometimes this translates to political interference and government misuse (FFTC 2006; Hedlund 1988; Wong 1979). This impedes the growth of cooperatives, resulting in a loss of the autonomy of the cooperatives and loss of efficiency. As a result of this, there are possibilities that the benefits derived from cooperatives will be allocated disproportionately, particularly for those with the highest social status and political power (Lele 1981). Japanese cooperatives for example, have been shown to be inefficient and uncompetitive due to a government intervention that institutionalized cooperatives and made them part of the government system (Trewin 2004).

Meanwhile, a cooperative that is founded with the assistance of donors, in some cases, provide false assumptions regarding large margins in the marketing channels

(Trewin 2004). The case study from Mali shows how NGOs supporting a group to improve processing and marketing of sea butter were not sustainable (Shepherd 2007). The failure of this intervention was caused by the direct involvement of the NGO in running the marketing side without preparing and developing the cooperative to take over. Based on this example, Trewin (2004) raised a number of factors which contributed to the liquidation or merger of the cooperative which include the changing environment, a poor business model, lack of management and lack of support from cooperative members.

Despite differences in opinion in relation to cooperatives, it seems that this institution has the potential to contribute to rural development as a whole and agricultural sector in particular. Facilitating farmer's access to markets is one of the cooperative approaches to increase farmers' income and provide jobs for rural communities. For a cooperative to function well, there is a need for it to be independently manageable without intervention from the government. This is important because, as an autonomous association, any decisions made by cooperatives should reflect the majority of its member needs without external intervention.

### **3.3.3 Contract farming**

Contract farming has existed for many years, therefore it can be considered as a way of organising commercial production, and it should also be seen as collaboration between agribusiness and farmers. Abbot (1993) and Simons (2003) define contract farming as an agricultural production that is produced according to the agreement between farmers and buyers which can be done by verbal or written contracts. To guarantee the delivery of produce, buyers provide farm inputs and extension to the farmers. Silva (2005), Eaton and Shepherd (2001) and Stringfellow (1995) refer to contract farming as a form of supply chain governance used by companies to secure their access to agricultural products. Based on this, contract farming can be described as an alternative form of vertical coordination which involves firms, a spot market and a full vertical integration.

The procurement practices that impacted the agri-food chains is influenced by two main factors; that is, industrialization and rapid rise of supermarkets, both in developing and developed countries (Reardon & Berdegue 2002). To respond to the trends of an agri-food system which has become more competitive, the coordination of supply chains need to be adapted to the trends accordingly. In addition, to lower the costs, ensure quality, control market risks and enhance the effectiveness of demand, it is necessary to better synchronize the vertical stages in the agri-food value chains (Tweeten & Flora 2001).

According to Abbot (1993), the most serious constraints on small farms relate to the problems of access to production resources, such as inputs, services, information and access to markets. The author remarked that one of the institutional forms which can deal with many of these constraints in an integrated manner is “contract farming”. Simmons et al. (2005) commented that contract farming often involves bringing together a unique connection of multinational corporations and smallholders. As confirmed by Woodend (2003), it is widely recognizable that contract farming has considerable potential in countries where smallholder agriculture is extended, and the enterprise that processed agricultural products for export are being promoted. For example, the case of farm-agribusiness in Kenya has shown how local farmers and agribusiness firms engage through contract farming to produce and process horticultural product to export to the United Kingdom (Rottger 2004).

From the definitions of contract farming mentioned, it can be said that contract farming is an agreement to work together between farmers and agribusiness firms in a mutually beneficial way in all aspects described in the contract, through formal and informal arrangements and at a determined price. In essence, contract farming commits the grower to produce a certain commodity at a certain time for an agreed price and, in return, the firm undertakes to market the commodity and may provide extension services and other facilities to producers in order to satisfy its production requirements in terms of quality and quantity (Woodend 2003). For example, in countries such as Kenya, Nigeria and Ghana, formal contracting arrangements are common. However, no evidence in these countries shows that this kind of contract is important for the linkages between farmers and buyers (ADB 2005). The reason is

that farmers generally consider mutual trust as more important than contractual arrangement. According to ADB, the most important thing is mutual trust between parties involved in the contract which can lead to fair play for both sides in terms of reliable and fast payments, and reliable and prompt product deliveries. A contracting relationship should not be seen as a competitive relationship where one party exploits the other, but it should be considered a partnership between the participants (ADB 2005). A successful relationship can only occur when there is a high level of trust and interaction between the parties involved.

Meanwhile, Silva (2005) argues that contracting is actually a mode of coordination. In this mode, the conditions are set specifically by some form of legally enforceable and binding agreement among transaction partners. The specification covers production technology, price discovery and others, and this can be in more or less detail. Indeed, Glover (1994) points out that contracting is related to the allocation of risks between parties involved in the contract. Specifically, Sykuta and Parcell (2002) added three key elements which codify the rule of transactions including value, risk and the right decision. According to them, the contract will be successful only if the allocation of value, risk and the right decisions are mutually beneficial, sharing the risk and improving the quality and production.

Contract farming has worked in various forms in many countries and it offers a mechanism for vertical coordination between agribusiness firms and small-scale farmers (Singh 2002; Rehber 2000; Key & Runsten 1999; Glover & Kusterer 1990). Contracting arrangements between parties involved in the contract are varied (Simons et al. 2005) and this covers the contracting party, the crops being contracted out, contract details, formality level and the number of farmers participating.

In terms of the advantages, Simmons (2003) and Little (1994) provided four areas of strategic advantage of contract farming that allow cost savings to smallholders access to a number of essential areas. These include farmer's access to product markets; access to credit; access to services and access on information; and logistics and marketing at a relatively low cost. For example, for farmers involved in contract

farming, their production and marketing risks are reduced, managerial skills are improved and they are given access to technical expertise (Silva 2005; Eaton & Shepherd 2001; Vellema 2000; Key & Runstein 1999; Pasour 1998). Empirical studies also reveal that farmers involved in the contract receive higher profits, higher production efficiency and their income is more stable than farmers who independently grow the same crops (Swinnen 2007). In addition, Simmons (2003) and Hudson (2000) added that at an operational level having contracts may have benefited farmers and rural communities, both directly and indirectly. Direct benefits include improved access to market and access to credit, better farm inputs, better use of technology, better management of risk and farm family employment. The indirect benefits from contracting are in relation to cultural values driven by the contracting process, importantly, empowerment of women and the development of a commercial culture. Furthermore, farmers enter into contract with the aim of reducing marketing risk, stabilising income, increasing profit opportunities and educational experience, in particular, interacting with agribusiness partners which can offer a channel for farmers who are trying to convert from subsistence to commercial farming (Sofranko et al. 2000; Martin 1999; Pasour 1998; Glover 1994).

The United States Department of Agriculture report revealed that contracts govern 36 per cent of the value of agriculture production in USA (Mac Donald et al. 2004) and this is the primary means of vertical coordination. In Brazil, 75 per cent of poultry production is coordinated through contracts whereas, in Vietnam, 90 per cent of cotton and 40 per cent of rice are being purchased by enterprises through contracts (Anh 2004). In Mozambique, Swinnen and Maertens (2006) claimed that an estimated 12 per cent of the population are involved in contract farming. These studies show that linking farmers to markets through contract farming is very important for many countries as a means to enhance smallholder farmers' participation in a competitive market.

Although farming risk can be reduced by contracting, Silva (2005) however posits that the risk source in the farm operation itself can be caused by contracting arrangements, and this can lead to potential disadvantages of contract farming. Some of the disadvantages of contract farming include farmer's loss of flexibility in

enterprise choice; agribusiness firms may avoid transparency in the mechanism of price determination; risks associated with the practice of monoculture; loss of autonomy; increased market power of agribusiness firms and increased concentration leading to reduced farmers income (Sofranko et al. 2000; Colchao 1999; Runstein & Key 1996; Royer 1995; Watts 1994). In addition, when farmers are growing new crops, they are facing the risk of both market failure and production problems and lack of management can lead to the manipulation of quotas; this means not all contracted production is purchased (Eaton & Shepherd 2001). This will contribute to the problems faced by farmers, including production problems and excessive advances which result to indebtedness. Because of these problems, the literature critical of contract farming argues that contract farming is simply a method of obtaining cheap labour and of transferring risk to growers (Abbot 1993).

Runstein (1992) and Glover and Kusterer (1990) also provide some evidence that often farmers do not accept the contracts and that some contracts are failing as result of misinterpretation and differences. For example, an Indonesian experience shows that the issues confronting smallholders on the operational aspects of contract farming appear to be the rule instead of the exception. It seems likely that after the contract maturity period is past, a contract is followed by contract tightening. A study in Giang Province, Vietnam recognized that there were significant obstacles hindering farmers' ability to fulfil contracts successfully because of the higher quality standards, lower prices and less convenient pick-up for the products (ADB 2005). These make contracts less competitive than selling to traders. In addition, Canadian and Australian potato contracting arrangements also found that there are common problems, similar to those mentioned, arising from contract farming (Fulton et al. 1996; Glover & Kusterer 1990).

Clearly, contract farming incurs transaction costs (Dietrich 1994). The decision by an agribusiness firm to become involved in contract farming shows the perspective that the costs of total production and the transaction cost of the contracts are lower than the alternative costs, such as vertical integration or open market operations (Simmons et al. 2005). Conversely, contract farming emerges when the net benefits for the firm and smallholders is better than other production options. In addition, this

approach is considerably important for countries where there is an expansion of small-scale agriculture (Eaton & Shepherd 2001). This is because larger farms become more important and farmers become marginalized (Simons 2003; Kirsten & Sartotius 2002; Rhodes 1993).

The key preconditions for successful contract farming, according to Eaton and Shepherd (2001), are a profitable market, both for firms and farmers, the physical and social environment, such as infrastructure and utilities, and government support, including enabling and regulatory role and development role. Other prerequisites for the success of contract farming are good coordination and organization of production, and a selection of households that have the same economic aim.

### **3.3.4 Linkages through supermarket/processors**

In developed, as well as developing countries, supermarkets have emerged as major players in food supply and distribution. Their dominance in food supply chains offer opportunities for farmers to access more stable markets. As stated by Reardon et al. (2004) if farmers can fulfil the condition imposed by supermarket procurement systems in the form of private standards this chain can provide clear chances for them to reach markets. However, the food standards set by the supermarkets, such as food safety standards, clean produce and neat packaging, is stricter than informal food markets which can make it difficult for farmers to meet their standards. In addition, to meet the requirements set-up by supermarkets, it is important for farmers to change their investments and farm production practices. Unfortunately, in terms of investments, some are quite expensive (e.g., agricultural machineries & inputs production). Because of this, many small agricultural firm and farms cannot afford to invest. Reardon et al. (2004 pp. 180) added ‘the changes in standards and the implied investments have driven many small firms and farms out of business in developing countries’.

To overcome these problems, farmers may need to be linked to large scale processors. Linking farmers to processors can provide opportunities for better and more stable marketing (Shepherd 2007). As noted by Onumah et al. (2007) smallholder farmers in Zambia make significant income by selling maize directly to millers. By delivering the product directly to processors, they can avoid the weight and quality problems that they face when selling through informal intermediaries. In Kenya for example, a dairy company working with organised groups of farmers demonstrated that their collaboration in this arrangement can ensure a stable market and price, as well as inputs for farmers (Wambua 2002). Through this linkage, the company processing capacity increased and it has become the leading milk processing company in Kenya.

The advantage of this type of linkage for farmers is that the market price is assured, for the fresh market, this provides an additional market, the firms can supply inputs and assistance, and it has the potential for farmers to sell larger quantities of the product (Shepherd 2007; Chen et al. 2005). The disadvantage is that all products need to meet standard demands, such as quality and safety specifications, and the price agreed to with the processor may be less than the price offered in the open market. In addition, there is a risk of delayed payments to farmers.

Rising population and increase in consumer incomes in developing countries posted big changes in business retailers including supermarkets. As a result, there will be an increase in consumer demand of quality agricultural products in particular in urban areas. To fulfil this demand, some measures need to be taken to support and promote farmers produce in the markets. These measures include improved infrastructure, information and marketing regulation. With the support from public and private sector, this can lead to farmers having better access to markets which can contribute to the rapid rise of supermarkets in developing countries.

According to APAARI (2008), to meet the demand of consumers for food safety and high quality agricultural products, most supermarkets have introduced value-added certified agri-foods (e.g., green and organic products). However, in many developing countries, there is still a gap between the traditional production system and modern agri-food supply chain with supermarket as the leader (Hu, et al. 2008).

While supermarkets need products with high quality and are safe for their customers, small-scale farmer households lack experience in dealing with the standards required. One way to solve this problem is to support small-scale farmers to change their traditional ways of production and marketing and so that they will be equipped and ready to fulfil the required standards requested by supermarkets. China for example, with their project for helping small farmers to adapt to global markets (SFAGM), had introduced approaches such as good agricultural practices, enhanced the method of extension systems, on farm quality and food safety assurance and supported development of farmers' corporatives. All of these are geared to increase production and marketing of value added agricultural products. This is important as it can facilitate farmers in entering high value markets through the supply of their produce to the supermarkets. This will result in the increase in income for farmers

### **3.3.5 Linkages through exporters**

Agricultural markets, particularly export markets for horticulture products, represent significant opportunities for farmers in developing countries. Evidence has shown that there was a booming flow of exports for high value horticultural products from developing to developed countries (Aksoy 2005; Diaz-Bonilla & Recca 2000). However, Onumah et al. (2007) point out that the levy for food safety standard and demand for quality has raised impediments too high for small producers. For example, export to European countries should comply with requirements such as EurepGAP, ISO9001, ISO 14000 and social responsibility norms. These discourage small-scale producers to enter into these markets.

Linking farmers to exporters is an approach that can overcome barriers to markets, particularly for high-value produce. This linkage seems to be important for the success in high-value markets, with the company providing training and regular monitoring. For example, an export company in Ghana which exports mangoes, water melon, pineapple and papaya to European markets, revealed that most of its suppliers are composed of small-scale farmers (Danson et al. 2005). These farmers have been certified as Fairtrade organic which meets the requirements imposed by the organisation. Through this arrangement, farmers can ensure regular supplies and

are able to fulfil food safety and quality standards. In addition, the infrastructure improvement also strengthened access to farms by company trucks (Onumah et al. 2007) and, at the same time, reduced the transportation problems faced by farmers.

The advantages of this type of linkage are that there is a high potential return for farmers, inputs and assistance may be provided by the partner export company and often the company will also provide transport and packaging (Shepherd 2007). Meanwhile, the disadvantages include: the export markets are naturally risky and compliance with the standards can be problematic, even with technical assistance.

### **3.3.6 Marketing boards**

A marketing board is comprised of a varied set of governmental or government-regulated marketing institutions that lie closer to the authoritarian than the anarchic, voluntary-cooperative end of the spectrum (Abbot 1993). As defined by Abbot and Creupelandt (1966) marketing boards are public bodies, established by governments to improve the marketing of agricultural products and empowered to exercise varying degrees of compulsion over producers, traders and processors. Crawford (1997) viewed marketing board as a government agency that intervenes in the process of marketing, and serves the cause of efficient and orderly marketing.

The arguments for the establishment of marketing boards stem from the belief that private marketing is not organised well, is exploitative and not efficient, and that marketing margins were excessive, farm prices were low and retail prices were unnecessarily high (Abbot 1993). According to Crawford (1997) the establishment of a marketing board is due to a situation where the middleman performs monopsonistic power over producers. In contrast, Jones (1982) argued that allegations about market imperfections and the incompetence of private entrepreneurs may have been no more than an excuse for government control. Crawford (1997) added that the marketing board is regularly used by governments as instruments of national policy for the promotion of agricultural and rural

development, encouraging farmers to grow more crops for export, pushing producer prices higher and also consolidating power through political appointees on the board.

Marketing boards however also have some advantages. First, marketing boards can contribute in managing marketing in an efficient way (Troughton 1989; Akinola & Ford 1987). They can also reduce intermediaries' capacity in manipulating the margins; and lastly, they can generate producer-oriented power (Cardenas 1994). For example, a marketing board can perform as a 'watch-dog' in terms of regulatory roles such as credit arrangements and quality control. It can also perform as a facilitator which provides some service such as credit and risk management. Apart from this, the marketing board also can increase farmers' income. The Canadian Wheat Marketing Board, for example, earns farmers the best possible returns for their wheat and barley (Canadian Wheat Marketing Board 1993). Although selling wheat and barley is its main function, it is also involved in a range of supporting activities such as product and market development, grain delivery and movement coordination and sale (Padberg et al. 1997). Thus, one way that a marketing board modifies the existing market structure is by reducing inefficiencies caused by unwarranted competition between intermediaries (Crawford 1997).

### **3.4 Supply chains and value chains**

The role of agri-food chains and networks has become increasingly important in providing market access for farmers in developing countries. In the last ten years most firms in developing countries have been integrating into geographically dispersed supply networks or commodity chains (Ruben et al. 2006). Producers, traders and processors in these countries are linking together with consumers and retailers in developed countries through the chains networks (Gereffi & Korzeniewicz 1994).

In addition, food and agribusiness chains are affected by consumers' demands related to the quality and safety of food and the sustainability of the production and the way producers handle the products (Ruben et al. 2006). Because of the high demand

from the consumers on the quality, traceability and environmental friendliness of products and processes it is important for producers to develop new ways of producing and marketing their products (Omta et al. 2001; Humphrey & Oetero 2000).

In the past it has been realised that many of the government and private sector programs have focused on increasing production with no sufficient attention to markets and the role of effective supply chains (Vermeulen et al. 2008). As a result many producers in developing countries cannot compete in new emerging markets. The reason is that there is lack of market opportunities to absorb their produce and there is not much attention paid on how to link farmers produce to the market. For producers to be more competitive in the market they need to be more involved in efficient and effective supply chains (Murray-Prior et al. 2005). In addition, improving smallholders access to market and competitiveness needs concerted efforts for linking various stakeholders including producers, traders, processors and retailers, in order to reduce transaction costs. Working collaboratively in the supply chain can guarantee access to new and profitable markets and the ability to timely respond to demand (Ruben et al. 2006).

### **3.4.1 Defining supply chains and value chains**

A supply chain constitutes a number of entities, including raw material supplier, manufacturer and retailers which have the responsibility for converting the raw material into the end product and make them available to end customers to satisfy their demand at the lowest possible cost (Sarmah et al.; KIT et al.; Hoffler & Maingi 2006). Batt and Cadilhon (2007) and Vorst et al. (2007) defined supply chain as a range of activities needed to bring the product or service from different stages of production and processing and deliver good value at the lowest cost to the customer. Indeed, the steps from which the product is procured and distributed to the end consumers can be included into the supply chain. In this context, supply chain can be described as a group of individuals interacting together to transform primary products into finished products and distribute to the customer. Folkers and Koehorst

(1998, p. 385) describe supply chains as ‘a set of interdependent companies that work closely together to manage the flow of goods and services along the value-added chain of agricultural and food products, in order to realize superior customer value at the lowest possible cost’.

Meanwhile supply chain management refers to the collaboration of organizations in a strategic way with the aim of fulfilling market objectives in the long term and benefitting all links in the chain (Chen et al. 2005). Batt and Cadilhon (2007), Woods (2004), Chase (1998) and Christopher (1998) simply refer to management of the supply chain as the management of the whole activities associated with production, distribution and marketing processes to supply the desired product to the end consumer. Supply chain management also refers to the coordination of goods, finances and the flow of information for all activities and processes in the supply chain (Simchi-Levi et al. 2000). Whereas Vorst et al. (2007) view supply chain management in the context of integrated activities of the business which include planning, implementation, coordination and control to deliver the product in an efficient way to satisfy market requirements.

From the statements of supply chain management mentioned above, it can be said that supply chain management is a collaboration of independent organizations that work together in all parts of the processes of production, distribution and marketing to manage the flow of the product from producer to consumer at the lowest price as possible. This means that activities involved in the distribution of food such as procurement, production scheduling, order processing and customer service, all are part of supply chain management. Through a good collaboration in all parts of the chain it enables companies to act effectively with regards to competition (Batt & Cadilhon 2007). To coordinate the flow of materials and information between suppliers, manufacturers and customers, the supply chain must be well-integrated (Narasimhan & Carter 1998). Thomas and Griffin (1996) add that for the supply chain management to be effective, planning and coordination among various channel members are needed.

Value chains on the other hand have become a major focus of many recent international programs on agricultural development. In the past there may have been too much stress on raising production without sufficient focus given to markets and the function of effective value chains and supply chains. Value chains are important wherever a business is situated along the supply as business success relies on the understanding of, and capacity to answer to, the needs of the whole chain (Johnson & Hoffman 2004). By using the value chain approach businesses can better understand which market segments, distribution channels, prices, product differentiation needed, selling propositions and configuration of chains will give them the highest competitive advantage (IMA 1996). For example, the standard of food quality and safety can only be fulfilled if accurate proceedings are in place along the entire chain. Conversely, efficiencies, and the activities of value-adding, need to be established and accommodated at every phase of the chain.

According to Porter (1985), a value chain can be described as the internal processes or activities that the company performs “to design, produce, market, deliver and support its product”. The author further stated there are two main business activities in value chain approach including primary activities which directly engage the transformation of inputs into outputs and the delivery process; and support activities that support primary activities. Value chain is defined as all activities that are adopted in modifying the primary product into a product that is sold and consumed (Hoffler & Maingi 2006; Johnson & Hoffman 2004; Kaplinsky & Morris 2000). These activities include the direct roles of primary production, collection, processing, wholesaling and retailing, as well as support roles, such as the supply of inputs, financial support and services, transport, packaging and advertising. The approach looks at the production process from the consumer’s end. In addition, value chain management is customer-driven and the focus is on the attention on the distribution of value added throughout the supply chain amongst different agents (Batt & Cadilhon 2007; Gereffi & Korzeniewitz 1994). The concept of value chain puts emphasis on the value adding component (Rola-Rubzen 2012, pers. com., 20 April; Arshinder et al. 2008; Martin & Jagadish 2006) i.e., the interlinked activity of value-adding that transform inputs into outputs and which helps to create competitive advantage.

In addition, in order to respond to market incentives, a marketing chain needs some degree of organization, mutual trust and reliable two-way information and communication along the value chain. As pointed out by Johnson and Hoffman (2004), careful management of the whole value or supply chain in modern markets is critical to ensure quality and safety and to increase efficiency.

The reason why value is important in the era of globalization is presented by Kaplinsky and Morris (2000) as follows: firstly, because of the competitiveness that has become more important with the global dispersion of production and the growing division of labour; secondly, to successfully access global markets, the only necessary condition is to produce the product efficiently; and lastly, entry into global markets allows for the sustainability of income growth, which means making the best of globalization. This needs an understanding of the dynamic factors within value chains.

According to OECD (2007) there are a number of factors that motivate the development of value chains in the era of globalization. One of the factors is the demand to raise efficiency. As domestic and international markets are growing, companies are forced to become more efficient and lower their costs. To achieve this, sourcing inputs from more efficient producers is important both domestically and internationally, and also within or outside the boundaries of the firm (OECD 2007). In addition, another important motivation is to have access into new emerging markets and access to strategic assets. Nonetheless, the predicted benefits involved in global value chains also apply to costs and risks for firms.

### **3.4.2 The importance of supply chains in linking farmers to markets**

In recent years, consumers and retailers are demanding products that can be supplied for most of the year, with good quality and at a competitive price. To meet this demand, the supply chains need to concentrate on market-oriented instead of product-oriented production. The chain that is driven by consumers can only be

successful if it is organised in a flexible, efficient and responsive way (Vorst et al. 2007).

According to Chen et al. (2005), rapid economic growth, increasing urbanization and faster integration into the world market, has seen a surge in the number of supermarkets in many developing countries. As a result of this, there is a significant institutional change which affects smallholder agriculture resulting from supply chain management, especially the rising of supermarkets in the domestic markets (Orden et al. 2004). Because of this change, there is a growing concern that modern organizational arrangements in agricultural food systems might promote the emergence of the imbalances in power and unfavourable terms of trade in the negotiation between small chain actors and the supermarkets (Orden et al. 2004).

To involve more small scale farmers in these rapid changes, one of the solutions is to involve small scale farmers into an integrated supply chain management (Shepherd 2007) from farm to retail shelf. Wheatley et al. (2004) claimed that an effective relationship between members of a supply chain has been shown to contribute to improving efficiency and innovativeness and enhancing a firm's competitiveness. As the goal of supply chain management is to create a responsive, consumer driven system (Ziggers et al. 1998), as a business it is important for distributors and suppliers to collaborate in order to increase consumer satisfaction and reduce their cost. Traditional agricultural and food business that have focused strongly on price were not equipped to respond to consumer demands (Woods; Johnson & Hofman 2004) and, individually, they lacked the means to provide effective consumer response. As consumers are becoming more demanding and legislation is becoming more stringent, stakeholders in the supply chain need to strengthen their effort to improve, maintain and control the quality and safety of agri-food products (Bijman et al. 2007).

Supply chain management provides a means to conceptualise management of the changes needed in the system so that it will respond efficiently to consumer needs, based on integration and coordination of the entire business unit involved in the production and delivery processes. Effectiveness and efficiency of supply chain

management requires trust, coordination and planning among parties involved in the chains (Johnson & Hofman 2004). Trust is an important factor in the supply chain which can shape the chain in an effective and efficient way, especially for fresh produce (Batt & Cadilhon 2007; Orden et al. 2004). For example, when producers and market intermediaries have less access to the legal system, it is recognizable that trust is increasingly important in the reduction of risk and facilitating exchange (Humphrey & Schmitz 1998; Fafchamps 1996; Mendoza & Rosegrant 1995). Kemp and Ghauri (2001) note that any conflict that arises will be solved in the first stage and this can satisfy both partners involved in supply chain when in a situation with a high level of trust. Meanwhile, to allow the chain to be more competitive and more responsive, practical improvements need to be implemented, which require active management initiated by members of the supply chain (Woods 2004).

The benefit of integrated supply chains for smallholder farmers is that it can provide information on new products, input, credit and extension, marketing services, improved product availability over a wider geographic region via transport systems, improved product availability over time due to storage and a better communication system (Batt & Cadilhon 2007; Orden et al. 2004; Dunne 1999). Rural communities will also benefit from adopting a market orientation only if smallholder producers in that community are able to gain from participating in higher-value chains (Wheatley et al. 2004). Batt and Cadilhon (2007) comment that, as a result of improved communication between the customers and the producers in a supply chain, there will be an improvement in product quality, both in terms of the technical specifications of the product, its ability to meet the downstream customer's needs and in terms of functional quality dimensions.

As the market moves further away from the wholesale market where prices are determined by supply and demand, it is very difficult for farmers to obtain market information. It is only when farmers are actively participating in the supply chain that they will actually know what is going on and, therefore, they need to make the decisions on what crops to grow in a particular time (Batt & Cadilhon 2007). For farmers, if they are able to provide the product consistently and reliably, then they

may become preferred suppliers, and this is important because once they become a preferred supplier then they are likely to have better access to the market.

One option to improve the prospects of smallholder farmers to participate and benefit from the chains is to form producer groups or cooperatives (Batt & Cadilhon 2007; Wheatley et al. 2004). The authors argue that to be competitive in the global market, small farmers need to work together as a group, or form a cooperative, so that they can collaborate and consolidate in response to the market. Through consolidation, smallholder farmers are able to improve the availability of supply, secure large quantities, undertake production planning to ensure continuous and regular supply and improve the quality of their product. Thus, they can work collectively to contribute the necessary investments in infrastructure and logistics to deliver what customers require and, finally, increase market power. For instance, a case study in China reveals that farmer cooperatives can solve the produce distribution problems in the supply chain systems and this has proven effective in enabling farmers to participate in the market (Zuhui et al. 2007).

Another option for the development of efficient supply chains is to include the small-farm sector to build on existing supply chains (Wheatley et al. 2004), particularly involving some actors, such as traders, to provide other services needed in a culturally appropriate manner, so that transaction costs are reduced without the need for the creation of formal farmer organizations. For example, the adoption of supply chain management in Indonesia for high quality local variety bananas to supermarkets was shown to be beneficial due to the quality-assurance practices and standards, with culturally appropriate incentives in place for producers, and communication strategies to reach farmers (Wheatley et al. 2004). Closer relationships and better understanding of the chain and customer value (Woods 2004) may offer opportunities for farmers to expand their operations along the chain. It also provides an opportunity to examine activities undertaken and services performed at each level in the supply chain, enabling all the participants in the supply chain management to gain a broader understanding of the way in which customer value is developed in the chain and possibilities to develop new values more effectively.

Ensuring that smallholders are able to access higher value markets will often require different levels of government working together with NGOs, the private sector and academics to deliver training and facilitate an integrated effort. It is vital that governments recognize the importance of providing an environment where small holders can also benefit in an equitable manner from their active involvement in higher value supply chains. Despite the collaboration mentioned, achieving more efficient supply chain management also requires horizontal collaboration at levels in the chain where there are multiple small players (Woods 2004). This means, the transaction costs between the vertical levels in the chain are reduced which may reduce power imbalances that happen in the interactions between large powerful players, such as supermarkets and small individual growers.

To achieve success in the market place that are nowadays very competitive, smallholder farmers need to participate in supply chains for added-value products with growing markets. This means producers need to find ways to participate in the type of managed supply chains that are efficient and also compatible with environmental and social sustainability. Hence, it is important for small-farmers to consolidate and to add value to their product so that they can enter into higher value markets.

### **3.4.3 The role of supply chain in the era of globalization**

In developing countries, the globalization of food chains has been driven by the increase of international trade and investment and the changes in food markets globally. Markets are penetrating deep into what were formerly rural subsistence economies (Minten et al. 2005; Johnson & Hofman 2004). Vorst et al. (2007) and Vorley et al. (2007) argue that the more local and cross border of food chains are integrating greater threats and challenges faced by agriculture and rural development. For example, smallholder farmers with limited resources and lack of access to markets and information face considerable constraints in the adoption of technological innovation. This may result in the exclusion of smallholder farmers

from trade. However, the study conducted by Minten et al. (2009) showed that smallholder farmers in the highlands of Madagascar can produce vegetables with quality standards required by supermarkets in Europe. The results of this study challenged the perspective that global supply chains are a threat instead of an opportunity available for smallholder farmers to improve their income and reduce poverty. Vorst et al. (2007) maintained that smallholder production can provide an advantage in terms of cost of farming enterprises which is based on the intensive use of labour that needs more supervision. Such competitive advantage can be identified; a family farmer's involvement in global food chains can be pursued as a good strategy to compete in the market place.

For farmers to survive, they need to operate successfully in a different, market-oriented environment where new skills and knowledge are needed to make different types of decisions. At the same time, the agri-food industry itself is changing, with a rapidly increasing role for managed, coordinated supply chains that are dominated by few large supermarkets retailers. As stated by World Bank (2008), one of the reasons supermarkets, food processors and food service providers should use supply chains is because of the inefficiencies that occur in traditional marketing system, as well as competition. Managed supply chains can minimize the cost of coordination, capture economies of scale and increase food safety and quality.

Furthermore, modern retail companies mostly dominate the international and local markets, particularly for high value products such as fruits and vegetables, and they determine the standards for quality and safety of food (Reardon & Swinnen; Reardon et al. 2004; Reardon & Barrett 2000). Following privatization and liberalization, new forms of vertical coordination have emerged and are growing (Swinnen 2006; World Bank 2006; Johnson & Hofman 2004; IFAD 2003a). As stated by World Bank (2008) and Swinnen and Maertens (2006), to guarantee the quality of supplies, private traders, retailers, agribusinesses and food processing companies become increasingly involved with farmers through contracting arrangements so that they can provide support, such as inputs and services. Conversely Batt and Cadilhon (2007) and Vorst et al. (2007) point out that the deregulation of global markets caused by increasing competition has forced retailers and manufacturers of foods to put greater

consideration about how to reduce costs while, at the same time, fulfilling the demand of consumers for high quality product.

With the increasing demand for high quality products and safety standards on the one hand, and the problem farms face to supply such products reliably, consistently and in a timely manner on the other hand, the emergence and spread of vertical coordination in many developing countries is the result (Swinnen & Maertens 2006). An example from Mozambique shows that an estimated 12 per cent of the rural population are involved in contract farming. In Kenya and Zambia, agro-industrial companies contracted a high number of rural households to produce agricultural commodities (IFAD 2003a).

The constraints faced by smallholder farmers in developing countries mostly relate to the difficulties in fulfilling high quality product, consistent supply, financial problems, as well as difficulties in input markets, low technical and managerial capacity and lack of access to inputs. One solution is for traders and processors to engage more in vertical coordination. As described by Vorley et al. (2007) buyer-driven chains are more regulated, and characterized by high levels of governance and long-term vertical coordination between producers, suppliers-integrators, processors and retailers.

To avoid smallholder farmers being pushed out of the rapidly growing sector and to benefit from the opportunities from growth that certainly exist, they need to be equipped with technology, financial capital, human capital and organization. To enable producers, particularly in developing countries, to meet their business requirements and trade standards, it is important to bridge the gap between local economic development and global chain integration (Vorst et al. 2007). To achieve this, fundamental reorganization of information which provides opportunities to smallholders in adjusting their supply to consumers' demands is required. As the market becomes more globalized, public and private partnership play an important role in creating farm to fork linkages which can satisfy the demand for food safety and other attributes, while maintaining smallholder farmers in the supply chain.

### **3.5 Studies on market linkages**

In recent years, LF2M has received major attention both in developed and developing countries. The reason for this is that many farmers are still facing difficulties in coping with the rapidly changing market environment. Another reason is that LF2M is recognised as a key factor for increasing income and alleviating poverty of poor farmers in particular in developing countries (APAARI 2007; APO 2006). Because of the importance of LF2M, a number of studies have been conducted in this field.

#### **3.5.1 General studies on LF2M**

Studies on linking farmers to market cover various issues including models such as contract farming (e.g., benefits, constraints and impacts of contract farming); private sector linkages through exporters, linkages with supermarkets, formation of cooperatives and other innovative institutional arrangements to establish market linkage. Some LF2M studies focus on the use of modern technology; others on market opportunities for small farmers; and others on the role of collective action and rural producer organizations and small farmers' inclusion in dynamic markets. Other types of studies, on the other hand, focus on the impact of smallholder farmers' participation on group farmers and others, on sharing best practices in supporting farmers in strengthening the link between public and private actors in the chain and between farmers and entrepreneurs.

In terms of linkages through contract farming, a number of authors have studied and reported on this area. For example, Patrick (2004) evaluated the benefits of contract farming to smallholders and agribusiness firms in Bali and Lombok, Indonesia. The results of their study showed that contract farming positively contributed to the welfare of the small farmers. In Lombok, contract farming resulted to the increase of returns to capital and participant farmers became better off. However in Bali, contract farming was found to have no impact on the increase of returns to capital but

it contributed to other aspects such as reduction in poverty. Contract farming provided small farmers access to credit and inputs and reduced the risk they faced. Another study on contract farming has been conducted by Anh and Binh (2005) which investigated agriculture contracts by farmers and poor people's participation in northern Vietnam. The study revealed that through small farmer's involvement in contract farming they benefited in terms of the reduction of the cost of production, improved product quality and the reduction of transaction cost.

Miyata et al. (2009) compared contract and non-contract producers of apples and onions in order to explore the constraints on participation and the impact of contract farming on income of farmers in Shandong province, China. The study concluded that farmers that participated in contract farming have more agricultural assets, earned more than non-contract farmers, their crop yields were higher and they received higher price for their product compared to non-contract farmers. The higher price they received reflects the higher quality of the product and this was made possible by the contracting arrangements. In this study, as a result of contract farming, three quarters of participant farmers indicated a rise in income since they engaged in contract farming arrangements.

With regards to the LF2M model of linking through exporters, a study was conducted by Danielou et al. (2003) using the case of exporting Malian mangoes to Europe. The study highlighted the need to promote innovative ways of designing development projects, emphasizing on a multi-sectoral approach (e.g., transportation, agriculture and trade) and on the value of indigenous resources (e.g., social capital). Low et al. (2006) on the other hand looked at linkages through supermarkets. The study investigated local supermarkets which had implemented innovative approach to granting and maintaining access to markets for small scale farmers in Limpopo province, South Africa. The case study illustrated the potential for successful, mutually beneficial cooperation between the commercial sector and small scale farmers. The supermarket not only provided a market for farmers produce but also offered some support and services including training and assistance, offering a stable market for farmers, regular visits by supermarket personnel and providing interest-free production loans to farmers. The commitment and effort from farmers and the

supermarkets is the key for the success of this linkage. However, the main problem faced in this linkage model is related to the access to information on production and the marketing aspect.

Other private sector linkage such as cooperatives and farmer groups was reviewed by Birthal et al. (2007). They explored how farmers can be linked to markets through cooperatives, grower association and contract farming. As a result of farmers' participation in this linkage model the production of their crops increased. However, their links to the emerging markets were not strong. The study concluded that the diversification towards high value food products and the marketing system of food that is moving towards vertical integration implies that greater linkage that is strong between production and the markets is needed.

Apart from models of linking farmers to markets, another aspect that researchers looked at was the nexus between LF2M and ICT. Lightfoot et al. (2008) explored how small farmers can be linked to markets using modern communication technology such as mobile phones, e-mails and the internet using the case of the First Mile Project in Tanzania. The study revealed that by using these technologies, farmers, traders and processors in rural areas are able to learn together how to manage the marketing chain that is profitable from producers to consumers. These communication technologies also enabled small farmers to engage more equally in marketing transactions that is complex and to benefit from the opportunities provided by globalization. A strong farmers' organization and a strong support team in implementing the project were factors that contributed to the success of this linkage.

Other studies focused on identifying market opportunities. Sanginga et al. (2004) identified market opportunities in East Africa. The study highlighted the main steps and procedures in building capacity among farmers, farmer groups and communities. These include identifying and evaluating market opportunities, developing agro enterprises that are profitable and intensifying production, while maintaining the resources in which their livelihoods depend. The study suggested that farmers have the capability to access new market opportunities and develop sustainable linkage that is profitable. However, a number of interrelated facilitating factors need to be

taken into consideration for LF2M to be successful. These factors include effective facilitation by development partners; identification of market opportunities need to be based on participatory approaches; facilitate market visits for farmers; and combine scientific expertise and local knowledge to reduce risk in marketing. A similar study on market opportunities for small farmers has also been explored by Diao and Hazell (2004) in Africa. Diao and Hazell stressed that government and donors must increase their investment in agriculture and the dissemination of technology development. However, they pointed that with the world economy that is now more integrated, the success of productivity-based agricultural growth relies on the expansion of market opportunities. The authors emphasised that to expand market opportunities in Africa it is important to improve the competitiveness of agricultural products in the domestic, regional and international markets (Diao & Hazell 2004).

Samaratunga (2006) used the case of Ma's Tropical Food Company to identify good practices from public and private actors in supporting small farmers' participation in dynamic markets in Sri Lanka. The business model of Ma's Tropical Food Company has brought sustainable benefits to the rural poor. The main aspect of this innovation includes the company working closely with small farmers and operating in various agri-food markets. The innovation performed by the company benefited all the players engaged in the supply chain. For example, through their innovations, corporate income improved, the trade volume increased, more employment was created, and price premium was received which raised farmers' income. In addition, market risk was reduced. The other benefits were that the transport was facilitated; harvesting cost also declined and farmers were trained on quality standards.

Markelova et al. (2009) explored the conceptual issues and empirical evidence on the role of collective action institutions in enhancing access to market for the rural poor. The study found that farmers who marketed their produce collectively reduced the costs of transaction. They are also able to get the necessary information, fulfil quality standards and operate on a large scale. This enabled farmers to sell their produce to the domestic and global markets. Through collective action farmers not only obtain a

good price for their products but also adapt to the global supply chains that always change.

Similarly, Bernard and Spielman (2009) examined the role of rural producer organizations (RPO) in supporting smallholder commercialization in Ethiopia. The study suggested that while such organisations are important, the poorest farmers tend to be excluded from the membership of the cooperative and decision making tends to be focused on the management committee that are less inclusive to the poorest members.

Fischer and Qaim (2011) on their study on LF2M analysed factors influencing the participation of small-scale banana growers on farmer groups and the impacts on farmer groups membership in Kenya. The result of the study also showed that while the groups are mainly inclusive of poor farmers, nonetheless, ownership of land and other agricultural assets as well as access to credit significantly increased the probability of joining a group. Factors that influenced the decision to join a group included the distance and condition of roads and the ownership of mobile phones. The study also revealed that farmers who have a good capacity to adopt and implement innovations and exchange information are more likely to participate in the collective action. Given that group membership contributed significantly to the increase in income for household farmers, particularly for those farmers that collectively marketed their produce, it is important that strategies are put in place to ensure increased participation by small scale farmers.

APAARI (2006) investigated farmers and entrepreneurs best practices in LF2M. The study revealed that farmers could be linked to the markets by grouping them together and providing appropriate technology, skills and access to markets. Berdegue et al.'s (2008) study focused on the key inclusion of small-scale farmers into dynamic national and regional markets. The study concluded that for small farmers to participate in dynamic markets, private sector intervention is needed to promote economic growth in rural areas. Farmers need to act collectively as this can increase their participation in the markets but it is important to facilitate links and develop innovative financial product that serve the needs of SMEs in the development of the

value chain. Moreover, the participation and cooperation of different agents is needed to achieve and sustain the inclusion of small farmers in the dynamic markets.

A study by Rao et al. (2004) looked at the innovative institutional arrangement for the formation of sustainable economic inter-linkages between rainy season sorghum growers and poultry feed manufacturers through a coalition of partners (e.g., researchers, farmers, farmers associations, poultry feed manufacturers and poultry producers). The aim of the arrangement is to improve small-scale sorghum growers income by establishing market linkages with poultry feed manufacturers. The study revealed that the creation of market linkages contributed to shortening the supply chain, farmers operated collectively and had direct links to the industry, and the quality of sorghum can be maintained.

From the studies described above it can be concluded that there are a number of ways in LF2M which includes linkages through contract farming, linking farmers through exporters, supermarkets, cooperatives and LF2M through collective action. Common factors that lead to success from these studies include reduction in risk faced by farmers, better access to training and assistance, reduced marketing costs, improved access to credit and interest-free loans, higher prices received by farmers and a stable markets for farmers. All of these further increased production and product quality, improved farmers welfare, increased returns to capital to farmers, created more employment leading to poverty reduction in rural areas.

### **3.5.2 Studies on horticulture market linkages**

According to Weinberger and Lumpkin (2005) the horticultural sector is one of the sectors that contribute to commercialisation of a rural economy and generating employment in rural areas. However, this sector is often hindered by lack of market access. There is however a number of attempts to link farmers to markets. A number of studies have been undertaken analysing the impact of these models.

Rottger (2004) investigated the linkage between an agribusiness company and local farmers in Kenya. The relationship was to guarantee the quality of horticultural

products demanded by the UK market. Through this collaboration, the company was able to source the total requirements of the product demanded by the market. The benefit for farmers is that market and price was assured, risk was reduced and the latest farming technology and technical extension were provided. This study revealed that small farmers can produce products with good quality as demanded by the market if they are well equipped. Through this partnership, both the farmers and the firms were able to benefit, which lead to an improvement in both quality and quantity of the products, as well as an increase in income and profit of farmers. Despite the benefits, there were also some constraints faced by both farmers and the company. For example, farmers felt disadvantaged in terms of using administrative processes to solve any conflict or misunderstanding that arose in the contract; while the main constraint faced by the company was how to ensure that farmers follow recommended technical instructions so that they can produce the quality and quantity required for the commodity.

Tukan et al. (2006) in their study on tree gardens in Nanggung, Indonesia demonstrated the relative importance of market linkages through local traders via external intervention. To facilitate farmers' access to markets, ICRAF initiated linkage assistance with support from USAID. The program provided training to farmers, conducted surveys, organised visits to markets and traders, production and post-harvest support. The result of the study shows how farmers organize themselves for collectively selling their products and actively linking them with traders. Through the intervention, a high percentage of production has met market specifications and traders now offer a price differential for the products that meet specified grades. This study provided a good example of how external interventions can facilitate linkages between farmers and traders.

Lemelleur and Tozanli (2006) explored how farmers can be linked through a cooperative in Turkey with the focus on FFV marketing. The benefits of farmers working with cooperatives is that there is only one bargainer to address for its sourcing; while at the same time ensuring regular deliveries of produce, sufficient quantity and quality and a fixed place for deliveries. This study showed how linkages

through cooperatives can contribute to increasing farmers' income and also enhance development in rural areas.

The issue of overcoming barriers to markets for high value produce in Ghana was addressed by Danson et al. (2005) in their study on fresh fruit processing company distributing to supermarkets in Europe. To fulfil EurepGAP standard, the company provided extension and training to farmers. Through this, quality products and the processing capacity of the company is increased. With higher prices offered and cash payments on the spot farmers are encouraged to save and reinvest in their farms. The factors that contributed to the success of this linkage include high commitment to work and prompt payment to farmers, ready market for fruits, education and dissemination of information to farmers about EurepGAP standards and certification and infrastructure improvement. Even with no credit provided to farmers, they can still manage and produce high quality product as demanded by the European market.

Ngugi et al. (2006) explored access to high value markets by smallholder farmers of African indigenous vegetables in Kenya. The study sought to identify how small-scale farmers could better be integrated in emerging markets such as supermarkets. The study revealed that good governance, ingrained culture of farming, commitment, access to technical advice, integration into necessary support services, regular and predictable incomes, transparency and accountability and support and backstopping by an agency, are factors that contribute to the successful participation of farmers/groups in dynamic markets.

Other studies on horticulture market linkages include Low et al. (2006) on the integration of small-scale vegetable producers into mainstream agri-food system in South Africa, particularly market linkage through retailers; Wiboonpngse and Sriboonchitta (2004) which looked at the ability of small traders to manage and link farmers to high end markets and how trust is developed; Dunn et al. (2011) which assessed the effectiveness of the USAID project on linking small-scale vegetable farmers to supermarkets in India and Martin and Jagadish (2011) which looked at the role of the lead firm in linking farmers to markets in PNG. In this study, the focus is on the marketer as the lead firm and then analysing the relationship with farmers

engaging in high-value perishable crops. On another study, Bakucs et al. (2007) examined the linkages through cooperative in the fruit and vegetable sector in Hungary. The study found out that cooperatives can be a solution for farmers to cope with problems arising from incomplete pricing mechanism.

Linking horticulture farmers to markets can be done through agribusiness firms, local traders, cooperative, processors, supermarkets and retailers. Factors that lead to success of these linkages include an assured market and price for farmers produce, risk faced is reduced, access to technical advice and extension, commitment to work and prompt payment for farmers, infrastructure improvement, price differentiation for high quality product and predictable incomes. These successes contributed to the enhancement of the development in rural areas, increased farmers income and improved the quantity and quality of farmers' products.

### **3.5.3 Studies on agricultural marketing in Timor Leste**

The agricultural sector plays an important role in the economy of Timor Leste as the majority of the population depends on this sector as the main source of livelihood and employing three quarters of the workforce (MAFF 2008; Lundahl & Sjöholm 2005; Costa et al. 2003). However, there is little attention from government on the marketing of agricultural products. In the past ten years there are only a few studies that have been conducted in the area of marketing aimed at finding out the problems and constraints faced by Timor Leste farmers and providing solutions for marketing produce (Fang 2006). The marketing issues explored in these studies include market feasibility studies (e.g., for marketing infrastructure and vegetable products), market demand studies, studies on the challenges and constraints in dealing with horticultural products, identifying potential agricultural commodities for export, marketing investment in agriculture, and current and future market for beef in Timor Leste.

The market feasibility study was conducted by Rahim (2005) in Timor Leste looking at the marketing infrastructure and economic environment in two districts, Ainaro and Manatuto. The result of the study revealed that the current agricultural production systems were operating on subsistence levels and that the volume of produce available for sale is small. Moreover, there are no major infrastructure investments and virtually zero input costs. In addition, production and management skills are very low in farming communities, the quality of the produce is poor and there is lack of coordination in varietal selection (Rahim 2005). According to the author, farmers grow crops because the seed is available and mostly from seeds retained from the previous harvest. There is no systematic approach of deciding what crop should be grown and what qualities are needed by the market. Farmers also face inadequate communication infrastructure in particular those residing in remote rural areas. The study recommended that there is a need to shift community based production to the community based marketing which focused on specific products.

DeBoer et al. (2004) also conducted a feasibility study of horticultural production. The study examined opportunities to introduce non-coffee commercial export crops in hilly areas in Timor Leste focusing on snow peas. The result of the study showed that the commercialization of snow peas is feasible. Through the cost and return analysis, it was revealed that this commodity could add over \$500 000 in annual exports which are almost 10 per cent of current coffee exports. The study estimated that farmers involved in snow peas production could earn cash income of about \$490 per year, which is far better than per capita incomes in Timor Leste of approximately \$300 per year (UNDP 2006).

DSP-USAID (2006) looked at the demand for horticulture products in Dili. The study found that the demand for local vegetables is four times higher than imported vegetables; and the demand for local fruits and herbs are also higher than imported products. This implies that there is a domestic market for locally produced vegetables. Farmers, the government and the private sector need to respond to available market opportunities. This can be done by working together in increasing the production and quality of the produce, improving infrastructure to facilitate the flow of the produce from local areas to Dili market, and providing an enabling

environment to support farmers. Increasing production and access to market for horticulture produce is important as this sector provides more labour and the value is higher than cereal crops (Wimberger & Lumpkin 2005; Minot & Ngigi 2004; Gabre-Madhin & Haggblade 2003). The study recommended that for certain high value vegetables such as capsicum, tomato, cauliflower, snow peas and lettuce can substitute for limited imports. In addition, Rola-Rubzen et al. (2010b) investigated the challenges and constraints in production and marketing of horticultural products in Timor Leste. The study revealed that the main challenges faced in this sector are low productivity and low quality of the produce which resulted from the low levels of inputs used for production, the poor crop management and post-harvest practices, high transport cost, lack of information and poor product handling. Due to the high demand for local vegetables as mentioned above there is a need for farmers to address the challenges so that they can benefit from market opportunities. For Timorese farmers to benefit from the horticultural industry they should adopt a whole value chain approach. This would need cooperation between the government, the private sector and the farmers. Through this approach, farmers would be able to capture emerging high end markets such as the rising middle class population and foreigners.

Meanwhile Sendall (2006) investigated agricultural commodities produced in Timor Leste that can be successfully exported to markets in West Timor, Indonesia. The identification of potential commodities for export is important as the demand for agricultural commodities in Java continue to increase. This provides an export market opportunity for Timor Leste. Through the export of agricultural products to Indonesia, economic activity in the agricultural sector will increase, which will offer employment and additional income for small and poor farmers in Timor Leste. Sendall's (2006) study showed that mungbean, soybean, peanuts, cattle, garlic, tamarind and cashew have the potential for export. The study also revealed that the production of these products is widespread in Timor Leste and farmers have the knowledge required to produce reasonable yields. In addition, the marketing network for these products already exists.

Following this study, Larsen (2007) explored the value chains for agricultural commodities such as mungbean, peanuts, soybean and cattle and found that all are

considered to have the 'best prospects' for production and development. Through external support to the farmer groups, as well as linking stakeholders in the entire mungbean value chain, potential commodities that have not develop yet can be explored for export and value adding. In addition, the direct supply of soybean from farmer groups to processors will improve the value chain management and logistics, and added value to the entire chain and farmers will be the main benefits. For cattle, the study found that there is a substantial scope for value adding in this industry, as there is a potential for exports. Larsen pointed that the challenge faced in particular for mungbean and soybean is the storage system that is still traditional. Using proper storage facilities will enable suppliers to store produce from one season to the next, meeting the requirement for continuity of supply (Larsen 2007).

Messister (2001) explored agricultural marketing investment in Timor Leste. The focus of the study was on agricultural marketing opportunities and agricultural marketing in general. The study found that there are many challenges faced by farmers in the rural economy of Timor Leste including poor seeds, non-functioning infrastructure and irrigation systems, lack of extension systems, and lack of well-functioning agricultural marketing system as farmers have difficulties in marketing their surpluses. These challenges contributed to the low productivity of crops and access to market for small farmers. The study concluded that one way to support economic recovery in Timor Leste is to find alternative crops and to focus on activities to stimulate production, processing and marketing of agricultural produce.

Fang (2006) investigated the structure and functioning of food international trade and domestic market with emphasis on cereals. The study showed that the introduction of US dollar as the Timor Leste currency has negatively impacted agricultural marketing in rural areas; and 70 per cent of total rice has been imported annually and the price of imported rice has significantly impacted on locally produced rice. As there is a general lack of dollar circulating in rural areas, farmers have no chance to be involved in market transactions. Because of this, barter trade is dominant in rural areas. The reason for importing large quantities of rice into the country is for food security reasons as the domestic production cannot fulfil the demand for rice. However, as the selling price is below the cost of production of locally produced

rice, this has significantly impacted on domestic production. In fact, production of rice dropped from about 60 000 t in 2009 to around 37 000 t in 2010 (RDTL; IMF 2011). Increasing production and the quality of local rice is important as this can stimulate economic activities in rural areas and provide more employment opportunities for rural population.

A beef market in Timor Leste has been examined by Serrao et al. (2010). The study looked at the scope for current markets, the supply chain and their production characteristics. The study identified two main markets for beef products including domestic and export markets. Dili has the largest local demand for beef while Indonesia is the largest destination of beef exports from Timor Leste. The key constraint faced by farmers in marketing is high transportation cost. This is due to poor infrastructure such as roads and the lack of capital.

The studies on agricultural marketing as mentioned above have contributed to the development of the literature on the agricultural sector in Timor Leste. However, there are no specific studies on LF2M for carrots, cabbage and snow pea in Timor Leste.

### **3.6 Concluding remarks**

Linking farmers to markets is an important strategy to increase farmer's income, generate employment, and reduce poverty in rural communities. Many empirical studies show that by becoming involved in the linkages, farmers will have access to markets, improve their skills and knowledge, have better bargaining positions and reduce the risks they face.

Farmers can be linked to the market through private traders, contract farming, cooperatives, supermarkets, retailers, exporters and processors. The contracting arrangements of the linkages can be based on mutual trust, formal written contract agreements, verbal contracts and sometimes complex contracting arrangements. Smallholder farmers can produce quality products demanded by the market if they

are organised and well equipped. To be successful, the partnership in linking farmers to markets should benefit both farmers and the stakeholders; this is likely to lead to an improvement in both the quality and quantity of the product and to an increase in income and profit.

The review of literature in this chapter shows that LF2M has benefited small-scale farmers in terms of increased quality and quantity of products and access to market. This in turn contributed to the improvement of farmer's income; enhanced rural development and employment generation. As a newly independent country, Timor Leste faces a lot of problems including low income of most of the population, unemployment and high rate of poverty. To solve some of these problems it is important to connect farmers to markets. While there have been a number of studies on marketing in Timor Leste, so far there are no studies on LF2M for horticultural crops as yet in the country. Thus, this current study which will analyse LF2M for selected vegetables, an important segment of the agricultural sector in Timor Leste, will fill in this gap.

## **Chapter 4**

### **Review of Approaches for Analysing Supply Chains and Linking Farmers to Markets**

#### **4.1 Introduction**

This chapter is dedicated to a review of the approaches for analysing supply chains. The chapter is comprised of three main topics including qualitative research methods, quantitative research methods and mixed methods research. In Section 4.2, qualitative methods such as case study analysis, focus group discussions, in-depth interviews and participant observation methods are discussed. Section 4.3 on the other hand focuses on the quantitative method, with focus on surveys, the most common approach used in quantitative analysis. Section 4.4 reviews mixed method approaches. The methods are reviewed in terms of the definition, their advantages and disadvantages using empirical examples of research that applied these methods in the analysis of supply chains and models that link farmers to markets (LF2M) and the appropriateness of using each of the approach. Finally, the chapter ends with Section 4.5, whereby, the summary and conclusions for the review are outlined.

#### **4.2 Qualitative research method**

Analysing supply chains and models of LF2M can be done using a variety of methods – using qualitative methods, using quantitative methods or using a combination of both. The qualitative approach includes the case study approach, focus group discussions, in-depth interviews and participant observations.

Qualitative research method is an approach that is usually associated with the social constructivist paradigm which emphasise the socially constructed nature of reality (Teddlie & Tashakkori 2009; Brannen 1992). It is characterized by its aim to

understand some aspects of social life and generating words for data analysis. This approach is also used to capture expressive information not conveyed in quantitative data about beliefs, values, feelings and motivations that underlie behavior (Berkwits & Inui 2009). Qualitative research is about recording, analyzing and attempting to uncover the deep meaning and significance of human behavior and experience. Researchers using qualitative research tend to be inductive which means that they develop theory or look for pattern of meaning on the basis of the data that they have collected.

The main focus in qualitative research is to apprehend, demonstrate, investigate, ascertain and illustrate connection, emotions, perceptions, behaviours, values, notions and proficiencies of a group of people (Kumar 2011). Its primary goal is to generate theory (Bryman 2004; Geertz 1973). Generating the theory assists researchers to demonstrate and generalize the factual data gathered throughout their study to a larger social appearance.

The principle of this method is that it gives participants a certain degree of freedom and permit spontaneity rather than forcing them to select from a set of pre-determined responses and to try to create the right atmosphere to enable people to express themselves. This approach is concerned with developing explanations of social phenomenon to help understand the world. The underlying premise of many qualitative researchers is that the pragmatic content of the social sciences does differ from the pragmatic content of the natural sciences. Bryman (2004) pointed out that numerous qualitative studies offer a specific assessment of what goes on in the surroundings being examined. Consequently, it appears to be full of possibly little details. However, the details are important because of their sense for their content and also because the specific offers an assessment of the atmosphere within which people's action takes place (Bryman 2004).

When utilising the qualitative method, researchers start with defining a concept in very general terms and, as the research progresses, they change the definition (Bryman 2004). This strategy leads to a greater understanding of the content and context of behaviours and the procedures that take place within the patterns of

interrelated factors which can be observed (Finch 1986). Qualitative method looks at the concepts and categories, not their incidence and frequency (Brannen 1992). This method is typically associated with analytical induction. In addition, one of the primary arguments why qualitative researchers are keen to offer significant narrative points is that they usually stress the significance of the contextual appreciation of social attitude (Brannen 1992).

In addition, the study design in qualitative research are grounded on deductive, instead of inductive logic, are flexible and emergent in nature, and are often non-linear and non-sequential in their relationship (Kumar 2011). This predominantly entails the selection of people from whom the information, through an open frame of enquiry, is explored and gathered. The methods used in qualitative research include ethnography, interviews, focus groups, case study, grounded theory, content analysis and participant observation (Hesse-Biber & Leavy 2011; Bryman 2004).

#### **4.2.1 Case study method**

Berg (2004) and Yin (1994) defined case study research as factual investigation that investigates a coexistent phenomenon within its real-life context. This involves collecting sufficient information in a systematic way on a particular person, group, or event, to facilitate researchers in understanding effectively how subjects are operating and functioning. This method also involves a time frame that is shared with the panel, trend and experimental designs and the emphasis is on detailed and deep data (Hessler 1992). Majority of the case studies research are done to establish an understanding of a complicated issue and expand knowledge about the things that are already known about previous research (Gable 1994). This highlights the contextual analysis in detail of a defined number of cases and their associations. The case study method is widely used by social scientists, particularly in examining contemporary situations in real life and providing a basis for the application of ideas and extension methods.

According to Hessler (1992), a case study is the best method that can be applied to generate research questions and to help a social scientist formulate concepts and theory. A case study is a basic arrangement that can coordinate a diversity of disciplinary views, as philosophical views on the nature of research itself (Merriam 1988).

The case study approach significantly varies from broad field studies to a single individual or group interview. The focus of a case study can be on an individual, group and community as a whole and may use a number of data collection techniques including life histories, documents, oral histories, in-depth interviews and participant observations (Hagan 2002; Yin 1994). Indeed, applying a range of data gathering techniques and approaches gives a more rounded and broad study than any other single arrangements.

According to Tellis (1997a) and Yin (1994), there are several designs for case studies including exploratory, causal and descriptive case studies. For exploratory design, field work and data gathering may be done before defining a research question. This design may be applicable as a preliminary study; for example, when planning a larger, more integral inquiry. Meanwhile, causal studies are areas where researchers can use explanatory case studies; whereas in descriptive case studies, an investigator is required to present a descriptive theory which demonstrates a comprehensive framework for the researcher to follow.

The use of various sources of validation allows case studies to provide a more rounded and comprehensive record of social issues and processes (Yin 2003). According to Hakim (1987) one of the most powerful research designs is the case study. This is because a case study provides rigorous and deep understanding of the investigated phenomena from the perspective of participants through an inductive approach (Yin 2003; Parkhe 1993; Bonoma 1985).

In selecting cases, researchers need to consider the purpose of the research. Denzin and Lincoln (1994) identified three categories of case studies: intrinsic, instrumental and multiple case studies. Researchers conduct an intrinsic case study because they

want a good understanding of the specific case. The case study is not conducted initially because the case portrays other cases, but because the case itself is of interest. On the other hand, an instrumental case study is undertaken to examine and provide perception into an issue of the theory. The case plays a supplementary role and facilitates an appreciation of something else. Multiple case studies are a study of various cases in order to investigate a phenomenon, population, or general condition.

In terms of the research design, case studies are composed of four components which includes the question of how and why and their definition, its prepositions, the unit of analysis and linking the data to prepositions (Yin 1994). The study prepositions sometimes emerge from the questions of how and why, and this is favourable in concentrating the goal of the study. Indeed, prepositions do not need to apply to all studies. The unit of analysis is the primary unit of analysis and this could be groups, organizations or countries. The last aspect to be developed in the case study is how to link the data to the preposition.

Case study research is applied by many people in many different ways. Keny and Grotelueschen (1980) suggested two preconditions that can help a researcher decide on the appropriateness of using a case study. Firstly, the case study can be considered appropriate when the desired projected objectives focus on humanistic results or on the differences in culture; and secondly, when data gathered from participants is not subject to reliability or misinterpretation but can be subject to examination on the grounds of plausibility. Hakim (1987) pointed out that selective case study can focus on particular aspects, or issues, to refine knowledge. For instance, case studies can be used to provide a more richly detailed and precise amount of the processes at work within particular types of cases highlighted by surveys. A design based on a large number of case studies is especially appropriate for topics that are too complex and involve too many actors to be addressed by an interview survey (Yin 2003). Case studies also may be applied for theoretical and policy research, including the study of individual case histories, communities' studies, studies of social groups, case studies of events, roles and relationships (Yin 2003; Rowley 2002; Perry 1998; Stake 1994; Eisenhardt 1989a). Furthermore, case study can also be useful in studying relationship amongst players engaged in the

supply chains for a particular commodity (Hoffman 2007; Vinning & Young 2006; Jensen & Rodgers 2001). Single cases are used to verify or question a theory or to portray a particular or ultimate case (Yin 2003; 1994). The case study approach is also ideal for exposure cases where viewers may have access to a phenomenon that was not accessible earlier (Stake 1995; Eisenhardt 1989a).

Case studies can also be used in evaluations. The reasons why researchers choose case study design when doing an evaluation are because the case study can be an important approach when the future of a programme is conditional on an evaluation being worked and there are no sensible indicators of programmatic achievement which can be implemented in terms of behavioural objectives (Yin 1994). An additional reason is that the case study method is suitable when the objective of an assessment is to evolve a good understanding of the dynamics of a programme and the case study design can be supported as the common language approach to evaluation (Keny & Grotelueschen 1980). For example, to evaluate how institutional arrangements support smallholder farmers to overcome barriers to market participation in northern Vietnam, the case study approach was used by Lapar et al. (2006).

Case study method is a very useful research method because it provides an expanding generalization of the theory through the combination of the existing knowledge with new empirical insight (Yin 2003; 1994). This method is also useful in developing new, testable and empirically valid theoretical and practical insights (Eisenhardt & Graebner 2007; Ghauri 2004; Voss et al. 2002). The method is very helpful for discovery, description, building relationship and testing the theory (Gummesson 2005), illustration (Siggelkow 2007) and development of the hypothesis (Tellis 1997b). In addition, this method can help researchers to predict and identify further needs of the research (Siggelkow 2007; Woodside & Wilson 2003). Another strength of the case study method is that it helps discover causal relationships, provide an understanding on how and why everything happened in a particular way and the phenomenon of the natural settings is easy to read and understand (Gummesson 2006; Patton & Applebaum 2003; Jensen & Rodgers 2001; Yin 1994; Dyer & Wilkins 1991). Other strengths of the case study method are that

the case study data can be collected over a long period of time (Ghauri 2004; Stuart et al. 2002; Yin 1994) and it can be gathered from a number of levels, perspectives and sources (Gummesson 2006; Dubois & Gadde 2002; Tellis 1997a). Furthermore, this method enables research to be conducted in countries where the sample base is too small for using statistical generalization (Daniels & Cannice 2004; Chetty 1996) and it is also possible to generalize from one case for theory building and testing (Stuart et al. 2002; Dyer & Wilkins 1991; Bensabat et al. 1987). Gable (1994) added that the case study approach is a relatively adjustable method of scientific research and it emphasises on context; which means case study specialises in the prescription of data that is deep and thick.

Despite the strengths of the case study method mentioned above, critics of this approach argued that the case study method is more time consuming and labour intensive (Voss et al. 2002; Nieto & Perez 2000; Simon et al. 1996; Leonard-Barton 1990). According to some, it is difficult to generalize individual cases and they cannot be controlled statistically (Patton & Applebaum 2003; Jensen & Rodgers 2001; Yin 1994; Lee 1989). In addition, the time and financial constraints may limit the number of selected cases and interviewees (Stuart et al. 2002) and during interviews the respondents may present their past decisions and actions in a very favourable manner (Vissak 2010). Another weakness of this method is that an intensive use of evidence can lead to overly complex, wide and descriptive theory without any clear focus (Eisenhardt 1989a). Further, the case study method is too subjective and relies upon personal clarification of data and consequences and this rarely provide a problem-solving prescription (Gable 1994).

Case studies have been extensively used in supply chain analysis and linking farmers to markets. Some empirical examples on the application of the case study method are as follows. Lynch (1999) utilised the case study method to analyse key influences of commercial horticulture in rural Tanzania. The study sought to establish why farmers choose to produce horticulture for sale and investigated the ways the product goes through the supply channels to the market. Zuhui et al. (2007) applied a case study of a watermelon cooperative for analysing collective action by small-farm households in large markets. An in-depth study was conducted and this included a

description on how the cooperative was innovated and evolved, and the way in which the cooperative was run, including organizing, marketing and distribution. Similarly, Danielou et al. (2003) explored and analysed linking farmers to markets using the case of Malian mangoes export to Europe. A case study was also used by Ngugi et al. (2006) to examine smallholder vegetable access to high value markets in Kenya. For this study, structured questions were used in the data gathering and this was collected through the interviews. Juhasz and Kurthy (2006) also used a case study to define the SME poultry farmer's conditions of inclusion and exclusion in the Hungarian supply chain using the case of Agricultural and Processing Cooperative.

#### **4.2.2 Focus group discussion**

Focus groups are a form of strategy in qualitative research in which views or perspectives concerning an issue, product, service or program are explored through a free and open dialogue between members of a group and the researcher (Kumar 2011; Fern 1982a). McDonald (1994), Lengua et al. (1992) and Basch (1987) define focus groups as an interview approach designed for small groups. By applying focus group approach, researchers seek to learn through discussions about apprehensive, semi-apprehensive and inapprehensive psychological and socio-cultural characteristics and processes among various groups. According to Pelto (2002) focus group discussion is a popular method of obtaining information. This is because the researcher can get a small group reaction and ideas about a specific topic of interest. In focus groups, the goal is “to let people spark off one another, suggesting dimensions and nuances of the original problem that any one individual might not have thought off” (Rubin & Rubin 1995, p.140).

A key element of focus group discussion includes a moderator, a set of questions, a number of recruited participants and a predetermined time and place within which the discussion takes place (Farhana 2010; Setor 2009; Bruseberg & McDonagh-Philp 2002; Morgan 1998a). The interviews in the focus group can also be guided and unguided dialog and address specific topics of interest to the researcher and the

group (Edmunds 1999). Berg (2004) adds that the informal group discussion setting of the structure of focus group interviews tend to inspire subjects to freely talk about behaviours, attitudes and ideas they retain. Focus group discussions also provide a means for gathering qualitative data where a one-shot collection is required. According to Setor (2009) focus group discussions can be used as a primary research method or in conjunction with other methods, such as interviews and surveys.

Applying focus group discussion as a research approach for gathering data offers a number of benefits for researchers. For example, this method is highly flexible and allows observation and interactions between participants and the researchers (Stewart & Shamdasani 1990; Berg 2004). This method also permits researchers to access significant content of verbally precise views, ideas, experience and attitudes and the information gathered can be detailed and rich (Kumar 2011; Berg 2004). Other benefits are that this approach permits researchers to observe social interaction in a setting of their own construction which can be done with less time and cost (Setor 2009; Krueger 1994). In focus group discussion, participants generally interact more between them instead of the researcher and they are able to change the topic of the discussion and question.

In spite of the strengths of focus group discussions, this method has been often criticized. The weakness of this method is that the technique used is subjective and there is no consistency of the results across groups (Winters 1990; Fern 1982a; Calder 1977). In addition, the method does not really provide the same depth of data as semi-structured interviews, offer less observational data and is unable to produce significantly more or better ideas (Berg 2004; Fern 1982). According to Kumar (2011), if the discussions are not carefully directed, focus groups may reflect the opinion of those who have a tendency to dominate a group. Further, focus groups are not appropriate for investigating sensitive topics and it is not the best way to collect individual levels of data and learning people's life story in depth (Setor 2009).

Focus group discussion is a popular method for finding information in almost every professional area and academic field. Social, political and behavioural scientists, market research and product testing agencies often use this design for a variety of

situations (Kumar 2011). For example, in marketing research, this method is widely used to find out customer opinions of, and feedback on, a product, their opinions on the quality of the product, price and packaging.

Focus group discussion is a well-established method of getting various parties' understanding of views on particular issues through dialogues. This method is also a well-established technique in market research for designing new products (Savage et al. 1995), as well as for human factor research and usability in education (Jordan 1998). Focus group discussions have been applied to study various social and scientific phenomena (Berg 2004). For example, Ribich (1998) utilised focus groups to study teacher's reactions to the gifted student concept; Berg (2000) conducted focus group interviews with Latino teenagers to determine their views about managing their asthma; Fongwa (2002) examined perceptions of quality of health care among a population of African Americans; Morgan (1997) and Bartos (1986) used focus group to study marketing; and a study conducted by Callahan (1983) applied group interviews to identify women who become psychologists and their attitudes regarding their mobility amongst the working class.

This method has also been applied to a number of studies in the field of supply chain and LF2M. For example, Manilli (2003) utilised focus group discussion to identify appropriate ways for vegetable farmers to better link to the market in the Philippines. Meanwhile, Zhang et al. (2009) used focus groups to gather information for their analysis of the Chinese apple chain from the global supply chain perspective.

### **4.2.3 In-depth interviews**

One of the data gathering methods employed by qualitative researchers is in-depth interviews, which is also known as intensive interview. This method is important in qualitative research because in-depth interviews use personal information as the starting point of the research process and accepts that persons have distinctive and important awareness about the social world that can be combined through oral

communication (Hesse-Biber & Leavy 2011). In-depth interview is a process of communication that involves asking, listening and talking. This method is also a specific kind of discussion between the interviewer and the interviewee that requires an active asking and listening process. The process in the in-depth interview strives to develop a partnership between the interviewer and interviewee, focused on content.

In-depth interview is generally less time-consuming than field work. According to Warren (2002) when the topic under investigation is not linked to a particular setting, but can be ascertained from individuals in a pre-arranged setting, in-depth interviews may be appealing and appropriate. Hesse-Biber and Leavy (2011) argued that the method can be used to yield exploratory and narrative data that may or may not induce theory. Likewise, in-depth interview can be used as a stand-alone method or in conjunction with a range of other methods such as surveys and focus groups.

Generally, researchers who administer in-depth interviews are looking for patterns that appear from the deep narration of social life described by the participants. In this sense, Johnson (2002) comments that qualitative interviews are designed to ascertain deep information or knowledge. As a result of this, in-depth interviews yield large aggregates of data in the form of interview transcripts which are later reduced in the analytical and interpretative process (Hesse-Biber & Leavy 2011). The method produces knowledge that is “contextual, linguistic, narrative and pragmatic” (Kvale & Brinkmann 2009, p.18).

Hesse-Biber and Leavy (2011) pointed out that an in-depth interview is applicable when the researcher has a discerning title that they want to stress on and attain data from individuals. This method typically occurs in one session per interview, centred on a specific topic in which the researcher is interested. The goal of the interview is to gain rich qualitative data on particular subjects from the perspective of selected individuals. In-depth interview is also very useful for accessing subjugated knowledge (Reinharz 1992). For example, those who are marginalized in a society may have hidden experiences and knowledge that have been excluded from the mainstream use of quantitative research methods. Interviewing is a way to access

some of this information. Reinharz further commented on how interviewing is one of the ways feminist researchers have attempted to access knowledge hidden by women. Interviewing also provides access to people's aspirations, concepts, and memories in their own words instead of the words of the researcher.

The advantage of in-depth interviews, according to Bryman (2004), includes the discussion of issues that are resistant to observation; they are less intrusive on people's lives; this method is easy to conduct longitudinal research; greater breadth of coverage; and the focus is specific. Other advantages include that this method offers interviewers and interviewees time and space to explore issues thoroughly; in-depth interview is useful for collecting a range of opinions on a topic. It is particularly useful for investigating personal, sensitive, or confidential issues which informants might find difficult to disclose and discuss in a group interview or focus group discussion (Longhurst 2009; Patrick et al. 2008; Yin 2003). In-depth interviews are also helpful for investigating into and seeking to understand complicated attitudes, experiences and views (Longhurst 2009).

Despite the advantages of in-depth interviews as mentioned above, there are also some disadvantages to this method. This includes that the method is very time-consuming as it can take days, even weeks, to conduct and prepare for the interview. Recruiting participants, formulating a schedule of questions and organizing time and space all add up to many hours of labour (Marvasti 2010; Longhurst 2009).

The study design of the in-depth interview may be highly structured, semi-structured, or less structured depending on the question of the research and the goal of the researcher. Highly structured interviews mean that the researcher will ask each participant the same series of questions, whereas semi-structured interviews depend on a particular set of questions and try to control the discussion. Finally, less structured interviews are completely open-ended interviews. Anderson and Jack (1991) explained that the heart of qualitative interviews needs much reflexivity, which is discerning to the important conditional dynamics between the researchers and research that can influence the existence of knowledge.

Empirical examples show that in-depth interviews have been applied by a number of authors in particular in the area of food, supply chains and marketing studies. For example, to investigate food-related issues, especially vegetarianism, Lupton and Keil (1992) conducted 73 unstructured interviews in the East Midlands; while Lupton (1996) used 33 semi-structured interviews to find out food preferences for communities living in Sydney. Another study was done by Rafaeli et al. (1997) looking at the significance of dressing at work place. To gather information on this issue, Rafaeli et al. interviewed 20 female administrators in a university business school. In addition, by applying in-depth interviews Zhang et al. (2009) explored whether farmers involved in apple supply chains received higher profits compared to other farmers. Further studies using in-depth interviews was carried out by MAC (2008) looking at the functioning and dynamics of value chains for high value commodities in Nepal. In this study, in-depth interviews were conducted with a key informant and a number of players at different stages of the market chain.

#### **4.2.4 Participant observation**

Participant observation is a strategy for gathering information about a social interaction or phenomenon in qualitative studies. This method is originally associated with anthropological field work, but is increasingly used by human geographers as part of the ethnographic approach (Schostak 2010; Walsh 2009; Fine 2004). This method claims special access to insight and understandings concerning the lives of individuals, groups, communities and peoples. Participant observation is usually done by developing a close interaction with members of a group or 'living' in the situation which is being studied. By doing this, the researchers can learn about a particular socio-cultural space and those who inhabit it by taking part and continually reflecting on what is happening. This method demands the establishment and on-going negotiation of social relationships for eliciting findings (Walsh 2009) and the quality of these relationships is understood to be critical to the success of the research.

Walsh (2009) stated that participant observation involves examining what people do, rather than only what they say they do. Because of this, therefore, this method differs from pure observation and full participation. The differentiation of participant observation with other methods (e.g., case study, group discussion, survey) is the sensual, emotional and embodied experience of the research being incorporated as a significant part of the research (Walsh 2009). Schostak (2010) describes witnessing what happens and acting alongside others in the research process makes participant observation more than just a method or technique for data collection. This means that the participant observer is part of the data itself; that is, the researcher is responsible for how this data is to be represented, analysed, interpreted and used. Joining with the others is also means getting to know the participants, getting to know their values and the reasons for their behaviour. Despite the fact that participant observations are important in anthropological fieldwork, this method has traditionally been a peripheral methodology in human geography enquiry (Kumar 2011).

At present, participant observation is employed in any research, methodological perspective or discipline in order to gain a perspective on the lives of others (Schostak 2010). Walsh (2009) adds that it is generally accepted that participant observation has the possibility to be used in the majority of field settings, but the ease of gaining and maintaining access will vary considerably.

Using participant observation in the research process offers a number of advantages. This includes the richness of the data and the improvement of the validity of the analysis (Walsh 2009). Rich data can allow an intense depiction that produces a fullness of understanding; while validity analysis of the findings brings one closer to the depiction of the scene. Other advantages are the interpretative understanding of the method which is related to the direct involvement of the researcher in the activity (Fine 2004). In addition, conducting participant observation is not expensive as the the researchers are the only members of the project so they can set the terms of their own involvement.

As participant observation relies on a single study to examine one scene, there are problems faced in the generalization which is the major weakness of this method (Walsh 2009). Because of this dependency, this approach raises questions about the nature of proof or reliability. Another weakness is that participant observation may be biased as it is reliant on the understanding of a specific scene, and hence this method is time consuming (Fine 2004). To note a full range of activities in which participants are engaged with, the researchers must spend sufficient time in the scene.

#### **4.2.5 Advantages and disadvantages of qualitative research methods**

Qualitative research is in stark contrast to quantitative research because qualitative method is done from a distinctive classification of epistemological purposes including positivism, post-positivism, interpretive, feminist, post-modernism and critical viewpoint (Geertz 1973). Qualitative method provides researchers a wide range of choices and the design is clear that researchers contribute to research premises that will finally influence the qualitative approach and results. Qualitative method also permits deep narratives and detailed clarifications of social processes, and the generation of theory on both narrow and broad levels of analysis (Bryman 2004). Further, qualitative research permits the researchers to seek and respond to a broad range of socially appropriate questions and evolve theories with both narrative and explicatory power (Bryman 2004; Geertz 1973).

Brannen (1992) considered qualitative research as a profound standpoint which depends on case studies or facts derived from individuals or discerning situations. The perspective on qualitative research is that this method is a process which investigates the processes behind the associations that can be observed between components, charts individual results and investigates the content and context of individual attitudes (Finch 1986). According to Brannen (1992), qualitative research method has been impressed by an epistemological position that negates the relevance of a natural science strategy to the study of humans. This research method tends to oversee social life in terms of processes (Bryman 2004).

There are however, disadvantages of using qualitative methods. As pointed out by Bryman (2004), some of the common critiques regarding the use of qualitative research are as follows. Firstly, the subjectivity of the qualitative research method; i.e., qualitative judgements depends more on the perspective of the researchers' that is not systematic about what is considered important, and also on the close individual relationship that the researcher consistently develops with the participants. Secondly, a qualitative study is difficult to replicate. This is because the method is not structured and often depends on the researchers' imagination. Therefore, in qualitative method, it is practically not possible to administer a real duplication, as long as there are hardly any standard processes to be followed. Thirdly, the problem of generalization; i.e., when participant observation or an interview that is not structured is administered with a small number of individuals in a particular organization or location, it is not possible to know how the judgements can be generalized to other contexts. Fourthly, lack of transparency; i.e., qualitative method is occasionally not easy to demonstrate from qualitative research what the researchers' really did and how they came to the conclusion of the study. Hence, qualitative data analysis processes are also consistently not clear (Bryman & Burgess 1994a).

The above studies show that qualitative methods have been used in analysing supply chains and market linkages. One of the advantages of qualitative methods for studying supply chains and LF2M is its suitability for obtaining in-depth information which is important in understanding the effectiveness of market linkages and for seeking information on current models of LF2M that exist in Timor Leste. This method is useful for analysing supply chains. However, it cannot provide quantified scores or information. In addition, the long narratives provided by the qualitative method can lead to subjectivity. Thus, quantitative research approach is also needed. Through the quantitative approach, the qualitative insights (e.g., from in-depth interviews, focus group discussions & case studies) can be quantified which will allow the researcher to answering some of the research questions in the study.

### 4.3 Quantitative research method

Quantitative research method is described as a technique related to the collecting, analysis, clarification and presentation of numerical data (Teddlie & Tashakkori 2009; Creswell; Johnson & Christensen 2008). In broad terms, quantitative research is defined as containing numerical data collection and displaying a perspective of the relationship between theories and researches as *a priori*, a prognosis for a natural science technique and as having an objectivist notion of social certainty (Johnson & Christensen 2008; Bryman 2004). Quantitative research method is commonly used in research models in natural science research and, in particular, its form of positivism (Creswell 2008; Brannen 1992).

The most common method to gather data for quantitative research is through surveys. The survey method involves the application of dimension strategy to the nature of the issue under review, as well as to collecting and analysing the data. According to Dale et al. (2008), Rungtusanatham et al. (2003) and Brannen (1992), the survey methodologies embraced include intensive surveys which can account for large issues, the integration of a range of components, and the inclusion of a large geographical expansion of representative samples and a focus on group results. Brannen (1992) added that this technique can offer a comprehensive survey of the data and relate distinctive factors. This method can also concern the incidence, epidemiology and limitations of problems of the situation under review. Quantitative researchers infrequently simply explain how things are, but also describe why things are the way they are. This emphasis is also often taken to be a feature of the ways in which the natural sciences proceed.

Critiques of the use of the quantitative research methods argue that quantitative researchers fail to differentiate people and social corporations from the world of nature (Bryman 2004). They also criticize the dimension process that retains an unrealistic and false sense of perfection and delicacy (Creswell et al. 2006). Bryman (2004) asserted that the correlation between the standards evolved by social scientists and the abstractions they are supposed to be discovering is presumed rather than real. Another criticism of quantitative methods is that this approach depends heavily on

managing research tools to subjects or regulating situations to decide their effects (Creswell 2008; Creswell et. al 2006; Brannen 1992). This dependency impedes the connection between research and everyday life. A further critique is on the relationships analysis between variables which generate a view of social life that is independent of people's lives (Johnson & Christensen 2008; Creswell et al. 2006; Bryman 2004).

In terms of methods used in quantitative research, the techniques are related to social survey approach, including structured interviews and self-administered questionnaire, experiments, structured observation and content analysis (Fink 2010; Bourque & Fielder 2004).

Survey method is one of the most powerful data gathering methods in the social sciences (Frohlich 2002; Scudder & Hill 1998; Frankford & Nachmias 1996; de Vaus 1991; Flynn et al. 1990). This method is used broadly to gather information on various subjects relating to research. Scholars, government officials and commercial interests in developing countries are increasingly recognizing that survey research provides the only means by which systematic information can be collected and analysed for a wide range of purposes (Dale et al. 2008; Rungtusanatham et al. 2003; Bulmer & Warwick 1993; Nachmias et al. 1992; Parten 1965). In recent years, with public demand for government accountability, the emphasis on survey instruments has increased and survey research is becoming a widely used tool of various government organizations (Presser & McCulloch 2011; May 1997).

According to Fink (1995) and Baker (1994), a survey is a system for gathering data to explain, correlate, and foresee attitudes, ideas, values, knowledge and behaviour. Baker and Fink also noted that the collection of data is undertaken through a precisely determined group of individuals which are requested to respond to a number of distinctive questions. A survey often begins by identifying a number of individuals considered representative of the group to be studied and by deciding what questions they should be asked (Nachmias et al. 1992; Parten 1965). The purpose of the survey is simply to provide someone (e.g., government, businesses, research institute) with information (Moser & Kalton 1989). However, a survey may equally

have a purely descriptive purpose, as a way of studying social activities, relationship and behaviour (Nachmias et al. 1992; Malhotra & Grover 1998; Dubin 1978). The coverage of a survey can vary from a number of case studies to a comprehensive enumeration, from cautiously selected samples, to an unlimited collection of volunteers.

Fink (1995) provided the following features as the best survey information. These include that the objectives are specific and can be measured, good design of the research, valid choice of population or sample, tools are valid and reliable, applicable analysis and the results of the survey is accurately reported. Meanwhile, de Vaus (1991) and Baker (1994) explained the general components of survey research as including modes of eliciting information (e.g., using questionnaire and giving interviews), mode of selecting respondents (e.g., consideration in choosing the respondent) and modes of returning information (related to clear instructions as to how it is to be returned).

Hart (1993) and May (1997) proposed two types of social surveys - descriptive surveys and analytical surveys. Descriptive survey is a common type of survey in which the investigator is interested primarily in discovering information or patterns of information. The prime focus of such survey is to gather data which will inform the investigator and the readers of the research report. Meanwhile, analytical survey is a type of survey that is specifically designed to throw light upon a research hypothesis. Analytical survey is the type of survey that might be employed by an academic researcher or by a professional who is particularly interested in trying to unravel patterns of causation.

According to Chadwick et al. (1984) and Baker (1994) there are two primary ways of administering a survey; through interviews and the use of questionnaires. Conducting an interview, for example, can be done by telephone, in a group setting or face to face between the respondent and the interviewer. The specific questions that need to be asked in an interview may be highly structured or may be unstructured.

A questionnaire on the other hand may be organised in large groups in a room and other settings and may also be sent by mail to respondents in which they will be asked to complete in private and return by mail. Alternatively, a questionnaire can also be delivered by hand to the respondents. The question of whether to use a questionnaire or an interview will depend on the circumstances of the particular project including time involved, resources available, the type of respondents, the coverage, the length and the general purpose of the research.

When the researcher plans to conduct long interviews with a representative sample of the general population and wishes to control for non-verbal behaviour, a personal interview survey can be used (Frankfort & Nachmias 1996). Meanwhile, Doyle (2006) commented that if sensitive information is involved in a survey which makes people reluctant to talk about it, then mail surveys will generally be used. Mail survey is also more appropriate to use when dealing with complicated questions contained in a survey with many different options for answers which may require long explanations. For surveys with complex or technical questions, face-to-face interviews may be more appropriate.

Hakim (1987) pointed out that surveys are regularly used to provide narratives on national or local statistics, particularly on issues not covered by the census of population. Surveys are also used increasingly for highly focused studies of particular social groups or of narrowly defined issues. This method can also be used to obtain information about events that have occurred previously and that now exist primarily in the memories of those to be studied (Chadwick et al. 1984). For example, farmers can be asked to provide information about their crop production in the last two years and where they market their produce. Because the data can be collected from large samples of respondents, surveys are frequently used when the researchers prefer to generalize their findings from a sample to a large population. Furthermore, surveys can also be used to test accepted explanation, or theories and to develop new ones (Baker 1994). According to Baker, surveys must be limited to the study of questions to which people can, in fact, give answers.

Surveys can be effective and applicable instruments for gathering information on characteristics, attitudes, thoughts and the behaviour of human beings (Manson & Dale 2011; Becker et al. 2005; May 1997; de Vaus 1991). There are a number of important reasons why survey research methods serve as a basis for a very large proportion of the research carried out by social scientists. One reason is that a survey is a relatively inexpensive method (May 1997; Becker et al. 2005). It is also easily organised; a survey can be organized using mail, email or telephone from remote locations (de Vaus 1991; Chadwick et al. 1984). Another advantage is that surveys can be administered in a feasible way for a large sample size (Manson & Dale 2011; Dale et al. 2008) and it is also substantially flexible to the analysis (Becker et al. 2005). The standardized questions in a survey make measurement more precise and the study can be repeated in different locations at the same time (Chadwick et al. 1984). Moreover, the approach facilitates systematic refinement of survey methods, techniques and the development of theoretical work. Finally a survey has high reliability and relatively easy to obtain as it is relatively easy to encourage people to participate (Becker et al. 2005). According to Hessler (1992), this method is best suited for the study and analysis of industrial society's problems, which require the study and analysis of massive amounts of data.

The fact that a survey provides the best method for collecting certain types of data does not mean that this is the best research tool available (May 1997; de Vaus 1991; Chadwick et al. 1984). According to a number of authors the disadvantages of the survey are as follows. Surveys generally are very restricted as they depend on highly structured questionnaires (de Vaus 1991). As a result respondents do not have the chance to challenge ideas on their own terms and they need to answer to pre-defined questions (Manson & Dale 2011; May 1997). According to May (1997) and Chadwick et al. (1984), it is difficult to establish casual relationships with correlational data and getting meaningful aspects of social behaviour with surveys. Another weaknesses of survey research is that the method relies on the data from self-reports (Chadwick et al. 1984). Therefore the result of the survey depends on participants properly reporting their attitudes and characteristics. Finally, surveys are costly in terms of time and resources, and it takes time to implement and analyse (May 1997; Hessler 1992; de Vaus 1991).

Despite the disadvantages of the survey as mentioned, Doyle (2006) argues that these do not suggest that a survey is not an effective research tool. There are plenty of studies using survey method in the collection of data on market linkage studies. For example, Patrick (2004) used survey in a study on the understanding of contract farming in Indonesia. Surveys were undertaken in the study areas and farmers involved in contract and non-contract farming were interviewed. One-on-one basis interviews were conducted with heads of households. In another study, the Asian Development Bank (2005) used a survey of rice farmers in Vietnam to better understand the attitude of farmers and buyers in terms of using contract markets and the possible sources of contract failure. Survey was the method used with farmers, traders and millers who directly bought the product from farmers. Masakure and Henson (2005) also conducted surveys on small scale farmers in Zimbabwe who decided to produce under contract. Interviews were completed with company personnel, government officials and key informants and in-depth interviews were conducted with a group of contracted small farmers. Low et al. (2006) applied survey in their study on incorporating small scale producers into mainstream agri-food systems in South Africa. The study was conducted based on face-to-face interviews with the manager of the supermarket, discussions with farmer's groups and telephone interviews. The latter was conducted to determine progress, success level, and whether this study could be duplicated. Semi-structured questionnaires were used as a guide in the interview and focus group discussions.

A study by Boys et al. (2007) on the impact of cowpea research on the economy in Senegal also used survey in their data gathering process. The survey instrument development was based on the literature, discussion with the expertise and reflection of the particular objectives of the study. For this research, a framework of semi-standardized interviews was chosen. In this study, the interviews were conducted using the most common language in the region and responses were recorded for data input and analysis.

These empirical examples of using survey method indicate that this method has been widely used in collecting data in the agricultural sector, particularly with studies on market linkages and supply chains which is the focus of the current research. Most of

the studies involved household farmers, traders, processors, government agencies, agribusiness firms and managers of supermarkets.

Studying LF2M involves a number of stakeholders (e.g., farmers, traders, retailers, wholesalers, private sector actors and government agencies). To gain information from these stakeholders it is important to the researchers to hear their voices directly regarding linkages issues through the discussions and interviews. However, the quantitative research method alone is not able to cover the context or setting in which people are talking and discussing. Because of this participant voices are not taken into consideration well in the research process.

#### **4.4 Mixed methods research**

To have a good understanding of the problem of a single study, combined quantitative and qualitative data can be used to gather and analyse the research data using mixed methods research (Creswell 2005; Tashakkori & Teddlie 2003). According to Creswell et al. (2006) mixed method research is a research strategy with theoretical propositions as well as a method of investigation. As a methodology, this method comprises theoretical assumptions that direct the instruction of the assortment and analysis of data and combines qualitative and quantitative techniques. As a method, it is focussed on gathering, analysing and combining both qualitative and quantitative data in a single study. According to Jang et al. (2008), Brewer and Hunter (2006) and Creswell (2005) two separate but linked studies which are specific from one another can use combined (quantitative and qualitative) methods in all phases of the research process. Alternatively, combined methods can be incorporated in one study and the linkages can happen in the field or in the data analysis or in the stage of the writing-up process.

Johnson et al. (2007, p.123) considers mixed method research as “the type of research in which a researcher combines elements of quantitative and qualitative approach for the purpose of breadth of understanding or corroboration”. Tashakkori and Creswell (2007, p.4) define mixed method research “as a procedure for collecting, analysing and mixing or integrating both qualitative and quantitative data

at some stage of the research process within a single study for the purpose of gaining a better understanding of the research problem”. These definitions clearly highlight the use of a combination of quantitative and qualitative methods in conducting a single research and this may be conducted simultaneously or consecutively. The philosophical orientation most often associated with mixed method is pragmatism (Morgan 2007; Bryman 2006b; Johnson & Onweuegbuzie 2004; Maxcy 2003; Tashakkori & Teddlie 1998; Howe 1988). Pragmatism is described as a deconstructive paradigm that uncovers concepts (e.g., truth and reality) and focuses on what works as the truth in relation to the research question (Teddlie & Tashakkori 2009).

The argument for combining both quantitative and qualitative data within a single study is based on the proposition that neither quantitative nor qualitative methods are enough to acquire the styles and details of a situation (Ivankova et al. 2006). By combining qualitative and quantitative methods, the approach complements each other and this allows for a stronger analysis, drawing on the strengths of each of each method (Tashakkori & Teddlie 1998; Green & Caracelli 1997; Miles & Huberman 1994; Green et al. 1989). Through integrating the datasets, mixed method offers a good understanding of the issue, in contrast to either dataset being used independently. This means that in mixed methods, it is not adequate to merely gather and analyse qualitative and quantitative data, but rather they need to be combined in some way so that, collectively, they form a more integral picture or problem. The form of data use in mixed method studies can be both narrative and numeric. Mixed methods also immediately address a number of both confirmatory and exploratory questions (Teddlie & Tashakkori 2009).

According to Carvalho and White (1997) there are three major ways to combine quantitative and qualitative methods. These include incorporating these two methodologies; reviewing, defining, verifying, rejecting, and/or enhancing information from one technique with the other; and combining the findings from the two techniques into one set of policy recommendations. These approaches will work depending on the exact combination of the objective of the study and the availability of time, skills and resources.

In terms of the design of mixed method research, Green and Caracelli (1997) propose two broad categories, i.e., component design and integrated design. In the component design the different methods remain independent through the collection and analysis of the data, and the mix of the methods occurs at the level of interpretation and judgement. An example of this design includes triangulation, complementarity and expansion design (Creswell 2003). Meanwhile, in integrated design, combining methods happens over the course of the investigation, from the processing of data collection to analysis and interpretation. Iterative, holistic and transformative designs are examples of integrated design. The implication for how these methodologies can be integrated relies on the progress of the quantitative and qualitative work (Carvalho & White 1997). The integration of the quantitative and qualitative methodology depends on which one is started first and the options for this are as follows (Creswell 2003). First, the use of quantitative survey data can be utilised to study the qualitative approach for individuals or communities. For example, poverty data from a survey can be applied to narrow-down groups or regions by using in-depth interviews. Second, quantitative survey can be used in the design of interview guides for qualitative survey. In this case, issues that cover qualitative work can be highlighted in the quantitative survey. Third, stratification of the quantitative sample can be decided by applying qualitative work. Fourth, the survey questionnaire design in the quantitative approach can be determined by using qualitative work. The use of qualitative analysis in this case is to ascertain greater understanding about the type of question that needs to be asked. This is important because it assists in identifying significant variables to respondents that need to be included in the quantitative questionnaire. Fifth, qualitative hypothesis can be tested through a quantitative approach. This may help a more detailed research agenda which can benefit from a single quantitative analysis.

Ivankova et al. (2006) noted that to conduct a mixed method research design, it is important to consider the following issues. First, the issue of priority; this relates to which approach (qualitative or quantitative or both) a researcher gives more consideration to over the process of data collection and analysis in the study. This is a difficult decision, however and Creswell (2003) proposed that it might depend on the interest of a researcher and/or what a researcher attempts to emphasise in the

study. Second, the issue of implementation; this refers to whether the qualitative and quantitative data gathering occurs in progression, one following another, or simultaneously (Creswell 2003; Morgan 1998; Green et al. 1989). Lastly, the issue of integration; this relates to the phase/phases in the process of the research where combining or mixing of qualitative and quantitative methods takes place (Tashakkori & Teddlie 1998; Green et al. 1989). The consideration of these issues need to be based on the process of the decision making which is overseen by the objective of the study and its research problem, as well as by the procedural discussions in the literature (Creswell et al. 2003; Morgan 1998; Morse 1991).

According to Creswell and Plano-Clark (2007) and Green and Caracelli (1997) the advantages of mixed method approaches are that the method is practical and enables researchers in the area of quantitative and qualitative research to collaborate. This approach provides stronger inferences (Teddlie & Tashakkori 2009) and enables one to immediately address the question of confirmation and exploration with both quantitative and qualitative strategies (Johnson & Turner 2003). Another advantage is that mixed method approach offers the opportunity for a better assortment of different perspectives (Erzberger & Prein 1977) and at the same time, the inquest of the quantitative results is more detailed (Morse 1991). Based on divergent findings, this method may also lead to the possibility of transformation of the data types, inference quality audit (Tashakkori & Teddlie 1998) and the arrangement of a new study or phase for further inquiry (Rossman & Wilson 1985). Other strengths are that mixed method offers more complete verification for studying the research problem and helps resolve questions that cannot be resolved through quantitative or qualitative approaches independently (Creswell et al. 2006).

Despite the advantages offered by the mixed methods approach, there are some criticisms related to this approach. Critics argued that studies using mixed methods do not follow accepted standards, and in data is not merged in the analysis/discussions (Creswell & Plano-Clark (2007). Although mixed method research has been broadly used as a strategy for research inquiry, there is a lack of integration of the findings from qualitative and quantitative strands of data and this is considered a significant weakness in mixed method research practice (Johnson et al.

2007; Bazeley 2006). Another weakness is that to conduct mix method research, the researchers require expertise in both methods. This is because neither quantitative nor qualitative parts of the research are often not conducted sufficiently well (Creswell & Plano-Clark (2007). Ivankova et al. (2006) asserted that a further limitation of this approach is the length of time and viability of resources to gather and analyse both quantitative and qualitative types of data.

Mixed method approach has been widely used in the area of applied research in social policy and marketing. For example, Qureshi (1985) presented a case study in policy research, where quantitative and qualitative techniques were mixed simultaneously in data collection and in the analysis. Johnson et al. (2003) used a mixed method approach to assess technological, economic, human and social impacts and the cost implications of incorporating beneficiaries in agriculture and natural resource management research. Meanwhile, Bird (1992) combined quantitative and qualitative approaches to judge the effectiveness of a policy which was designed to promote opportunities for adults to return to education.

Laurie and Sullivan (1991) applied multiple methods in the study of household resource allocation. Barron et al. (2008) also applied mixed method research to participatory development projects in Indonesia. Jang et al. (2008) conducted research on school success in complex circumstances employing integrative mixed method research in their study. In this study the strands of qualitative and quantitative data were analysed separately through thematic analysis of qualitative data and factor analysis of survey data, followed by the procedure of an integrative data analysis.

## **4.5 Summary and conclusion**

This chapter discussed the approaches for analysing supply chain including qualitative, quantitative and mixed method research approach. Each of these approaches is discussed in terms of the usefulness, advantages and disadvantages and

empirical examples. The qualitative research methods explored are case study method, focus group discussion, in-depth interview and participant observation; while the quantitative research approach focused on the survey. Both qualitative and quantitative approaches have their strengths and weaknesses. The main strengths of the qualitative approach are that the method allows profound and detailed narratives and clarifications of social processes and can facilitate researchers to find out and answer a range of social questions. However, subjectivity, generalization and lack of transparency are the main weaknesses of the qualitative approach. On the other hand, the main advantage of quantitative method is that the data can be comprehensive and quantified, but it is poor in contextualising what people said. Thus, using only qualitative or quantitative approach by itself seems incomplete and limits the ability to answer all the research questions and/or objectives of a study. Because of the weaknesses of using each of these approaches individually, mixed method research was considered. Mixing qualitative and quantitative research method allows a researcher to address the questions of a confirmatory and explanatory nature. Combining these two methods can provide a deep and better understanding of the research problems compared to either approach alone. Given the complex nature of studying the LF2M and supply chain problem as raised in this study, combining qualitative and quantitative methods using a mixed method framework which includes techniques such as case studies, focus group discussions, in-depth interviews and surveys is appropriate.

Hence, in this study, mixed method approach was chosen. The rationale for choosing this method is because mixed methods can offer a better understanding of the research problem and explore the views or ideas of the respondents in greater depth. This method is also a practical approach which enabled the researcher to use various methods to address the research problem. Mixing qualitative and quantitative method can provide for a more robust analysis which can complement each other. As the nature of this research is to seek information on how farmers deliver their produce to the markets through the chains available, therefore, a mixed method approach is suitable for this study.

Using the case study method allowed the researcher to answer the how and why questions in order to understand the nature and complexity of processes of supply chain taking place in the study area. The method was also suited for understanding the interactions amongst players engaged in the chains. Linking farmers to markets can be researched in a natural setting, enabling the researcher to learn about the state-of-the-art and generate theories from practice (Bensabsat et al. 1987). Meanwhile, the focus group discussions was useful for collecting a broad overview and detailed understanding of the supply chain issues discussed (Gellynck & Kuhne 2008; Stokes & Bergin 2006). The issue explored in group discussions aided in understanding how respondents were linked to the market and the problems and constraints they face. On the other hand, for individual respondents to speak freely and to express detailed beliefs and feeling on the topic, in-depth interview was applied in this study (Zhang et al. 2009). Interviewing is an essential and fundamental data collection technique of any qualitative research (Denzin and Lincoln 2003; Cavana et al. 2001; Yin 1994). In this study, players involved in the distribution of the product from farm gate to end market were interviewed. Finally, the survey was also used in the study of LF2M in Timor Leste to gather quantitative data. The survey method is relatively cheaper, easy to organize, flexible and it can be conducted for a large number of sample. The use of the survey method in this study was to ascertain information related to the quantitative data on production, marketing and income.

Details of the research approach including the study design is discussed in the next chapter.

# Chapter 5

## Research Methodology

### 5.1 Introduction

This chapter outlines the research methods used in the analysis of linking farmers to markets in Timor Leste. The chapter outlines the design of the research to answer the research questions, highlights the survey and case study design, defines the unit of analysis and describes the data gathering tools used in the study. In addition, data gathering, population and sample selection, location of the study, questionnaire design and data analysis and data requirements were also explained. The data analysis process discussed includes supply chain mapping, marketing margin analysis and cost and return analysis. Lastly, the ethical issues were elaborated on followed by the chapter conclusion.

### 5.2 Site selection

This study was conducted in Aileu Vila, Maubisse, Hatubuilico, Dili and Baucau in Timor Leste. The survey of producers was concentrated in Aileu Vila, Maubisse and Hatubuilico, as these areas have been identified as having potential for vegetable production in Timor Leste (MAFF; DeBoer et al. 2004). The majority of the population in these areas are engaged in vegetable production. For institutional buyers, most of the interviews (90%) were done in Dili and the rest were in Aileu Vila and Maubisse. The reason for this is that Dili is the capital city, where most hotels, restaurants and supermarkets operate. Meanwhile, Aileu Vila and Maubisse are tourist destination areas which link Dili with other districts in the south and west part of Timor Leste, such as Suai, Same and Ainaro. The interviews with mainstream buyers were done in Dili, Aileu Vila, Maubisse and Hatubuilico. This is because traders normally purchase the product from the production centres and sell it to the main market in Dili.

### **5.3 Population and sample size**

The population in this study consisted of producers of carrots, cabbages and snow peas; institutional buyers such as supermarkets, restaurant, hotels and other institutional buyers; and other downstream buyers such as traders and retailers. The reason for choosing these crops is because most of the population (75%) in the region grow carrot, cabbage and snow pea and they depend on these crops as a source of income. The total sample size for this study is 895 respondents, of which 800 respondents are producers, 70 respondents are buyers, and 25 respondents are other downstream buyers. The criteria for selecting producers were based on the crops they grew (e.g., carrots, cabbages and snow peas). Farmers chosen in the sample had grown at least one of the three vegetable crops mentioned.

For institutional buyers (e.g., hotels, restaurants, hospitals, army headquarters), those chosen to be interviewed were those who regularly purchased the target vegetable products for their menu for their customers. The criteria for choosing downstream buyers was based on those who operate regularly to buy and sell the target products, both in the production centre and in the main market in Dili. The names of the downstream buyers were obtained using the snow ball approach (Patton 2002).

A number of sampling techniques was used in this study including random sampling and purposive sampling using snowball technique. Random sampling was used for the sample selection for farmers. Random sampling enables an appropriate sample size to be chosen where each member of the population has an equal and known chance of being selected. Purposive sampling was applied for the selection of sample for institutional buyers and the other downstream buyers. This sampling technique was selected because the focus of the sample was on a particular characteristic of a population that are of interest for the research. Patton (1990) suggested that in purposive sampling, a sample should be selected from among a potential population which are information-rich and offer the researcher with understanding about the research issue. In particular, for the downstream buyers, the snow ball technique was used when interviewing farmers (Patton 2002; Kumar et al. 1999). This sampling technique can assist researchers and enumerators in finding the

traders who regularly buy farmer produce. As farmers engage with traders for many years, they know who normally purchase their products.

## **5.4 Survey and case study design**

According to Yin (2003), the design of the research should guarantee the evidence to be gathered is significant to the questions of the study and the approach covers competing concerns of the study. Matching the design of the research with appropriate research methodology is important in any research project.

### **5.4.1 Survey design**

The choice of the study site for the survey for producers was based on the potential areas for vegetable production and also the types of vegetables grown, particularly carrots, cabbage and snow peas. Data from MAFF (2007) showed that more than 50 per cent of the production of carrot, cabbage, and snow peas in Timor Leste were produced in Aileu Vila, Maubisse and Hatubuilico. This indicates that these areas have the potential for horticulture, especially for carrot, cabbage and snow peas. Therefore, these areas were chosen for the producer survey.

Before the actual survey, the head of the village informed farmers about the survey activities that would be carried out in their village to gather information on the production and marketing of carrots, cabbages and snow peas. They then introduced the researcher and enumerators to key informants in the village. Farm-households to be interviewed were then selected randomly. The total number of farmers interviewed per location is as follows: Aileu Vila, 316 respondents (39.5%); Maubisse, 229 (28.6%); and Hatubuilico, 255 (31.9%).

Due to the small number of institutional buyers, as many buyers as possible were interviewed from hotels and restaurants, supermarkets, hospitals and army

headquarters. For restaurants, a total of 64 respondents were interviewed; hotel and supermarket constituted of two respondents each; and a hospital and the army headquarters were also included as they are two of the biggest regular institutional buyers of vegetables in Dili. The biggest proportion of the sample constituted of restaurants which accounted for 91.4 per cent and the rest were composed of hotels, supermarkets, hospital and army headquarter. Most of the respondents (90%) are located in the capital city, Dili and the others are based in Aileu Vila and Maubisse.

For the downstream buyers, farmers were asked who their buyers are to find out downstream buyers that normally purchase their produce. Based on the information gathered from farmers, 40 names of traders were listed. However, due to the difficulties in contacting these traders, only 25 traders were able to be interviewed. The locations where these traders were interviewed were in Dili, Aileu Vila, Maubisse and Hatubuilico. These are the areas where traders regularly buy and sell their produce. The total number of downstream buyers interviewed per location is as follows: Dili, 13 respondents, Aileu Vila, 5 respondents, Maubisse 4 respondents and Hatubuilico, 3 respondents.

#### **5.4.2 Selection of case studies**

For the case LF2M models, the case study method was used. Selecting the appropriate case study design is a crucial issue when using this approach due to the effect of the preferred design on the quality of the research findings which is often influenced by the nature of the investigated phenomenon in relation to the number of units of analysis (Yin 2003). In this study, the researcher applied a multiple case design which refers to conducting several cases (Villard 2003; Bonoma 1985). This design is favoured because multiple case design offers strong and rigid grounds for better quality research gathered from the triangulation of confirmation compared with single case design (Yin 2003; Parkhe 1993).

The procedure for case selection began with gathering information from those sources involved in the agriculture sector, both in the production and marketing, as well as discussions with international agencies supporting income generation activities, NGOs and the private sector. As a result, six institutions and/or businesses were selected to be interviewed. This included agribusiness firms, cooperatives, NGOs and private businesses. The criteria used in choosing these institutions and/or businesses as case studies were based on their programs or involvement in facilitating the movement of farmers' produce to the markets. These institutions and/or businesses have engaged with farmers for a certain period of time and have assisted farmers in assessing both domestic and international markets. The cases selected, as mentioned, are the best cases which are rich in information and offer the researcher profound knowledge and understanding of the research issue.

## **5.5 Questionnaire design**

The design of the questionnaire is one of the most important phases in the process of the research (Zikmund 2000). According to Zikmund, a well-designed questionnaire should be based on three aspects: the wording of the question, the norms of measurement and the overall aspect of the questionnaire. For this study, three types of questionnaires were developed. These included a producers questionnaire, traders questionnaire and an institutional buyers questionnaire.

The information asked from producers in the survey was composed of three main types, namely, general information, information on farm/production and information on marketing. The main question asked in the general information included the location (e.g., district, sub-district, village and sub village), basic information about the respondent and their spouse (e.g., name and age), gender, education, main occupation, number of family and dependent members. For farm production, questions asked included the respondent's experience in farming, total land area, land utilization, assets owned, cropping calendar, source of irrigation, productivity of vegetable crops, planting and harvesting time, inputs used, crop production and

disposal, assistance from government and NGOs, training, labour utilization, crop varieties used and problems and constraints faced in dealing with the production of carrot, cabbage and snow peas. Meanwhile for marketing, the information asked included farmer's selling price, location and timing for selling the products, type of buyers, information on prices, distribution channels, types of transport used, value adding activities, grading and quality standardisation, packaging, post-harvest activities and problems and constraints farmers faced in selling their products. Other marketing information included whether respondents were involved in any LF2M programs, arrangements under the program, agencies involved, support received, effectiveness and impacts of the program, financial requirements and problems and constraints faced in the programs.

For institutional buyers, information included in the survey were the type and size of the business, prices, product availability in the market, buying preferences, quantity of product purchased per month and how frequently they buy the product. Finally, the data gathered from other downstream buyers constituted five main sections, including general information, type of business, supplier, information on selling of vegetables and the distribution system of the product. The information derived from these sections included business experience, position and role in the business, business size, price paid, value adding activities, selling prices, production and marketing costs, supply chain, ultimate buyers, transportation, marketing cost and margin and market trends.

As most of the respondents and enumerators did not speak English it was necessary that, before the pre-test was conducted, the questionnaire was translated into Indonesian language. After the translation, the questionnaire was pre-tested prior to the collection of the data. The pre-test is a very important phase of real data collection. As pointed out by Zikmund (2000), by conducting pre-test, unexpected problems that frequently arise in the data processing and analysis stages can be eliminated. Likewise, the aim of the pre-test is to train interviewers with limited experience in doing interviews prior to the actual data gathering. Another aim is to discover unanticipated mistakes that may arise during the preparation of the questionnaire such as awkward expressions, leading questions and uncoordinated

flow. Notes were taken where the respondents found the question obscure, repetitive or irritating. When the pre-test was finished, the questionnaire was then revised accordingly.

Similarly, the guide questions for the case study interviews were pre-tested. Questions were basically open-ended and wide questions (Haigh 1990) and proposed to gather rich, profound and complete information about the program of linking farmers to markets carried out by institutions and/or businesses. The main types of information gathered in the case study included background information, marketing, ownership structure of the organization and effectiveness of linking farmers to markets. More detailed information included the service provided to the farmers, products handled, clients and competitors, who the customers are, distribution system, pricing and costing strategy, funding and management structure of the organization, measures of success in linking farmers to markets, problems and constraints, role of government in developing such models, government support and important challenges faced.

## **5.6 Data gathered**

Quantitative and qualitative data were collected in this study, derived from primary and secondary sources. Primary data were gathered through interviews with farmers particularly the production and marketing data. Secondary data were collected through various institutions, including the Ministry of Agriculture, Forestry and Fisheries; Ministry of Trade and Commerce; the Ministry of Development; NGOs; businesses and the private sector. Data required included national data on production and productivity, government programs supporting agriculture (horticulture), policies and legislation promoting marketing of agricultural produce, climate data, extension, import of vegetables, programs on linking farmers to markets, problem and constraints and physical infrastructure and marketing.

## 5.7 Data gathering method

The main methods of data collection in mixed method research include a combination of approaches including interviews with the directors of the stakeholders involved in linking farmers to markets; focus group discussions with farmers engaged in the program of market linkages; and face-to-face questionnaire survey of farmers. The advantage of using the personal structure interview is that the researcher can freely accommodate the questions as required, reduce uncertainty and guarantee that the responses are correctly understood by rehearsing or rewording the question (Sekaran 2000). In addition, the case study research method was selected as a research strategy because it allows systematic investigation while maintaining a contextually rich understanding of a phenomenon (Baxter & Jack 2008; Flyrbjerg 2006; Yin 2003). This approach has been widely used because the case study method has demonstrated the ability to capture the complexities involved (Banjade & Ojha 2005). Furthermore, additional interviews with key informants, informal discussions and participant observations were also conducted. Sampling at all levels of the case study component can be described as purposive sampling.

To anticipate bias that may occur during the data collection process, two days training of the interviewers was conducted by the researcher. The aim of this training was to explain in detail the objective of the study and to inform them that all information in the questionnaire and the interview processes should be aimed at achieving the study objective. The importance of establishing trust, motivate respondents to answer questions honestly and eliminate respondents hesitation in answering the question, were all emphasized by the researcher during the training. As Sekaran (2000) mentioned, appropriate and thorough training does not only provide guidance to interviewers but also accommodates and affirms the need to collect high quality data. The researcher employed five final year students from the Faculty of Agriculture, National University of Timor Leste in collecting the data, particularly the survey. The reason for choosing these students is because of their experiences in conducting a survey (they have previously been involved in surveys), they have good skills and knowledge in relation to agriculture in Timor Leste so

would understand the terminology, most of them are familiar with the location of the research, and some of the students can fluently speak the local dialect.

The producers' data were collected through a survey of a random sample of vegetable farmers from the study sites. Farmers were visited and interviewed face-to-face to increase reliability of data. Interviews were done in the field or in the farmer's house. As some of the farmers were illiterate, in some cases, an assistant was employed to facilitate the interview process, and gestures and demonstrations were also used to assist farmers who are illiterate. To ensure the accuracy of the data (e.g., land area) the interviewer sometimes asked the respondents to show their farm and what they did.

Interviews were also done with the managers and/or staff of institutional buyers and downstream buyers. Rapid rural appraisals were carried out which included a site visit and semi-structured interviews with community leaders, government agencies and local and international NGOs to ascertain institutional structures, resource base in the study sites and organizations in the area.

## **5.8 Data analysis**

Because the data gathered included both quantitative and qualitative data, data analyses used in this study included mixed methods as well. Both qualitative and quantitative data analyses were used such as descriptive statistics (e.g., frequencies, percentages, mean scores, ranks/rating scores) and qualitative text analysis (e.g., integrative data analysis and thematic analysis). Apart from descriptive analysis and qualitative text analysis, other analyses used include supply chain mapping, marketing margin analysis and cost and return analysis.

### **5.8.1 Supply chain mapping**

The use of chain mapping is important for an understanding of the vegetable supply chain. By developing the map of the supply chain, a common appreciation of the supply chain can be achieved. Giunipero et al. (2006) pointed out that in a globalized world where the market system is more concentrated, a large company's power to impress prices in the market is rising, particularly for agriculture products. As a result, the price that consumers will be paid also rises and, further, the farm prices will decline due to the divergence of the market. Because of this it is important to understand the supply chain.

According to Gardner et al. (2003), it is important to comprehend the character of maps, the magnitude of supply chain mapping, the function of supply chain mapping strategy, and attributes of supply chain mapping before a process of dynamic supply chain mapping can evolve. A well-designed supply chain map should amend the environmental reviewing process of strategic planning. This can be constructed through the right information that is easily displayed and understood.

Supply chain management emphasizes managing flow. These flows may be inventory, cash or information. According to Gardner et al. (2003) the benefits of strategically mapping the supply chain are as follows.

- To connect wholesale strategy to supply chain strategy;
- To catalogue and allocate vital information for survival in an assertive environment in order to direct the focus of the managers;
- To offer a foundation for rearrangement of supply chain or remodelling;
- The mapping helps define the standpoint of the integration of the supply chain effort;
- The process of map development and dissemination leads to a standard understanding of the supply chain;
- Supply chain mapping offers a communication instrument to spread throughout firms, functions and wholesale units;
- The mapping assists monitoring of supply chain integration;

- A well-documented approach of the supply chain mapping can lead to an improvement of the supply chain management operation.

The supply chain map in this study was developed to capture the relationships and components of the vegetable chain in transferring the product from producers to consumers, along with some information about the nature of the entire processes (Gardner et al. 2003); while value chain analysis was conducted to provide a description of the horticulture value chain, to distinguish potential high value market areas and to examine current and potential products in the domestic and export markets in relation to quantity, specification, value and growth trends.

### **5.8.2 Marketing margin analysis**

The marketing margins have mostly been used for evaluating the performance of supply chains as the information about prices are generally available (Batt 2004). The margin differs according to the products, the condition the market face and the marketing services offered along the channel (Padberg et al. 1997). Marketing margin is defined as some function of the difference in price between retail and farm level of a given farm product, and this is designed to quantify the cost of providing marketing services (Wohlgenant 2001; Padberg et al. 1997). The margin is the percentage of the final average selling price weighted taken by each phase of the marketing channel. Kohls and Uhl (1998) describe marketing margin as the difference between the price the customer pays and the price at which the product is resold. The margin must cover the costs pertained in hand over the produce from one stage to the next and offer good earnings to those engaged in the marketing (FAO 2010). Marketing margin depicts the difference between the prices in the farm gate, or between wholesale and retail prices. The prices in the farm gate are basically grounded on the costs of production to which the value of cash incurred during crop season is calculated to provide net revenue equivalent to that same cash value that has been spent.

According to Wohlgenant (2001) factors that initially impact on the margin includes shifts in real demand, farm supply and prices in marketing. Other factors include time lags in supply and demand, market power, risk, technical change, quality, and spatial considerations. Thus, marketing margin can also fluctuate based on a number of factors, including product perishability, the number of players engaged in trading, the uncertainty and risk borne by each actor and the supply of the product based on the season (Batt & Parining 2002; Pomeroy & Trinidad 1995).

In addition, markets are described as efficient when the price paid by end consumers adequately reflects the cost of storage, the cost of transport and price differences due to product form (Harris-White 1995). Margins should be looked into carefully for a large marketing margin may result in little or no profit for an actor and may even result in a trading loss depending on the prices of buying and selling and the marketing costs incurred (Mendoza 1995).

Marketing margin has been used by a number of authors in the area of agricultural marketing. For example, Gardner (1975) used this analysis to study the agri-food sector by analysing the impact on margins of changes in agricultural supply and input markets. Heien (1980) applied the analysis to study dynamic models for the agri-food sector, considering that market instability is a significant element in price formation, and thus of significance for margins. To estimate the impact of banning postharvest pesticide use in fresh grapefruit industry, Buzby et al. (1994) used margin theory and Gardner's model to do the analysis.

In this study, marketing margin analysis is used to analyse the margin that occurred in every stages of the supply channel of the improved and traditional chains that exist in the study site. According to Padberg et al. (1997) analysing marketing margin is important because of the frequent changes in the quality and quantity of the product delivered from producer to consumer, and also the combination of market factors caused by political and socio-economic events.

### **5.8.3 Cost and return analysis**

The basic justification of the analysis of cost and return is based on the idea that things are worth doing if the benefits from doing them overshadow their costs (Sen 2000). According to Brent (1998a) there are two levels of assessment in cost and return analysis which include a financial cost benefit analysis and an economic cost benefit analysis. The financial cost benefit analysis is used to decide on private projects or issues and the analysis takes into account all those issues that directly affect the organization involved. Economic cost benefit analysis on the other hand takes a broader approach which includes the financial analysis, as mentioned, and it also takes into account the economic, public, or social welfare issues, and tends to cover a longer period of time. Producers generally use a financial approach as they make a decision as individual private organizations. Despite this, they are aware of the public benefits of improved food safety and that they need to run a profitable business to stay in the industry and survive. Raised profits can be created by attaining higher product price or lowering the costs. Therefore, the relationship between costs and benefits must be carefully examined by any producer of any commodity, whether in agriculture, manufacturing and even in service business (Hawkes et al. 2004).

Shively and Galopin (2009) pointed out that the objective of cost and return analysis is to evaluate the economic merit of a project; to compare competing projects; and is used to assess business decisions and examine the worth of investments. This analysis is not only based on decisions regarding costs and benefits, but also considers the value of net benefits after taking out costs and benefits.

The use of cost and return analysis in this study is important so as to evaluate the impact of the LF2M programs in terms of increase in production and income. By identifying crop productivity per hectare, price per unit and the cost spent in producing the product, the analysis will show whether a farmer's participation in the LF2M program benefited them. Cost and return analysis is also important because this analysis will provide a starting point from which to initiate an evaluation of the activities or projects. This analysis permits comparisons to be made between investments or projects.

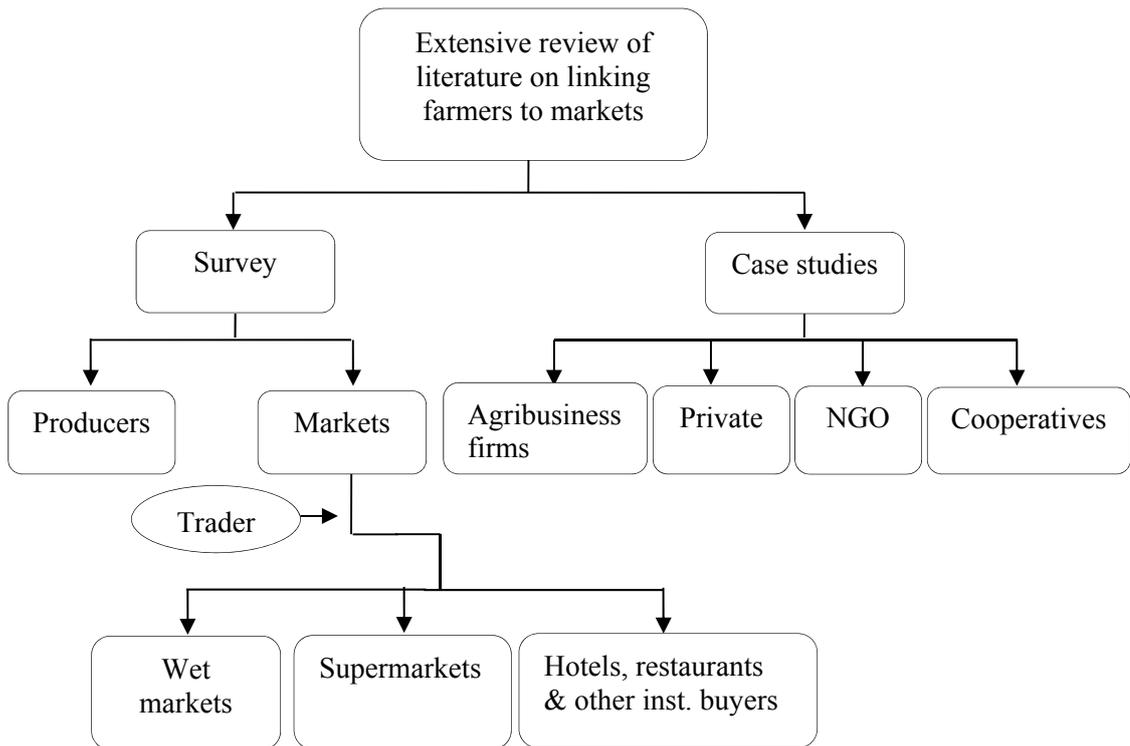
#### **5.8.4 Computer software for analysing data**

To analyse qualitative information from different sources and in different forms, computer-assisted qualitative data analysis software such as Nvivo can be used (Richards 1999). This program allows researcher to retrieve and code data, and develop theory building and modelling (Jones 2007). Nvivo provides many ways of combining the parts of a project, incorporating comments and recorded data. The research can view and review all the documents in document explorer and can group them for easy monitoring by making sets of documents. Nvivo can also combine coding, editing and the linking of documents with no order imposed. To manage the complexity of the data, Nvivo can also help in managing and synthesising the ideas.

For the quantitative data, a statistical package such as SPSS can be used. SPSS is a tool that can analyse all sorts of data about a countless variety of topics. SPSS is a set of programs for computers that enable researchers to do many types of statistical analysis. This program is a professional tool used across the social and behavioural sciences. SPSS program has a number of features that makes it easier to use than other statistical analysis programs and therefore this program is the most widely used for statistical analysis (Bryman 2004; Hedderson 1991). Babbie and Halley (1994) further commented that SPSS is capable of computing many different statistical procedures with different kinds of data which makes this program a very powerful and useful tool. By using SPSS researchers can compute simple averages for the data; perform a cross tabulation to examine associations among variables; compute correlations between variables; conduct multiple regressions and discriminant function analysis; and display the data in a variety of table, graph and map formats (Hedderson 1991).

Due to the mixed qualitative and quantitative data involved in this study, both Nvivo and SPSS were used to process and analyse the data. All the qualitative data from the case studies, in-depth interviews, focus group discussions, key informant interviews, informal discussions and field notes were transcribed and translated into English and analysed using Nvivo-9 (Richard 1999). The reason for using Nvivo to examine qualitative data is because this program offers a range of instruments for managing

rich data records. By using Nvivo's text, researchers can also edit any document at any stage of the research project. Meanwhile, quantitative data from the survey was analysed using SPSS 17.0 (Norusis 2008). Descriptive statistics such as percentages, mean and standard deviations were calculated to characterise the surveyed population. Figure 5.1 below shows the research approach of the study. The field research of this study was conducted from April until September 2009.



**Figure 5.1: Research approach used in the study**

## 5.9 Ethical consideration

Prior to the field data gathering stage, the researcher completed the ethics application requirements of data collection for research at Curtin University (see Appendix 5). In this application, the researcher explained the research project and how the data were to be collected. As Ticehurst and Veal (2000) claimed, for the entire research process in relation to the designing of the research and collecting and analysing the

data, ethical issues need to be considered by the researchers. Having obtained approval from the ethics committee, the data collection began following the guidelines proposed by Dick (1999), including informing the respondents, defining the aim of the research project to the respondent, demonstrating a good relationship that is not biased toward the respondent and deciding on the date, time and place for the course of the interview.

Important aspects that need to be taken into account by researchers in relation to ethical issues include informing participants regarding their engagement in the research; avoiding harm and risk; providing free choice; guaranteeing privacy; and, finally, informing the participant about confidentiality and anonymity (Knapic 2002; Ticehurst & Veal 2000; Patton 1990). Assurance for avoiding any harm and risk to participants during the data collection and analysis process was given and the participants were informed about their free choice to withdraw from the study at any time without penalty. Likewise, assurance about privacy, confidentiality and anonymity of the interviewees' responses and identities during the data collection and analysis process were provided in the ethical application. As a result, all the information gathered remained confidential and anonymous. Finally, the researcher offered to communicate the significance of this study and its framework to potential participants, but only within established ethical and confidentiality considerations.

## **5.10 Concluding remarks**

In this chapter the research design and methodology undertaken to conduct the research were discussed and justified. Two main data gathering methods were used, including the survey approach and the case study approach. Survey was done through interviews with producers, institutional buyers and downstream buyers. Random sampling and purposive sampling using the snowball technique were employed in sample selection. Meanwhile for the case studies, a preliminary investigation was performed to collect information, followed by interviews and discussions with key people in the institutions and/or businesses.

The data gathering method employed included face-to-face interviews using structured questionnaires and focus group discussions. Data analysis used included descriptive statistics, qualitative text analysis, supply chain and value chain analysis, marketing analysis and cost and returns analysis.

The following three chapters will present the analysis and results of the study, with the next chapter first presenting the supply chain for carrots, cabbage and snow peas in Aileu Vila, Maubisse and Hatubuilico, Timor Leste.

# Chapter 6

## Supply Chain for Carrots, Cabbages and Snow peas

### 6.1 Introduction

This chapter is devoted to the description of the supply chains for carrots, cabbages and snow peas in Aileu Vila, Maubisse and Hatubuilico, Timor Leste. The description of study sites, farmers' characteristics and farm production and marketing aspects are discussed. The chapter highlights information related to the traditional chain in the study site and the chains introduced by the private sector and NGOs, which is aimed at improving farm income in the region. Further, a brief description of the traditional chain is presented followed by a discussion of the value chains mentioned. At the end of the chapter, a discussion of the traditional chain and the value chains are presented followed by conclusion and implications.

### 6.2 Site description

This study was conducted in Aileu and Ainaro district, in particular in the sub-districts of Aileu Vila, Maubisse and Hatubuilico, Timor Leste (see map on Figure 6.1). A total of 17 villages were included in this study namely Lauisi, Bandudato, Liurai, Fatubosa, Lequitura, Lahae, Daisoli, Fahiria, Selo Malero, Mulo, Nunumoge, Maubisse, Horaikiik, Aitutu, Brigada, Edi and Fatubesi. Below are the descriptions of each site.

#### 6.2.1 Aileu Vila

The sub-district of Aileu Vila is situated in the north-western part of Timor Leste, about 47 km from the capital city. Aileu Vila can be reached in one and half hours

from Dili. The total area is 314 km<sup>2</sup> with a total population of 17 638 people which is composed of 9108 males and 8530 females (NSD & UNFPA 2011). The total household number around 3500 with the population density of 55 people per km<sup>2</sup>. The altitude of this area is 869 m above sea level, with the temperature of approximately 20 – 23°C (Keefer 2000). The latitude is 8°44' S and the longitude is 125°34' S. Aileu Vila is included in the climatic zone of the northern highlands where the wet season is longer than the dry season. The wet season commences around October and lasts until May with a duration of 6 – 7 months and an average annual rainfall of more than 1500 mm. The dry season begins in June and lasts until the end of September with a duration of about 4 – 6 months.

The main source of income for the majority of the population in Aileu Vila is agriculture. The major crops grown are vegetables, coffee, fruit, maize, cassava, sweet potato, taro and beans. The total number of households growing vegetable crops in this area is about 2700 households (NSD & UNFPA 2011). The livestock raised are mostly cattle, buffalo, goats, pigs and poultry. The topography of the area is generally sloping and mountainous. Aileu Vila has an extensive area sown to horticulture crops with a cool climate and favourable rainfall throughout most of the year. Therefore, Aileu Vila is recognised as one of the potential horticultural production areas of Timor Leste.

### **6.2.2 Maubisse**

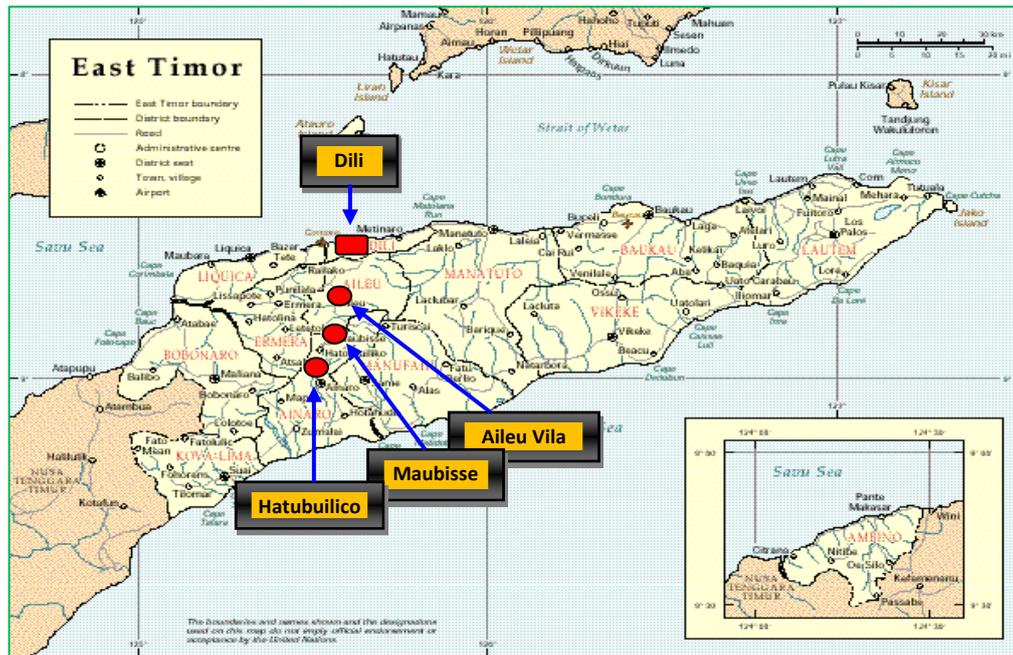
Maubisse is the main town in the central highlands south of Dili and is a traditional horticulture producing area. The drive from the capital city takes between 3 – 4 hours, and 45 minutes from the sub-district of Aileu Vila. The total area is 197 km<sup>2</sup> with a total population of 18 408 people which consists of 9343 males and 9065 females (NSD & UNFPA 2011). The total number of households is approximately 4400 and the population density is 103 people per km<sup>2</sup>. Most of the income of the population in Maubisse is derived from agriculture, particularly vegetable crops. Majority of the households (90%) grow vegetables in Maubisse. Other crops grown

include coffee, fruit, maize, beans, cassava, taro and pumpkins. Livestock including cattle, goats, pigs, buffalo and poultry are owned by most of the population.

Maubisse is located at 1432 m above sea level with a latitude of 8°50' S and longitude of 125°36' E. This high altitude allows this area to produce a large range of vegetable and other crops. The temperature is approximately 17 – 20°C (Keefer 2000). The rainy season is 6 – 7 months from October – May, while the dry season is from June – September lasting about 4 – 5 months. The topography is mainly mountainous, with steep slopes throughout much of the area. Maubisse is known as the centre for vegetable production and marketing in Timor Leste and many people and traders came to Maubisse every week to buy vegetables and fruits and sell them to districts all over the nation.

### **6.2.3 Hatubuilico**

The sub-district of Hatubuilico is situated in the southwest of Timor Leste and is close to the highest mountain, '*Ramelau*' (Figure 6.1). Hatubuilico is part of the Mambae region and it takes about five hours to travel there by car from the capital city. The total area is 129 km<sup>2</sup> and the population size is 9647 people, made up of 4802 males and 4845 females (NSD & UNFPA 2011). The total number of households is about 2300 and the population density is 83 persons per km<sup>2</sup>. The majority of the population depend on agriculture as their main source of income, with vegetable crops as the largest source of income for the population in this area. The percentage of households in Hatubuilico that engage in vegetable production is more than 80 per cent. Other major crops grown in Hatubuilico are fruits, maize, taro, beans and coffee. Cattle, buffalo, pigs and poultry are the livestock raised by most of the population in this area.



**Figure 6.1: Map of the study site**

The elevation of Hatubuilico is about 1900 m above sea level. Hatubuilico is located at a latitude of 9°00' S and longitude of 125°31' E. The temperature is approximately 15 – 20°C (Keefer 2000). Because Hatubuilico is part of southern highlands climate zone, the wet season is a little longer than nine months and the average annual rainfall is more than 2000 mm. The wet season is normally from November – April and May – July; while the dry season usually begins in August and ends in September. The majority of the area is made up of mountains and slopes.

### **6.3 Farmers characteristics**

The total number of respondents in this study is 800 farm households comprising of 57.1 per cent males and 42.9 per cent females. The gender balance indicated that the involvement of women in the activities of growing vegetables in this area is quite high. This shows that their role is important in supporting the family economy by engaging more in the production and marketing of vegetable produce. The average age of the respondents is 42.6 years with the youngest being 17 years old and the

oldest, 80 years old. The average farming experience of the respondents is about 20 years.

The size of the family in general is quite large with the average household size, including the respondent, calculated at 7.1. The average number of dependents in the family below the age of 15 years is 3.6 and above 65 years is 1.5. In terms of education, more than 50 per cent of respondents were not schooled at all and are illiterate, 19 per cent completed primary school and 21.7 per cent finished their secondary schooling. The rate of illiteracy found in this study is consistent with the national illiteracy rate of about 50.1 per cent (UNDP 2006). The main occupation of most of the respondents is farming with a small percentage of them working as teacher or traders. Table 6.1 shows details of farmers' characteristics in the study area.

**Table 6.1: Characteristics of farmers in the study area**

	No. of respondents	Mean/ percentage	SD
Socio-economic information:			
Age of head of the household (years)	800	42.6	14.4
Gender:			
Male (%)	457	57.1	
Female (%)	343	42.9	
No of family members (including respondent)	800	7.1	2.9
No of dependent household members below 15 yrs.	686	3.6	2.1
No of dependent household members above 65 yrs.	251	1.5	0.8
Education of head of household:			
Completed primary school (%)	152	19.0	
Completed Secondary school (%)	174	21.7	
Not school at all/illiterate (%)	474	59.3	
Farming as main occupation (%)	786	98.3	
Farming experience (years)	800	20.2	11.0

In terms of the spouse, the average spouse age is 41.9 years. The spouses' level of education is also low, with most of the spouses being illiterate or having no schooling at all. Only about 19.3 per cent of spouses finished primary school and 17.8 per cent completed secondary school. In terms of their main occupation, 95.4 per cent of the spouses are farmers.

## 6.4 Farm production and marketing

This section will present farm production and marketing information including cropping patterns, resources used to produce the crops (e.g., inputs, labour, land, etc.), assistance provided to farmers and marketing of the product.

### 6.4.1 Land area and land tenure

The land used for agriculture activities in the study sites was about 691.5 ha, or 47.6 per cent of the total land area, and from this only 352.5 ha or 50.9 per cent is used for growing carrots, cabbages and snow peas. The total area allocated for growing carrots is 71.8 ha, cabbages 155.9 ha and snow peas 125.3 ha. The average land area owned by respondents is 1.8 ha. The farm size of respondents ranges from 0.05 to 25 ha. Table 6.2 shows that about 79 per cent of the respondents owned between 0.26 – 1 ha; only about seven per cent own less than 0.25 and only slightly over one per cent own above 2 ha. Generally, land is privately owned, and the types of the land used for vegetable growing, are mostly upland rain fed and upland irrigated, the majority of which are composed of slopes and are mountainous.

**Table 6.2: Farm size**

Farm size (ha)	No. of respondents	Percentage
< 0.25	53	6.6
0.26 – 0.50	317	39.7
0.51 – 1.0	315	39.4
1.1 – 2.0	104	13.0
> 2.0	11	1.3
Total	800	100.0

### 6.4.2 Cropping pattern

The vegetable and food crops grown by respondents for most of the year in Aileu Vila, Maubisse and Hatubuilico were carrots, cabbage, snow peas, mustard, lettuce, beans, garlic, shallot, taro, maize, cassava and sweet potato as shown in Table 6.3.

**Table 6.3: Primary crops planted**

Crops	No of respondent	Percentage
Cabbage	565	70.6
Snow pea	478	59.8
Maize	426	53.3
Carrot	313	39.1
Beans	209	26.1
Mustard	162	20.3
Potato	146	18.3
Lettuce	76	9.5
Cassava	50	6.3
Garlic	18	2.3
Paddy	4	0.5

As shown in the table, more than 50 per cent of respondents in the study area planted cabbage, snow pea and maize; while less than 10 per cent of them grew lettuce, cassava and garlic. Paddy, in particular, was only planted by less than one per cent of respondents.

These crops are generally planted in upland areas, both in rainfed and irrigated areas. The production of vegetable crops is a major element of the farming systems in the region due to the favourable agronomic and climatic conditions in the areas. As mentioned by MAC (2008) it became evident that vegetable-based farming systems is a more profitable land use in the hills compared to annual crop based systems. The production and marketing of vegetable crops is one of the major sources of livelihoods for a large number of farmers, traders and transporters. In general, vegetable crops are grown by most of the respondents, particularly for cabbages, snow peas, carrots, beans and mustard, while food crops such as cassava and paddy are only planted by a small number of respondents as the high altitude of the area and the topography are not favourable for growing these crops.

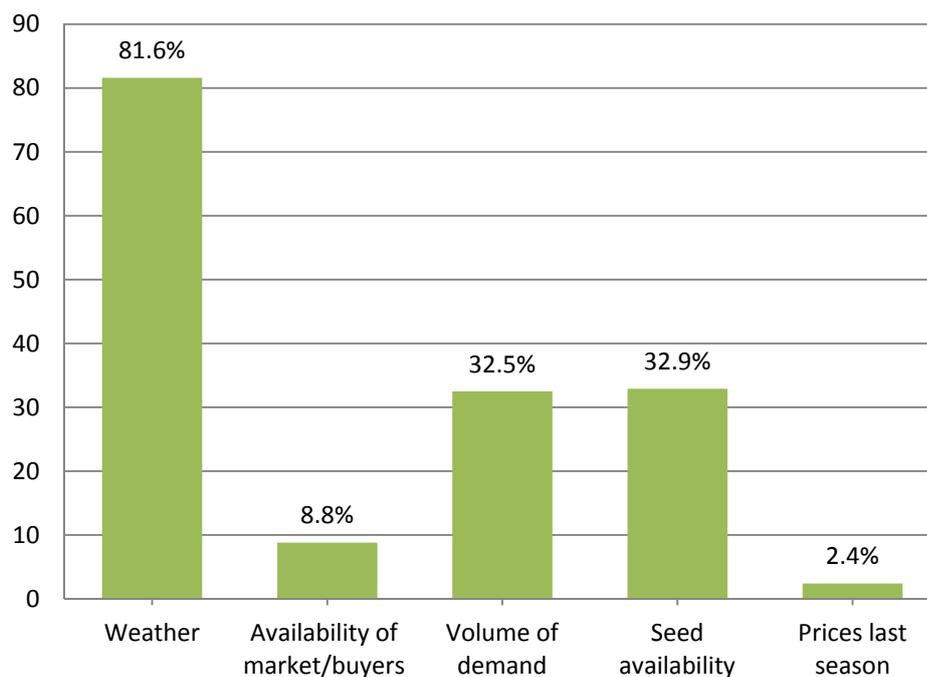
Carrots are usually planted in November together with other food crops such as maize, cassava and beans. The main crops are planted as the rainy season starts, whereas some of the respondents grow carrots and other vegetables (e.g., shallot,

garlic and lettuce) in April and May. At this time, when the wet season is starting to decline, most farmers in this region engage in vegetable production. February, July and August are the months where carrots are ready for harvesting. Because the production of this crop is based on the season, all respondents harvest the same type of crops around the same time.

Cabbage is generally grown by respondents in January and some in May and September. Respondents who grow cabbage in September are mostly from Hatubuilico. This is because climatic conditions in this area are favourable and farmers also plant at this time in anticipation of the undersupplied market in December when most of the farmers in Timor Leste are not producing cabbage. As a result of the private sector intervention in this area, the farmers started to produce the crops which are not only based on climate but also on market opportunities. The harvesting time for cabbage is in April, August and December.

Snow peas on the other hand can be grown throughout most of the year. However, due to the seasonal limits on water, respondents can only grow snow peas in November, February and May. In November, farmers usually grow maize, cassava and snow peas, and in February and May, snow peas, mustard and beans are planted by farmers. Harvest time for snow peas is in January, April and July.

In terms of the basis for deciding what crops to plant on a specific season, 81.6 per cent of respondents said they based their decision on the weather, 32.9 per cent on seed availability and 32.5 per cent based their decision on volume of demand. Only a small percentage of respondents based their decision on prices at the last season and the availability of market or buyers as shown in Figure 6.2.



**Figure 6.2: Basis for deciding what crops to plant**

Based on the results of the survey, it appears that the production of most of the agricultural products in the region is not market-oriented. Majority of the farmers still depend on the weather to grow the crops. They do not consider how to market their produce and whether they will receive higher prices for their products. As a result they continue to receive low prices for their products.

### **6.4.3 Production of carrots, cabbages and snow peas**

The total area planted by respondents of cabbage was 155 ha and 154 ha were harvested, showing that more than 90 per cent of the crops planted are harvested. The details of area planted and harvested by respondents for carrots, cabbage and snow peas in 2008 is shown in Table 6.4.

**Table 6.4: Area planted and harvested, production, and productivity of carrots, cabbages and snow peas**

	<b>Carrots</b>	<b>Cabbage</b>	<b>Snow peas</b>
	<b>N=313</b>	<b>N=565</b>	<b>N=478</b>
Area planted (ha)	71.83	155.93	125.28
Average area planted (ha)	0.23	0.28	0.26
Area harvested (ha)	71.61	154.06	123.04
Total production (kg)	88 991	177 862	67 358
Yield (kg/ha)	1239	1140	538
Consumed (kg)	6108	11 421	4465
Total sold (kg)	82 883	166 441	62 893
Average price (\$/kg)	0.35	0.30	0.45
<b>Total value of produce sold (\$)</b>	<b>29 009</b>	<b>49 932.3</b>	<b>28 302</b>

Despite carrots, cabbage and snow peas growing well in these areas, the productivity is very low. This is due to the lack of crop management, low skill of farmers, low input use and extensive use of local seeds. For example, the average yield for carrots was 1.24 t/ ha, cabbage 1.14 t/ ha and snow peas 0.54 t/ ha (see Table 6.5). Although the crop yield of farmers in the study sites are higher than the national figure which are 0.70 t/ ha for carrots, 0.80 t/ ha for cabbage and 0.30 t/ ha for snow peas (MAFF 2007), if compared to other countries (e.g., Thailand and Nepal), however, the yield of these crops are very low. For example, according to FAO (2006) and MAC (2008), under good growing conditions and use of good seed varieties, carrots can yield up to 25 t/ ha, cabbage 20 t/ ha, and snow peas 5 t/ ha. Due to the suitability of agronomic and climatic conditions and farmers' experiences in growing vegetables in these areas, the yield of these crops can be increased given the right management, resources, inputs, and training.

From the total production of carrots, cabbage and snow peas of respondents, 90 per cent were sold in the market. This provided an income per farmer of about US\$93 for carrots, US\$35 for cabbage and US\$60 for snow peas, per season on average. Despite the small revenue earned, one thing that is clear is that the purpose of growing vegetables is for selling to the market. In fact most of the income earned by

the respondents came from these crops. Only about seven per cent of snow peas production was consumed by respondents and the rest were sold to the market. In addition, the average prices for carrots, cabbage and snow peas ranged from 30 to 45 cents per kg, depending on the type and the availability of the product in the market. For example, carrots sold at an average price of 35 cents per kg, cabbage 30 cents and snow peas 45 cents per kg.

#### **6.4.4 Inputs and labour used**

Inputs such as good quality seeds, fertilizer and pesticides are important to enable farmers to increase production. However, 83 per cent of the respondents said that they do not use some of these inputs and this includes inorganic fertilizer, pesticide and herbicide. Lack of the application of this inputs resulted in low productivity of the crops. As pointed out by Diao and Hazell (2004), lack of using purchased inputs contributed to the low yield for most of agricultural crops. The reasons farmers gave for not using these inputs is that they are not available locally and that they are expensive. If respondents want to purchase these inputs they need to spend money on transportation costs to travel to Dili, the only place that inputs are available. The small number of respondents who regularly use granular fertilizer and pesticide are those who had better access to transport, information and capital. Inputs that are regularly used by respondents include compost and manure. These inputs are locally available and are mostly free as they come from farmers' own farms.

Seeds used by respondents are composed of local and modern seed varieties. Carrots seeds used by the respondents are all new seeds, such as Vikima and Shine Kuroda which are quite expensive. At present, there is no local seed for carrots. Because of this, when planting season starts respondents need extra cash to purchase seeds from traders.

In the case of cabbage seeds, some respondents used local seeds while others used modern seed varieties. Respondents that used modern seed varieties (e.g., KK-Cross,

RP & Green Coronet) accounted for 79 per cent; while 21 per cent still used local seeds. Respondents from Hatubuilico in particular are still applying local seeds. The reason is that farmers in this area had difficulties accessing modern seeds as the area is very remote and far from suppliers. It is also difficult to access transport. The modern seed varieties of carrots and cabbages, mentioned above, generally originated from Indonesia, Australia and Taiwan. For snow peas, the majority of respondents are still using local seed. This is because no new seed variety of snow peas is available locally. It seems that the low productivity of snow peas, only 0.50 t/ha, is because modern seed stock is unavailable to farmers. Lack of good quality vegetable seeds is one of the major limitations faced by vegetable farmers in this region.

The majority of farm families in Aileu Vila, Maubisse and Hatubuilico generally are engaged in both production and marketing activities. The labour generally used in the production and marketing of carrots, cabbage and snow peas is composed of family and exchange labour. The reasons for choosing family labour are that the land area is small, family labour is readily available and to save money; while the tradition of helping one another to complete necessary activities as quickly as possible is the main reason that farmers exchange labour. The activities where respondents exchange labour include land preparation, planting and weeding. This is common as these activities requires more labour. In addition, hiring labour is not common in most vegetable production areas in Timor Leste. Therefore, no hired labour is used by vegetable growers. The main reason for this is that most farmers are not commercially oriented in managing their farm, the land area is small and they lack capital.

The average number of labour days spent per hectare on carrots was about 121 days, for cabbage was 133 days and for snow peas was 140 days. The average number of labour days is quite small compared to other countries. For example, in Vietnam the average labour days spent per hectare for vegetable production and marketing was 297 days; in Cambodia, 437 days; and Bangladesh, 338 days (Ali & Hau 2001; Hau et al. 2002; Abedullah et al. 2002). The small number of labour days spent for carrots, cabbage and snow peas production and marketing is because the majority of

farmers in these areas are still produce according to what they can and are not run as a business. In turn, this contributed to the low productivity of their crops. The farm activities in which farmers spent most of their time is watering activities, followed by land preparation and marketing. For watering, except in the wet season, respondents usually water their crops twice a day, once in the morning and once in the afternoon until the crops are ready for harvest.

Farm activities that are generally performed by respondents in the vegetable production are land preparation, clearing, bond preparation, seedling, planting, weeding, watering, harvesting, packing and sorting, transporting and marketing. Ploughing, harrowing, fertilizing and trellising are not carried out in this area.

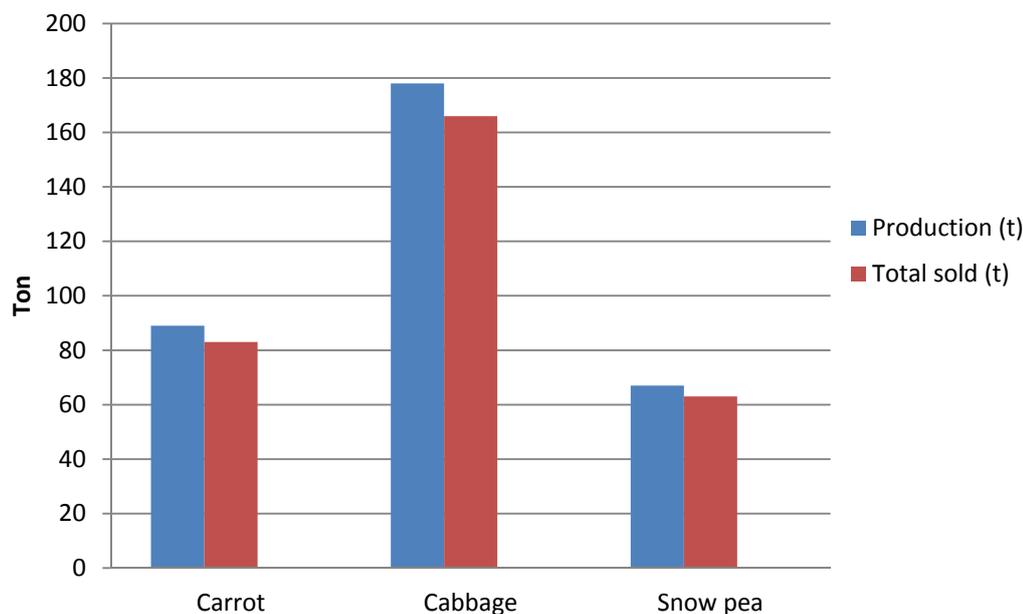
#### **6.4.5 Assistance and training**

As most of the respondents are illiterate, regular assistance and training is important to improve their skill and knowledge so that they can increase the production of their crops, increase farmers' income and foster development in these rural areas. However, the results of the study show that the majority of the respondents (91.4%) did not receive any assistance from either the government, nor from other institutions. This makes it difficult for farmers to increase their production and improve the quality of their product. Only 8.6 per cent of respondents received assistance from providers, including MAFF, NGOs, agribusiness firms and international agencies. The kind of assistance received included the provision of seeds, training, technical advice, provision of fertilizer and information. To increase production, government and private sector intervention in providing assistance to farmers is needed. Through such intervention, farmers will improve their skills and knowledge in managing their farms and, in the end, increase the production. As stated by AVRDC and ADB (2005) and MAC (2008) the contribution of private sector in providing training and support to small farmers benefit them in terms of better farm management, improvement of crop production and improvement of quality of products.

In relation to participation of respondents in formal and informal training to improve carrots, cabbage and snow peas production and marketing, 92.6 per cent of respondents claimed that they had never participated. Only 7.4 per cent of respondents participated in formal and informal training. Indeed, training is important to improve farmer's skills which, in turn, encourage Farmers to fulfil new requirements or standards required by the high value dynamic market. Farmers who continuously participated in the training are able to keep up with the quality and quantity demanded by the markets (Ngugi et al. 2006). The kind of training they attended included methods to increase vegetable production, compost processing, new techniques of growing vegetables, land preparation and use of organic fertilizer. Other training attended included integrated pest management, terracing, crop and soil management, marketing techniques and seed production. The training conducted in the study area were mainly sponsored by non-governmental organizations (NGOs), the Ministry of Agriculture Fisheries and Forestry (MAFF) and Desenvolve Seitor Privado (DSP-USAID). Other sponsors include the Catholic Church, Ainaro and Manatuto Community Activation Project (AMCAP), Zero Star and the United Nations Office for Project Services (UNOPS).

#### **6.4.6 Marketing**

The income for the majority of the respondents is generated from vegetables. This reflects the large quantity of products sold to the market in the area as shown in Figure 6.3. For example, from the total production of about 177 t of cabbage during the time of the survey, around 93 per cent were sold to the market. This generated a total value of about US\$50 000. This means that cabbage alone could provide a substantial improvement in income of US\$88.5 per farm households per season in the region. This is significantly important as most of the farms are isolated, the size of the farms is small and there are difficulties in sustaining family income from other crops.



**Figure 6.3: Total production of carrot, cabbage and snow pea sold to the market**

In terms of the localities for selling vegetables, 89.4 per cent of respondents preferred the local market for selling their produce, followed by district markets. As the cost of transport is expensive, and access to roads and transport to other major markets is poor, this resulted to the respondents relying on local markets for selling their produce. These markets are characterized by asymmetric relations between large numbers of small farmers and a few traders. IFAD (2003a) describe such market relations as characteristically uncompetitive, unpredictable and highly inequitable.

In addition, 99.6 per cent of respondents claimed that other downstream buyers (e.g., traders) are the main buyers for their products. Farmers have no option to sell their products to other buyers because the only buyer that purchases their product is the traders which are very limited in number. Farmers who face difficulties in reaching markets often become dependent on traders coming to their village to buy agricultural produce and to sell inputs. This situation is further exacerbated because buyers are also the primary source of information on prices and other relevant market information. High dependency on traders and local markets affect the price offered because traders have greater power over farmers, especially in deciding the price for

the product and through extending credit. However, if farmers have better market information, they could bargain for higher prices from traders.

Generally, value adding can be an important activity as this can have an impact on the increase of price of the product and also competitiveness in the market place. The result of the study showed that more than 50 per cent of respondents are not value adding their produce before they sell to the market. The reason is that there are no price differences between value added products and primary products. Meanwhile, some respondents remarked that they do value add to their product so that they can compete in the market, as consumers are always looking for clean and fresh products. Value adding activities conducted by respondents include cleaning, washing and sorting. For grading, more than 70 per cent of respondents do grade their product before they sell to the market. The grading activities are conducted only on the basis of the size of the product.

The type of packaging used includes sacks, crates and plastic bags as shown in Appendix 3. The use of sacks is the type of packaging that is mostly utilised by respondents for transporting their carrots, cabbages and snow peas. This type of packaging is easy to do and counting the sacks is easy. In addition, they are strong, easy to find, cheaper and easy to organize and transport. For these reasons, most respondents use sacks in many different sizes (e.g., 25 kg, 35 kg, 50 kg and 100 kg) to sell their products to the market.

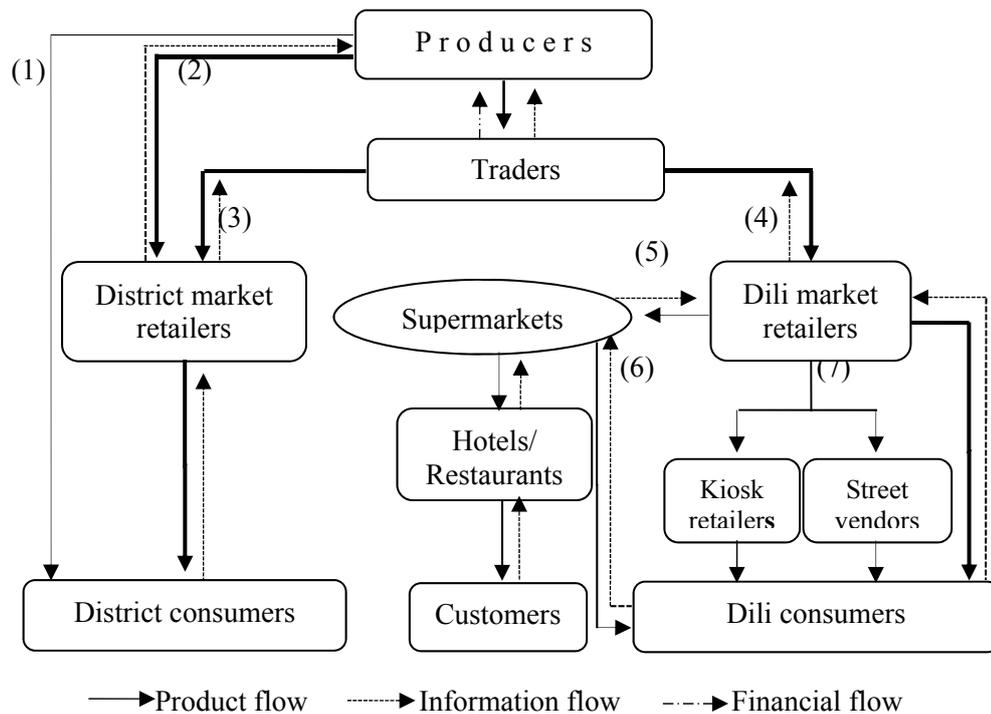
## **6.5 Supply chain for carrots, cabbages and snow peas**

There are several supply chains for vegetables in the study sites. These include traditional supply chain and the supply chain introduced by Zero Star and World Vision as described below.

### **6.5.1 Traditional chain**

Vegetable trading has been done for many years in Aileu Vila, Maubisse and Hatubuilico through a trust system between farmers and traders at the village, sub district and district level. The chain used by farmers in the distribution of the product to the market is still mostly traditional. Approximately 90 per cent of farmers in these areas still use the traditional chain. The reasons farmers continue to engage in this chain are because most of them lack skill and knowledge about marketing, lack information on input and output prices and have low capital. In this chain, farmers mainly depend on traders as the main buyers of their produce. They have little choice but to continue to sell their produce to the traders, as these traders regularly provide them cash advances and buy their produce.

The traditional supply chain involved more participants in the chain, including downstream buyers (e.g., traders and retailers), street vendors and supermarkets. Figure 6.4 below shows the traditional chain for carrots, cabbage and snow peas in the study area. In this chain, farmers have only three options to deliver their product to the market: they can sell directly to the consumers (district consumers), sell directly to the district market retailers, or they can sell to the traders. No farmers deliver their produce directly to the Dili market because the cost of transport is expensive and access to transport and roads are poor.



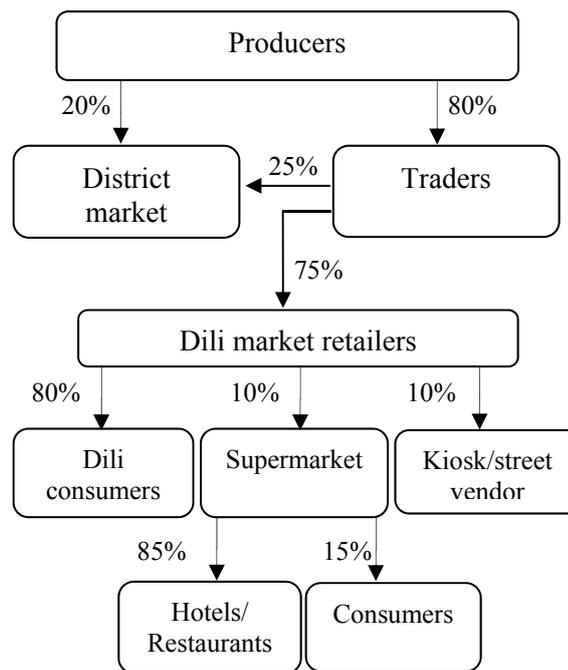
**Figure 6.4: Traditional supply chain for vegetables in Aileu Vila, Maubisse and Hatubuilico**

Channel 1 is the shortest channel which involves only producers and consumers. The reason producers sell their product directly to the district consumers is because, geographically, the buyers are very close to their village and producers may have to walk for about two to three hours to reach district markets. Producers feel that by engaging directly with retailers they can obtain a better price and also access better information about the market. In this channel, the quantity of the produce sold is very small.

In channel 2, producers sell their product directly to district market retailers who then sell to district consumers. In channel 3, the product is delivered to the traders then sold to district market retailers and is then sold to the district consumers. In channel 4, traders buy the produce and distribute to the Dili market retailers who then sell the vegetables onto Dili consumers. Channel 5 is the longest channel which involves producers, traders, Dili market retailers, supermarkets, hotels/restaurants and customers. The main channels in this chain are channel 2, 3 and 4 as shown by the lines in Figure 6.4.

In terms of information flow, producers do not know exactly what happens in the market particularly, the price their produce fetched. In some cases they do not even receive information on whether their product is in high demand or low demand, factors that will affect their potential profit. For example, if the product is in high demand in the Dili market the market price will increase. However, information on demand for the product does not reach producers. Information on quality requirements and prices, are determined by retailers and supermarkets, especially in Dili. Not unexpectedly, producers receive biased information on quality and prices as traders do not pass on these information to them. In terms of the financial flow, this only comes from traders who normally operate in these areas for buying vegetables. For example, to secure the product, a trader may provide cash or inputs (seeds) in advance to producers to support the production and, in turn, the product must be sold to them.

In the traditional chain, producers generally do not perform value adding activities. The only value adding activity that occurs before the product is delivered to the traders or to district market retailers is cleaning and packing. There is no grading and sorting of the vegetables. Traders conduct basic grading, sorting and packing and further distribute the product to Dili market retailers. They then sell in bulk to the retailers. A large proportion of the product bought by the traders is sold in Dili as this is the main market where traders and retailers operate in buying and selling produce. Figure 6.5 presents the percentage of the product distributed from one player to another.



**Figure 6.5: Percentage distribution of vegetables to customers**

As shown in Figure 6.3 above about 80 per cent of the produce from producers is sold through traders and the rest is distributed through district market retailers. This indicates that traders play an important role in the distribution of the product from farmers to consumers. The produce that is delivered by traders to Dili market retailers' accounts for about 75 per cent of the total produce marketed, while the other 25 per cent is sold to district market retailers. The Dili retailers sell approximately 80 per cent of the produce to Dili consumers and the remaining sales are to supermarkets and kiosk/ street vendors. Finally, the majority of the produce from supermarkets is sold to hotels and restaurants, while some 15 per cent are sold to domestic consumers.

Even though farmers can sell their produce to the traders and also sell directly to the consumer in the district market, the net price received for carrots, cabbages and snow peas is the same. For example, carrots are sold with the price of 0.35 cents/kg, cabbage 0.30 cents/ kg and snow peas 0.45 cents/kg. Farmers did not incur marketing costs as traders bought the product directly from farmers. Thus, farmers who sold their produce to the district market spent nothing on transport because they just walked or used their horses to market their produce.

In terms of marketing margins, each market intermediary plays a specific function or value addition in contemplation of compensation that is related to the quality of the service delivered. Table 6.5 below shows that the highest percentage of net margins for carrots and snow peas for the traditional supply chain was earned by supermarkets while the highest margin for cabbage was received by retailers. In addition, the smallest percentage of net profit margin is earned by traders.

**Table 6.5: Net margin for various participants in the traditional supply chain<sup>1</sup>**

Description	Carrots		Cabbage		Snow peas	
	Net margin (\$/kg)	Percentage net margin (%)	Net margin (\$/kg)	Percentage net margin (%)	Net margin (\$/kg)	Percentage net margin (%)
<b>Trader</b>	0.07	15.6	0.12	26.7	0.17	22.2
<b>Retailer</b>	0.12	20.0	0.20	33.3	0.30	30.0
<b>Supermarket</b>	0.40	30.8	0.30	27.3	1.65	55.0

The table above shows that in the traditional supply chain, traders received the highest profit margin from cabbage then from snow peas which accounted for 26.7 and 22.2 per cent, respectively. For retailers, these two crops still offered a good profit margin accounting for 33.3 and 30 per cent, respectively. The least margin earned by traders and retailers was from carrots. On the contrary, supermarkets got their highest margin from snow peas then from carrots accounting for 55 and 30.8 per cent. For all of the chain participants, supermarkets received the best profit margin while traders earned the lowest margin. In addition, amongst these crops snow peas provided the highest profit margin (55%) followed by cabbage (33.3%). Carrots on the other hand offered the least profit margin of 15.6 per cent.

The figures on the table above are based on the average of the sample and comprise all costs incurred in the chain. The selling price is the price a farmer or trader receives for the product; while the buying price is the price a trader or customer pays; marketing costs are expenses incurred in the marketing of the product (e.g., transportation cost, labour and processing). The marketing costs vary greatly by channel and the players engaged in the chain. Carrot farmers do not incur marketing

costs because traders purchase carrots directly from farmers. The profit margin is the marketing margin minus marketing costs and this is different for each of the chains.

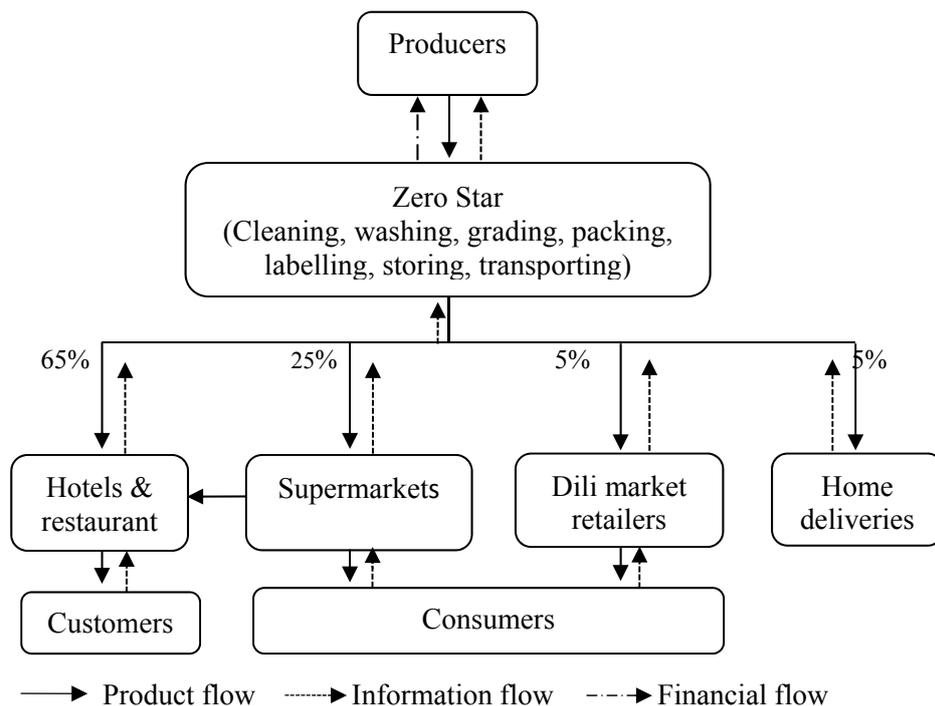
The main problems and constraints faced by respondents in this chain are the high cost of transport and the low selling price. Rural roads in Aileu Vila, Maubisse and Hatubuilico are generally in bad condition. Bad roads and bridges, especially in rural areas, have impacted adversely on the transport network and access to vegetable growing areas. This has further resulted in an increase of the cost of transport. Farmers cannot afford to pay for transport to deliver the produce to the market and, therefore, they rely heavily on the local markets which offer low prices for the produce. Another problem is that the price offered for the product is quite low (e.g., less than 50 cents/kg). This resulted from the low quality of produce and high dependency on traders and local market. Low prices are also related to farmer's poor bargaining power with other players involved in the chain. In this case, traders have a much stronger bargaining power as well as better information, therefore, they can control the price. Other problems faced by farmers are the difficulties in accessing other markets.

### **6.5.2 Value chains for vegetables**

Apart from the traditional supply chain, there are two value chains that have recently developed in East Timor which emanated from initiatives introduced by an NGO and international aid agencies. To increase vegetable production and facilitate farmers' access to markets, an NGO and private business have been working with farmers in Aileu Vila, Maubisse and Hatubuilico. One of the interventions of their programs is improving cooperation with farmers in increasing their production and distribution of the produce to the market in an effective and efficient way. The resulting value chains for vegetables for these initiatives are discussed below. Full case studies of these two initiatives are discussed in Chapter 7.

### 6.5.2.1 The Zero Star supply chain

Zero Star Uni Pessoal was founded by Komar Mendonca as a small business supplying wholesale vegetable products to the main wet markets in Dili. The supply chain introduced by Zero Star is as follows (see Figure 6.6). Zero Star purchases the product directly from farmers and then transports to the warehouse in Dili. Following this, the products are processed (e.g., cleaned, washed, graded, sorted, packed & labelled) and stored in a cool room prior to delivery to customers. By storing the produce they are able to choose the buyers and allocate the product to those buyers who offer the highest returns, making their part of the chain more efficient. The main buyers are supermarkets, hotels and restaurants, Dili market retailers and home deliveries. As Zero Star owns their own cool trucks and a cool room, this enables the produce to be collected on a regular basis from farmers on a time schedule which is based on optimising harvest quality and supplying to the main buyers in good condition.



**Figure 6.6: Zero Star supply chain**

When harvesting the crops, farmers normally perform basic sorting and grading, cleaning and packing of the products. They then distribute the product to the central collection point (side road) that has been chosen. Following this, Zero Star staff then

collects the produce and transports them to Dili. During this stage, farmers are not paid but the product collected is registered at an agreed price. The product is delivered to the customer on a weekly basis. Vegetables classified as first grade are delivered to supermarkets, hotels and restaurants, and private home deliveries; while the second and third grade vegetables are usually distributed and sold to the retailers operating in the Dili wet market. Most of the produce supplied by Zero Star go to hotels and restaurants and this accounts for about 65 per cent of total vegetables handled by Zero Star. This is followed by products that go to supermarkets at approximately 25 per cent and both home delivery and Dili retailer market at around 5 per cent each. After the products are sold, Zero Star pays the farmers; this occurs once a week. The system of payment applied by Zero Star has contributed to farmers' confidence in the business which has resulted in a continuous supply delivery system.

In terms of information, there is a clear flow of information through the chain. For example, customers inform their preferred demand to Zero Star who in turn communicate these to the farmers. This is important because farmers need to know what is demanded by the market in terms of quantity and quality, timing and the prices offered. As pointed by Batt & Cadilhon (2007), by knowing this information, farmers are able to make decisions on what products they should produce in a particular season. In this case, however, information on market prices in Dili is not correctly relayed to farmers. Because of this, even though Zero Star has enough information in regards to quality requirements for the product, some farmers (25%) distrust this relationship as they feel there are no rewards and payments for good quality products.

Financial assistance is also provided to farmers by Zero Star. In many cases, Zero Star provides cash advances to farmers who need to buy the basic necessities required to support farm production. When the crop is harvested, cash advanced are deducted directly from the sale of the produce without any charge of interest. This is a practice Zero Star uses to gain and maintain the trust of farmers which also raises farmers' confidence about their future in the industry. More importantly, farmers are assisted in accessing the high end market.

In this chain, there is no formal contract arrangement between Zero Star and farmers. The negotiation and the supply of the product from farmers to Zero Star are based only on trust and established social relationships. This is important because trust can develop long-term relationships between parties involved in the chain. Some farmers (75%) trust Zero Star because they feel that Zero Star will assist them in delivering their produce to the market, as well as help them when needed. In this relationship careful management of the value and supply chain need to be maintained as this is critical for ensuring the quality and safety of the product and to increase efficiency (Jhonson & Hoffman 2004). The net margins for each chain are shown in Table 6.6 below.

**Table 6.6: Net margin for various participants in the Zero Star Uni Pessoal value chain**

Description	Carrots		Cabbage		Snow peas	
	Net margin (\$/kg)	Percentage net margin (%)	Net margin (\$/kg)	Percentage net margin (%)	Net margin (\$/kg)	Percentage net margin (%)
<b>Zero Star</b>	0.30	40.0	0.30	46.2	0.45	45.0
<b>Supermarket</b>	0.40	30.8	0.35	31.8	1.75	58.3

The table above shows that cabbage provided the highest profit margin to Zero Star at 46.2 per cent while carrots offered the least margin of 40 per cent. In addition, snow peas still contributed the highest margin to supermarkets at 58.3 per cent followed by cabbage at 31.8 per cent. For more details about the net margin in Zero Star chain can be seen in Appendix 2b.

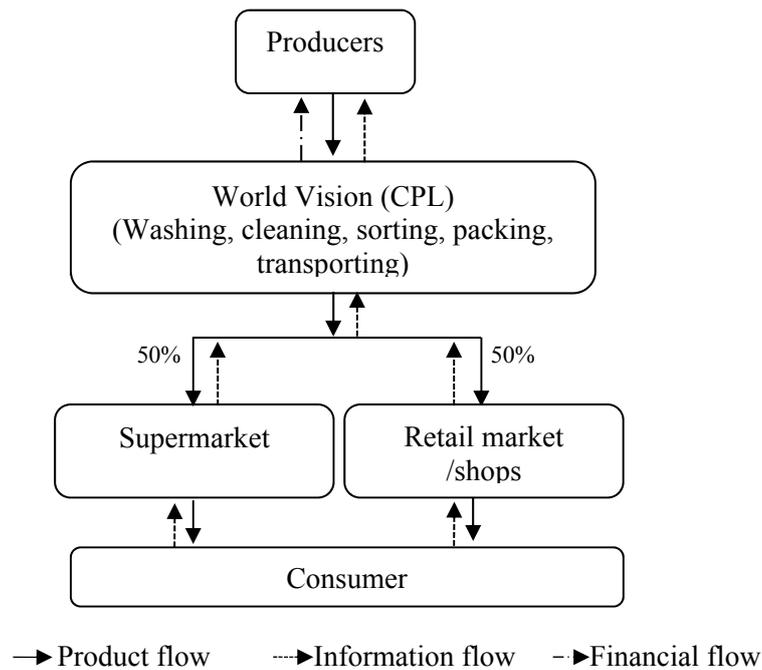
The main challenge faced by the Zero Star chain is that the skills of most of the farmers in these areas are very low. As domestic demand for vegetable products increases, there is a need to increase the production and productivity of vegetable crops. However, the low skill level of most of the farmers in these areas affects the ability to increase production to supply to the market. Another challenge is the remoteness of the localities where farmers produce the products. This affected the quality of the product as farmers need to walk long distances to the collection point (road side). A further challenge is the delay in obtaining production inputs which affects the production and marketing plans and hinders farmers' and Zero Star's

ability to respond to market demand. So far, there is no party involved in propagating new vegetable seed varieties and producing inputs, such as fertiliser and pesticides in Timor Leste. These inputs have to be sourced outside Timor Leste. Other challenges include limited access to seeds and technologies for year round production, high volume of importation of horticulture products (i.e., competition) and poor infrastructure. Poor rural infrastructure and poor communication facilities affect farmers' ability to better link with the markets.

### **6.5.2.2 World Vision supply chain**

The second supply chain in the study sites emanated from World Vision's project on Income Generation and Rural Communities in Timor Leste. World Vision is an international NGO working in the districts of Aileu and Bobonaro.

The World Vision supply chain is composed of three main players, namely farmers, the Centro Produto Local (CPL)-World Vision and their customers. Farmers usually bring their product to the CPL, although, in some cases, World Vision staff collect the produce from the farms and deliver them to the CPL. All the products that go through CPL are registered and documented in terms of quantity, type of produce and the agreed price. After the produce has been documented, CPL then washes, cleans, sorts and packs the vegetables. Following these activities, the produce is then transported and delivered to the Dili market using World Vision's own transport as shown in Figure 6.7.



**Figure 6.7: World Vision value chain**

The main buyers of World Vision are the retail shops and some supermarkets, and the products offered are mainly vegetables (e.g., carrots, cabbage, tomato, beans, snow peas & mustard). The percentage of products distributed to supermarkets is about 50 per cent while retail markets/ shops take around 50 per cent. Farmers who distribute their produce through CPL do not receive any cash payment on delivery. The produce, as mentioned previously, is registered and recorded. Farmers receive payment only after the produce is sold and this normally takes about a week. The cost of transportation is then deducted after the produce is sold.

In terms of the information flow, consumers inform the CPL what products are needed, in what quantity, when they are needed and at what price. From CPL then, this information is passed on to the farmers. Because World Vision is not a private business, all the information, including prices gathered from consumers, are transmitted and explained clearly to the participating farmers. World Vision also provides inputs such as seeds to farmers and helps farmers access micro-finance institutions in that area. The net margins of each chain participants are shown in Table 6.7 below.

**Table 6.7: Net margin for various chain participants in the World Vision value chain**

Description	Carrots		Cabbage		Snow peas	
	Net margin (\$/kg)	Percentage net margin (%)	Net margin (\$/kg)	Percentage net margin (%)	Net margin (\$/kg)	Percentage net margin (%)
<b>World Vision</b>	0.15	25.0	0.15	30.0	0.25	31.3
<b>Supermarket</b>	0.50	38.5	0.50	45.5	1.95	65.0

The table above shows that supermarkets earned the highest net margin from snow peas at 65 per cent followed by cabbage and then at 45.5 and 38.5 per cent, respectively. For World Vision, snow peas also offered the best profit margin at 32.3 per cent followed by cabbage at 30 per cent.

Comparing the net margins received by participants in the chain, snow peas still provided the best profit margin both for the Zero Star and World Vision supply chains which accounted for 65 and 58.3 per cent, respectively. In addition, for the Zero Star chain, carrots and cabbage offered higher profit margins than supermarkets and this accounted for 40 and 46.2 per cent; while in the World Vision chain, these two crops provided the lowest profit margin at 25 and 30 per cent, respectively. Hence, it can be concluded that in the World Vision chain it appears that supermarkets earn more net margins compared to World Vision across all vegetable types while in the Zero Star chain, supermarkets get the highest margin from snow peas and receive the lowest profit margin from carrots and cabbage.

The main challenge faced by this supply chain is that the project run by World Vision depends on the funding from donors. Therefore, they could not guarantee the continuation of the project in the future. Another challenge is the lack of modern seed varieties. As most of the seeds grown by farmers are imported, which, in terms of price is quite expensive and not available locally, farmers need to spend extra money on transport to get seeds from Dili. A further challenge is the lack of motivation to manage the farm. In addition, there are too many family events such as funerals and weddings which dominate most of farmers' time and money that are supposedly used for farm activities. For example, if some of the relatives die, all the related families need to participate in the ceremony which sometimes takes weeks.

Other challenges are lack of input suppliers, lack of standard measurement and the poor skill level of the farmers.

## **6.6 Discussion**

Improving effectiveness and efficiency of a supply chain depends on enhancing all aspects, from production to processing, handling, distribution and marketing. Cox et al. (2007) argued that if the supply chain is to operate, there must be a clear benefit for the players engaged in the chain. For example, farmers are looking for a price that is high and an assured market; whereas buyers are going to seek low prices and a supply that is sustainable. Therefore, if Timor Leste farmers are to be competitive in the market, their supply chain needs to be more efficient and effective (Batt & Cadilhon 2007; Johnson & Hoffman; Orden et al. 2004).

The two value chains that emanated from external initiatives (private sector development and NGO) attempted to link farmers to markets and are two examples of linking farmers to markets (LF2M) in Timor Leste. Through these LF2M initiatives, the supply channel of the product has improved. The value chains introduced has changed the traditional marketing channel, which tends to be long and yield lower net margins to farmers. The introduced chains are shorter and more effective and integrate the need of farmers, Zero star/ World Vision and their customers. This is consistent with the study done by Rao et al. which showed that creation of market linkages significantly contribute to the shortening of the chain with farmers developing direct links with the market (Rao et al. 2004). In addition, all players involved benefited from the chain. Farmers can deliver their produce and receive cash payments weekly; Zero Star/World Vision can get their supply of vegetables on a sustainable basis and with better quality; and consumers can enjoy the availability of the product needed at affordable prices.

The new value chains have also assisted some small farmers in the region to adopt suitable farm inputs, use improved crop husbandry practices, handle produce

properly after harvesting, enhance quality and maintain the recommended standards and packaging. Participating in the value chains can offer benefits to small farmers including access to information, inputs and credits and marketing services (Orden et al. 2004; Dunne 1999). Zero Star and World Vision had linked farmers to high value markets such as supermarkets, hotels and restaurants and farmers now also have guaranteed markets for their products throughout the year. This is important as the stakeholders not only offered a market for farmers produce but also provided training and assistance and offered stable markets for farmers (Low et al. 2006).

In this chain, basic information and supply coordination practices are also shared between players which has led to a more efficient distribution system. As pointed out by Minot and Hill (2007) and Collinson et al. (2003) enhancement of the flow of market information contributes to the high integration between the market and the reduction in costs in the chain which benefits farmers. This can result in a growth in agriculture as the existing demand is transmitted effectively to the farm-gate (Wiggins 2009). The provision of market information for farmers in this region is important as the information can assist farmers with farm-gate marketing decisions, including helping them understand marketing processes more fully and developing strategies to achieve better and more stable prices for their agricultural produce. Improving information and communication amongst players engaged in the chains will result in quality improvements of the product (Batt & Cadilhon 2007).

The new chains provided a better channel for transmission of consumer needs to producers and also information on demand and supply conditions in the Dili and district markets. Value chains are more responsive to consumer needs based on the integration and coordination of the efforts of parties involved in the production and delivery processes (Vorst et al. 2007; Johnson & Hoffman 2003; Ziggers et al. 1998). For instance, in order to maintain product quality and provide a more consistent supply, Zero Star/World Vision is engaging in long-term relationships with farmers. This is needed because through closer relationship and better understanding of the chain and customer value, farmers will likely expand their activities along the chain (Woods; Wheatley et al. 2004), particularly if they are able to identify new approaches to develop products and services that will enable their customers to

perform their activities more economically. World Vision provides training to farmers in the production and marketing of their produce. For example, they provide regular training to improve skills and capacities of chain members so that they are able to adapt to the change that occurs; provide information about market demand of the product; and facilitate transportation of produce to the market.

Value chains are more effective compared to the traditional chain, the reason being that the new chains take into consideration consumer preferences and the demand for the product (Ziggers et. al 1998). As pointed out by Van der Vorst et al. (2007), for the chain to be successful it needs to be efficient, flexible and responsive.

Despite the benefits offered by the new chains, however, the number of respondents engaged with Zero Star/World Vision is small, accounting for only about eight per cent of the total sample. The majority of the respondents are still relying on traditional chains in delivering their produce to the market. The reason is that most of the respondents lack skills and knowledge on how to market their produce, lack capital, have limited information on markets, lack access to roads and face expensive transport cost.

The traditional chain on the other hand is characterized by a large number of actors and a number of alternative marketing channels (Batt & Cadilhon 2007). Farmers lack power in terms of bargaining, lack cash and lack timely information. As a result, traders are able to extract value at the expense of farmers. Farmers generally depend on traders for cash and, in some cases, they provide inputs such as seeds. In turn, farmers must sell their product to traders at the agreed price and this is usually very low. Farmers have no choice because of the problems and constraints they face such as low skills, lack of information as well as their weak bargaining position. As most farmers in the region lack capital to support their farm activities, their dependency on traders to support them cannot be avoided. Higher dependence on traders results in higher vulnerability and, as traders are the exchange partners that are more powerful, they can create and manage the trade that is more favourable for them (Heide and John 1988). On one hand, farmers feel that traders are helping them by providing cash to assist in the production of their crops but, on the other hand, this

support can make them more dependent on the traders. Because of this, traders have the power to decide the value of the product (Batt & Cadilhon 2006) which leads to less revenue being received by the farmers. Therefore, whenever channel members dominate the resources required by another member, this will emerge through various power relations (Andaleeb 1996). This potentially enables the party to have control over the resources to exercise their power. The lack of knowledge of market prices and weak bargaining power, combined with lack of cash and lack of storage facilities in rural areas have further weakened the bargaining power of farmers (Thapa et al. 1995; Lantican 1997; Shresta & Shresta 2000; Khushk 2001).

In the traditional chain, farmers rarely have access to information on inputs and outputs and lack access to the market. Farmers lack strategic information because they do not have skills and knowledge (Batt & Cadilhon 2006) and therefore they rely on what they know. Because of the difficulties in accessing information, farmers do not know what the exact quality requirements are, when the produce is needed and what quantity is being demanded by the market. As a result, the majority of the farmers in the region continue to produce the same product at the same season, as the production is not based on what is demanded by the customers. A further consequence is that vegetables are sold at a low price. In addition, most of the actors engaged in the traditional chain conduct less value adding activities and, in some cases, there is no value addition at all for the produce. Traditional supply chains generally are not equipped to respond to a large range of customer demands (Johnson & Hoffman 2004). For this reason, traders have no direct access to supermarkets, hotels/restaurants and similar bulk buyers.

In terms of the net prices received by farmers, there is no differences in the net prices offered both in the traditional and the value chain introduced for carrots, cabbage and snow peas. For example, in the traditional chain, carrots were sold at 0.35 cents/kg while in value chain the price received by farmers was the same. The net price offered in particular for the value chain does not reflect the quality of the products and the resources used in the value adding activities. The reason why the price offered to farmers is the same is because there is a lack of buyers in the region and farmers lack bargaining power as they generally sell their produce individually. In

this case, buyers have the power to decide the price including the price for value added products. Another reason is the seasonality of production which resulted in the oversupply of the product in the market. Even though farmers' value added their products, this did not result in better prices received. This discourages some of the farmers to be involved in the value chain as there is no differentiation in the price offered by the various chains.

Based on the net margin analysis it can be concluded that across the traditional supply chains and the value chains, supermarkets consistently earned the highest percentage net profit margin, particularly for snow peas. However, the percentage net profit margin earned by supermarkets from value chains is higher than the traditional chain. For example, in the World Vision and Zero Star chain, supermarkets receive 65 and 58.3 per cent of net profit margin, respectively, while in the traditional chain their net profit margin was lower at 55 per cent. The income effects on farmers will be examined in more detail in Chapter 8. Traders and retailers that are still operating in the traditional supply chain earned the lowest net profit margin because they provide little value adding and the products delivered do not respond to what is being demanded by the market. For World Vision, in particular, achieving a satisfactory margin is important because this will then enable them to continue to support their LF2M program. The profit gained from this activity will be used by World Vision for paying CPL staff, transport costs and for the purchase of inputs required by farmers.

The prices received by farmers varied according to the type of the product. Carrots are sold with an average price of 0.35 cents per kg, cabbage at 0.30 cents and snow peas at 0.45 cents per kg. There is no price differentiation for good quality products provided by farmers. The price of all the products supplied to the buyers is the same both in the traditional chains and the value chains. For example, both graded and non-graded snow peas fetched the same price; that is 0.45 cents per kg. The price offered to farmers, in particular, those involved in the value chains should be better than those for farmers who operated in the traditional supply chains because in the value chains farmers performed value adding activities for the product and therefore need to be rewarded in terms of better price for the product. However, this does not

seem to occur in the study area. This result is in contrast with previous studies (e.g., Miyata et al. 2009; Samaratunga; Tukan et al. 2006; Silva; Danson et al. 2005) which found that farmers who participated in LF2M programs received higher price for their produce. In these studies farmers efforts in providing good quality products are rewarded with a price premium received for their produce.

## **6.7 Conclusion and implications**

The supply chains for carrots, cabbage and snow peas that exist in Aileu Vila, Maubisse and Hatubuilico are comprised of traditional chains and value chains, the latter introduced by Zero Star and World Vision. The traditional supply chains are longer and complicated; while the value chains are shorter and take into account customer preferences and therefore, is more effective in meeting costumers' needs.

In the traditional chain, farmers usually manage their farm businesses individually and therefore their bargaining position with traders is weak. In addition, because of lack of skills and capital, the quality of their product is low. During peak harvest season for example, there is fierce competition by producers in the same district or villages to sell their produce, rather than take any collaborative action to exercise any influence on the prices offered by buyers. As a result of the low price received and other problems and constraints faced in this chain, farmers are deterred from increasing their production. Players engaged in this chain, in particular, traders and retailers, earn the lowest net profit margin.

In value chains, there is an effort to improve performance of the supply chain through the application of pre-harvest and post-harvest technology, such as the use of crates, plastic sack, use of standard weight and boxes. Through cooperation with Zero Star and World Vision, a mutually beneficial relationship developed between farmers and Zero Star and World Vision in terms of an assured market for farmers and good quality products delivered to the market. As Van der Vorst et al. (2007) pointed out, tightening partnership with other parties engaged in the chain is

important for all businesses so as to guarantee safe and high quality food for consumers. Farmers who engage in this chain are becoming more aware of the quality of carrots, cabbages and snow peas that are desired by customers. Through the chain, Zero Star and World Vision encouraged participant farmers to pay attention to the quality of their products.

Implementing an effective chain which delivers high quality produce to the market however did not guarantee an increase in income for farmers. This can be seen in the percentage of net profit margin received by participant farmers which is the same with non-participant farmers. The benefits of the LF2M were from the increase in production and the improved quality of the produce assuring them entry to institutional markets. In the new value chain, farmers were empowered to work in groups so that they can have a stronger bargaining power in the transaction process and be able to supply to supermarkets. Farmers participating in this chain were able to increase production and improve the quality of the product, though this did not affect the prices received for their produce.

The value chains introduced by Zero Star and World Vision are better than the traditional supply chains. The chains are shorter and facilitated entry of farmers' produce to the high end market in Dili. Traditional chains on the other hand do not have access to the high end market. There is no improvement in the chain and the channel is quite long and complicated.

The finding of this study has some policy implications in enhancing supply chain systems for horticultural produce in Timor Leste and in developing countries, in general. For instance, the government needs to create an enabling environment that facilitates marketing agents (e.g., traders and intermediaries) to engage in the marketing of horticultural produce and get a fair share of the benefit from their effort and investments. In this case, there is a need for government to develop roads which link potential rural horticultural areas with market centres. Improving rural roads will not only reduce the cost of transport but also encourage potential buyers to engage in the marketing of agricultural produce. This will also promote competition among buyers thereby improving farmers' chances of getting fair prices for their produce.

Also important is an environment that is conducive to facilitating the implementation of the LF2M programs. This can be done through the provision of better information systems, improving the flow of information on input and output prices from various market centres to farmers. Farmers' groups can perform this role with the assistance of government and NGOs. The availability of marketing information in particular on prices would offer farmers a choice on where and to whom to sell their products.

Carrots, cabbage and snow peas are perishable in nature which means that efficient distribution and handling under controlled conditions are critically important to maintain the quality of the product. The cool truck and cool room facilities of Zero Star demonstrated the value of delivering quality fresh produce from the farmer to the consumer. Farmers are also encouraged to ensure that their downstream customers are happy and satisfied when purchasing the product.

# Chapter 7

## Current Models of Linking Farmers to Markets in Timor Leste

### 7.1 Introduction

One of the objectives of this thesis is to examine current models of linking farmers to markets in Timor Leste. This chapter describes in detail the current programs on LF2M in Timor Leste for various products including horticultural products. Section 7.2 presents six cases which represent six models that currently operate in buying farmers produce and selling them to both the domestic and export market, are first presented. Section 7.2.1 presents the case of Zero Star Uni Pessoal, an international aid supported private sector development initiative. Section 7.2.2 highlights the case of an NGO initiative to support rural livelihoods - World Vision's income generation and rural community project, followed by the case of a coffee cooperative known as Cooperativa Café Timor (CCT) in Section 7.2.3. In Section 7.2.4 the case of Timor Global, a private sector initiated contract farming in Timor Leste is presented. Section 7.2.5 deals with a government supported program to address input and output marketing - the case of Agriculture Service Centres (ASC). Finally, Section 7.2.6 presents the case of a local farmer-driven cooperative known as Cooperativa Haburas Fronteira.

Each of these case studies presented the background of the stakeholders, products handled, services provided and the distribution system for the products handled. Following the cases, the learnings are then synthesised in the discussion section (Section 7.3). Finally, the chapter ends with some concluding remarks in Section 7.4.

### 7.2 Models of linking farmers to markets in Timor Leste

In the last ten years a number of stakeholders have been working in Timor Leste in supporting farmers to increase their income. The contribution of these stakeholders is

important for the development of the country in terms of raising the income of the rural population and helping the poor get out of poverty. This is usually done through the agricultural sector by providing farmers support and assistance and empowering them so that they can manage their farm business effectively.

Recognising the importance of the private sector in the economic development of Timor Leste, a number of interventions have been made through institutions such as cooperatives, agribusiness firms, private businesses and government support programs. The aim of these interventions is to support and assist farmers increase their production and facilitate the movement of their produce to the market. While there have been several linking farmers to markets (LF2M) initiatives introduced since Timor Leste's independence, little is known about the nature of these linkages and the issues surrounding implementation, as well as their impacts. Yet, such knowledge could be useful in providing vital information on effective LF2M strategies in the country, their benefits as well as the challenges. Such information will be useful not only in Timor Leste, but in other developing countries as well as the world moves towards more global integration.

In this study, case studies of current models of LF2M in Timor Leste were developed, with the view of understanding the impact of the LF2M initiatives in Timor Leste, their challenges, and key strategies to deal with these challenges. These case studies and the subsequent analyses are presented below.

### **7.2.1 Private sector development via international aid: the case of Zero Star Uni Pessoal**

Zero Star Uni Pessoal is a small business distributing vegetable products to the Dili markets. The business started when Mendonca moved to Dili to study in 1997. To support his tertiary education, Mendonca started to trade in Dili market, selling vegetables. After learning more about the trade, he decided to start his own business in buying and selling horticulture products. In 2006, Mendonca officially registered

his business under the name, Zero Star Uni Pessoal. This LF2M initiative resulted to the Zero Star value chain described in Chapter 6.

At that time, most of the products Mendonca bought from farmers were sold at the local market. He was unable to enter the more lucrative higher end supermarkets which mostly sold imported vegetables. In 2006, Zero Star got involved with DSP-USAID. Through its targeted business assistance and Small Grants Program (SGP), the DSP-USAID project helped Mendonca transition to a professional wholesale business with cold chain management capacity, production planning with growers to produce new products and market to high-end buyers. As part of DSP's assistance, Mendonca undertook training in horticultural production, post-harvest handling, packaging, grading and standardisation.

Zero Star first started delivering graded produce to Dili supermarkets in early 2007. By January 2008, Zero Star had a fully operational cold chain in place, with a cold truck used in the procurement of vegetables from the mountains and delivering produce to Dili. Zero Star also built a small cold storage facility in Dili where grading, sorting and packing were done. All of the facilities (e.g., cold truck and cold storage) were purchased with the support of DSP-USAID.

The vegetables supplied by Zero Star to the high end markets in Dili include carrots, cabbages, snow peas, beans, lettuce, pumpkins, tomato, broccoli, kale, cauliflower and Chinese cabbage. These products are supplied through a network of about 500 independent smallholder growers in Aileu, Maubisse, Hatubuilico, Ermera and Liquica. These are largely small-scale farmers who depend on these markets for income and other essential needs. Buying arrangements with growers vary, from scheduled planting for specialized products to cash on delivery purchases when products are available. The products are harvested in the early morning to avoid the heat and are transported carefully to protect them from the sun and wind, until delivered to the client. Grading takes place at the farm gate. Since Mr Mendonca started his business in 1997, the number of farmers who produce vegetables for Zero Star has grown from 20 to about 500 farmers.

Services provided by Zero Star to farmers include access to inputs (e.g., seeds, fertilizers and chemicals); training on production techniques; and buying farmers produce. Farmers are provided with the inputs, with special arrangements made for the repayment of these inputs. For example, farmers pay back the costs of seeds, fertilizers and chemicals after harvesting their crops. Farmers who receive these inputs are obliged to sell their products to Zero Star. This is because, aside from the inputs farmers receive, Zero Star also provides regular assistance to them in the production process and in harvesting. Capacity building includes training, participating farmers in technical and agronomic aspects, integrated pest management, composting, harvest and post-harvest operations, book keeping, grading and packing. Zero Star, with DSP's assistance, also helps small scale farmers form a group. By working in groups, organizing for the purpose of marketing is easier (e.g., putting together the products in one place and reducing the number of people involved in the organisation to only one person). It is also easier to coordinate training and information dissemination, such as exchanging information, between members of the groups.

### **7.2.2 NGO-supported programs: the World Vision income generation and rural community projects**

Another LF2M model in Timor Leste is an NGO-supported program – the case of World Vision's income generation and rural community projects. This initiative discussed resulted to the creation of the World Vision value chain discussed in Chapter 6.

World Vision is an international NGO working in Timor Leste, particularly in the districts of Aileu and Bobonaro. World Vision started work in Timor Leste in 1995 and continued work until Timor Leste became independent. Most of the World Vision programs stressed improvement of the yield of agricultural crops, increased level of income in rural communities and addressed the issue of children's health and nutrition. World Vision's project on *Income Generation and Rural Communities* focused on developing the agribusiness and private sector in Timor Leste. This was

done by developing the entrepreneurial skills of the community and establishing mechanisms to link farmer's produce to the market. This, in turn, encouraged communities to expand their production capacity.

The aim of World Vision was to increase agricultural production and improve marketing through the introduction of new crop seed varieties, introduction of new technologies, linking farmers to markets and improving farmer's income through income generation activities. The services provided included training in enhancing soil fertility, composting, crop rotation, establishing terraces, weeding, marketing and ways to improve animal health. Other important services were distributing agricultural materials and tools, providing modern seed varieties, facilitating extension workers to assist farmers, establishing mini greenhouses and facilitating transport to market farmers produce. The products handled included carrots, cassava, potato, mustard and cabbage. The reason that these products were central to World Vision was based on a market demand study prepared in the business plan.

The activities in which World Vision assisted farmers in production and marketing include encouraging farmers to use proven modern seed varieties, organizing farmers into groups by sharing their labour and skills to increase production, facilitating transportation of the produce and training in post-harvest handling and quality control. World Vision assisted in conducting a market survey and in the establishment of a centre for local produce known as CPL.

CPL is a centre established by World Vision in 2007, with the aim of helping farmers sell their produce to the market. Farmers who deliver their products to the CPL do not receive any cash payments from the centre. The centre just registers the quantity of the products received and then processes the products. CPL applies quality control for all products received from farmers. After the products are sold in the market, CPL then pays farmers according to the agreement that has been made, particularly the price of the products. It takes about one to seven days before the entire products are sold. Through the centre, farmers save time and money for some marketing activities, such as transportation cost, grading, cleaning and packing.

The strategy used by World Vision to help farmers in selling their produce is as follows. In the first year, 75 per cent of transport costs are paid by World Vision and 25 per cent are paid by farmers. In the second year, the cost of transport is split 50:50, with, World Vision paying 50 per cent and farmers paying 50 per cent. In the third year, farmers pay 75 per cent and World Vision contributes 25 per cent. Finally, in the fourth year and onwards, farmers pay 100 per cent of the transportation costs. This is an important strategy as it involves farmers in organising the transportation of their produce to the market. It is a slow process but the farmers are clear that by the fourth year they will be responsible for their own transport costs. This is one way to train farmers to collectively organize their produce and share the cost for transporting their produce to the market, as this can reduce the cost of marketing. Furthermore, by involving farmers in sharing the cost of transport progressively, World Vision is showing that their contribution will be withdrawn one day. This prepares farmers to take over when it comes to the completion of the project. This means that the sustainability of the program will be maintained in the future.

### **7.2.3 The cooperative model: Cooperativa Café Timor (CCT)**

Coffee is critical to the overall economy of Timor Leste. It is also the most significant source of foreign exchange for the country. Coffee is a dominant source of income for about 44 000 families, or one-fourth of the Timor Leste population (MAFF 2004; Saldanha & Costa 1999). Initially in 1994 (under Indonesian occupation), NCBA, in partnership with the Timor Leste Village Unit Cooperatives (PUSKUD), developed a program to market organic coffee internationally. Under the Timor Economic Rehabilitation and Development Project, CCT was established. After Timor Leste achieved independence, the previous CCT structure and activities stopped working. Recognizing the importance of coffee to the economy of Timor Leste, following independence, Timorese coffee farmers came together to re-establish CCT with the hope of expanding the market of their coffee to the international market. By 2000, about 19 000 small coffee farmers were organised

into 16 organic cooperatives and 493 farmers groups to form the structure of a national cooperative known as CCT (NCBA 2005).

Cooperativa Café Timor is a secondary cooperative owned by Timorese with processing and marketing of organic coffee as the main activities. According to CIP (2005) there were about 150 000 farmers who have been selling their coffee through the cooperative. The objective of the cooperative is to increase the income of coffee farmers, introduce an improved chain to farmers and to develop the planning and policy for the commodity that supports the economy of Timor Leste.

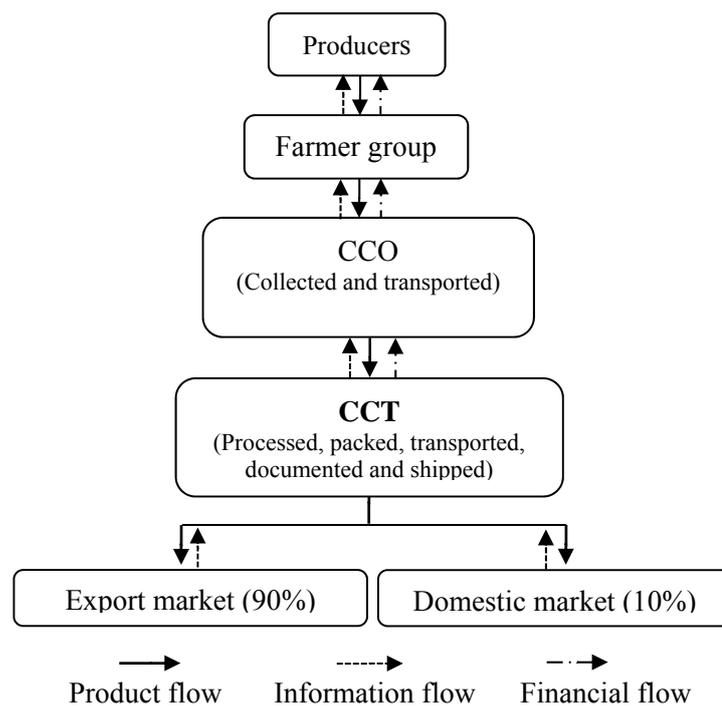
The cooperative has expanded and now has 21 553 members who grow coffee, spanning a total area of 26 352 hectares (Fair Trade Certified 2008). Cooperativa Café Timor now has a registered certified organic membership of 17 576 participating farm families located in Aileu, Ainaro, Ermera, Liquica and Manufahi districts (MAFF 2006). CCT's coffee is now internationally certified "organic", and the product has been accredited by the International Fair Trade Labelling Organization. Since the international organic grown certification and Fair Trade Labelling, the cooperative has benefited from receiving Fair Trade price.

As a cooperative, CCT is owned by members which are mostly comprised of coffee farmers. The components of the cooperative are coffee production, agriculture diversification, organizational structure and health. In terms of the organization, CCT has three levels of organization and management - at the national level: a federation; the primary cooperatives societies (CCO) and farmer groups (NCBA 2003). At the producer level, the cooperative structure is based on about 500 democratically organized farmer groups. The leadership of CCT consists of a board of directors which is responsible for all decisions related to the policies of the federation, coordination with government and development planning; and a manager and staff that is responsible for the procurement operations (see Appendix).

The produce handled by CCT includes organic coffee, organic vanilla, Bali cattle, nursery and cloves. The reason for choosing these products was that these products have the potential for export and also provide significant income to the rural

households. The services provided to members include training (e.g., management, business, leadership, pruning, compost, grading and application of quality standards); rehabilitation of shade trees; distribution of coffee seeds; delivery of health assistance; and rehabilitation of rural roads. Other services include the development of an export market for vanilla beans and the opening of trade links with neighbouring Indonesia for the sale of cattle to traders in West Timor.

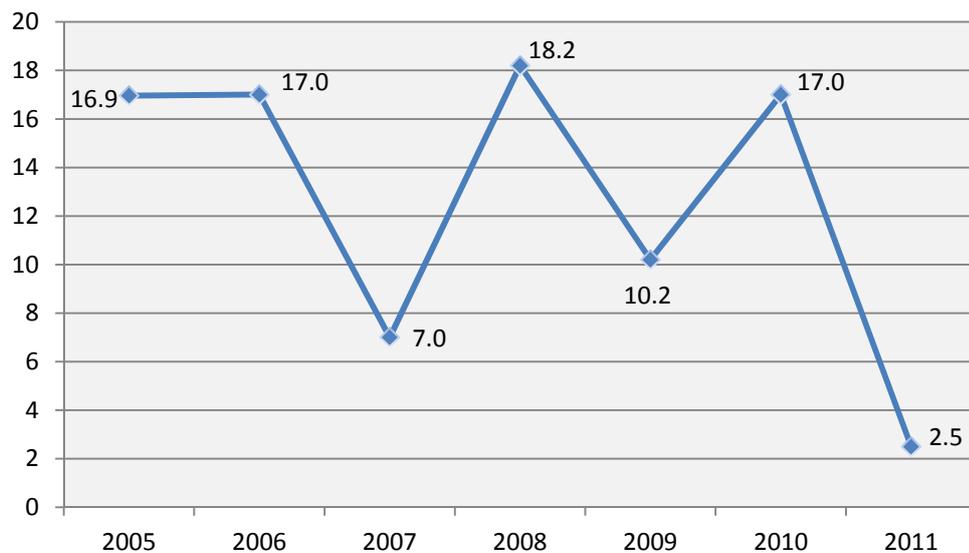
The distribution model for organic coffee is as follows. Coffee farmers deliver their product to the group and then, in turn, the group delivers to CCO and, finally, CCO delivers to CCT. The coffee is processed by CCT before being exported to the destination countries. In this model, CCT conducts all the processing activities from collecting, transporting, drying, grading, packing, documenting and shipping, as shown in the Figure 7.1.



**Figure 7.1: Supply chain for organic coffee**

For organic coffee activities alone in 2003, CCT employed 300 full-time employees and provided part-time jobs to 4 000 workers, mainly in the coffee season. About 800 women were employed to grade the coffee (Weihe & Warner 2005).

The main criteria used when buying coffee cherries from its members is the quality of the product. The coffee sold by farmers needs to fulfil the standard set up by CCT. This is to meet the internationally recognised certification standard for organic coffee and the need for this quality standard to be maintained. Cooperativa Café Timor only buys coffee from its members as it is easier for them to control the quality and also to organize when it comes to harvest season. Figure 7.2 shows CCT’s production of organic coffee from 2005 – 2011.



**Figure 7.2: Production of CCT coffee (ton)**

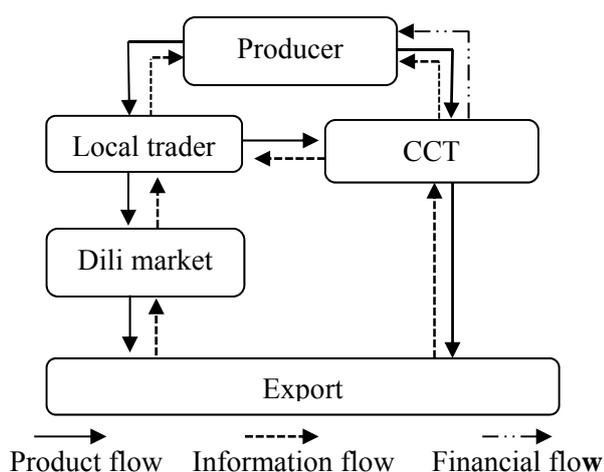
The Figure above shows that the peak of the production of CCT coffee occurred in 2008 with total production of about 18t. In 2011, the coffee production was decreased drastically to only about 2.5t. This is due to the bad weather condition that occurred in that year.

The majority of organic coffee produced by CCT is for export, with 80 per cent of the product going to the United States of America and the rest to Portugal, Australia, New Zealand and Japan. Only a small percentage of the product is sold through the domestic market (10%). In terms of the competitors, there are a number of competitors in Timor Leste who compete with CCT to buy organic coffee, including Timor Global, Timor Corp and Peace Wing from Japan.

In addition, as a result of the fluctuations of international coffee prices over recent years, CCT has been developing diverse enterprises, including an organic vanilla enterprise and a farm family-based cattle enterprise. The aim is to increase farmer's income and also to reduce risks faced by most farmers in the region, relying only on coffee as the main source of income.

From early 2002 to 2005, CCT processed and marketed about two tons of export vanilla beans. This product has also been internationally certified as an “organic” product. Almost 3 000 farm families now produce high quality vanilla beans for the international market (USAID 2006). During 2005, 28 farmer groups had already grown vanilla, with total area planted covering 224 ha which spanned 10 districts (CCT 2005).

The distribution channel of vanilla is shown in Figure 7.3. As shown in the figure, farmers can sell their product directly to CCT, or they can channel it through a local trader. However, most farmers sell their product directly to CCT. The reason is that CCT is the only entity that provides regular assistance in the production of vanilla and trains farmers how to conduct artificial pollination. Cooperativa Café Timor then processes (e.g., cleans, dries, grades and packs) the vanilla beans in preparation for export. The products that are distributed through the traders are generally sold in Dili markets.



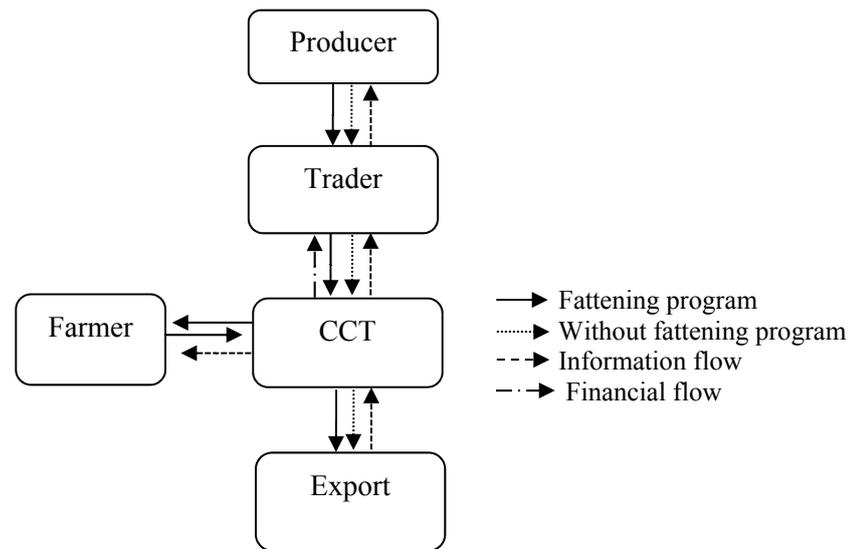
**Figure 7.3: Supply chain for vanilla**

The *Bali Cattle Fattening program* of CCT currently accounts for a total of 472 heads of cattle, being managed by 319 farm families (MAFF 2006). The mechanism of the program is that the Bali-bred bulls, which weigh 150 kg, are contracted to farmers who feed, water and care for the cattle for about 12 months, or until they have reached a body weight of about 280 kg. CCT then organises the local and international marketing of the fattened cattle, returning 70 per cent of the sale price to farmers, and also purchasing replacement cattle for the contracted farmers to repeat and expand the program. Cooperativa Café Timor also assisted their fattening farmers to establish fodder banks for use as supplementary feed for cattle. In effect, they are credit providers to farmers since the value of the young animals which are fattened is deducted from the final purchase price of the finished cattle. The objective of this programme is to assist farmers to diversify and improve their income with a minimal input of technology, economic risk and investment by smallholders.

According to Sendall (2006) the cattle export model developed by CCT has proved successful and, as shown, profits, although small, can be made from exporting cattle to West Timor (see Appendix 5). The *Bali Cattle Fattening Program* is a successful model because technical assistance, free fodder seedlings and market incentives provide the basis for a shift in farmer attitudes and practices. The main export market is Java, Indonesia. The demands for beef in this region are likely to remain high for the foreseeable future (Sendall 2006). In 2006, for example, CCT in conjunction with NCBA-West Timor exported 500 cattle from Timor Leste to West Timor for shipment to East Java. Premiums are paid for heavier beasts and, as export charges are on a per head basis, marginal profit is increased by exporting heavier cattle.

There are two Bali cattle supply chains operated by CCT (Figure 7.3). These supply chains are as follows. First, the supply chain not involving CCT intervention in the fattening program. In this chain, traders buy bulls for CCT from farmers that fulfil the standard export weight required by export buyers. Then CCT sells these cattle to exporters from West Timor. The second supply chain uses traders to buy Bali cattle bulls for CCT fattening programs. In this chain, traders, on behalf of CCT, buy young bull/s from farmers which are then supplied to CCT. Cooperativa Café Timor

then supplies these young bulls to farmers it has contracted. The farmers are then responsible to CCT for the husbandry of the bulls until the required export weight of the animals has been reached, upon which, CCT sells the animals to the exporters from West Timor (see Figure 7.4). Most of the market for Bali cattle is for export. This system can provide extra income to farmers at US\$107 per head, per year. In addition, the total bulls that farmers look after per year are one to two bulls.



**Figure 7.4: Supply chain for Bali cattle**

The challenge faced by CCT is how to guarantee the quality of the product while, at the same time, offering a better price to farmers. As the price of coffee is based on world prices, it is difficult for CCT to guarantee a better price for farmers. This sometimes creates misunderstanding between CCT and its members. This problem is exacerbated by the fact that most of its members have little or no formal education and they do not understand the impact of world commodity prices.

Another challenge is that there are more businesses involved in buying organic coffee for export. This creates significant challenges to CCT in terms of how to secure the quantity of coffee for export. To secure the volume of the product, some businesses offer higher prices to farmers. As a result farmers sell their product to those businesses. There is no commitment for some of the cooperative members in selling their coffee to CCT.

Other challenges include poor infrastructure and constant fluctuations in the price of the product. As the price of the product is based on world prices, the increase or decrease in prices can happen at any time and this contributed to the revenue received by farmers. Lack of investment in rural infrastructure makes it difficult to bring coffee cherries to the cooperative for processing. Timely delivery of the coffee is essential to achieve a high quality product and, thus, delays in delivery will reduce the quality and thus the price paid by the cooperative. Expensive transport cost resulting from bad roads and bridges also affect farmers in accessing the market.

#### **7.2.4 Contract farming: Private sector initiated linkage - the case of Timor Global**

The fourth LF2M model is contract farming, which was initiated by a private sector firm. One of the private sector businesses that operate in the agricultural sector in Timor Leste is Timor Global. This firm is a joint venture firm between a Singaporean and East Timorese firm. The business was started in 2005 under the management of a Timorese businessman involved in importing and exporting agricultural products. The motivational catalysts involved in starting this business in Timor Leste is firstly because of the potential for the production of organic coffee and to promote the coffee industry in this country; secondly is the businessman's desire to develop agribusiness in Timor Leste and to help improve the income of farmers; thirdly, the potential to export; and, lastly is because the owner of Timor Global was originally Timorese who operated a business in Timor Leste during Portuguese times.

The firm has an office and warehouse in the sub-district of Railaco, Ermera and owned more than 70 ha of land which is ready for growing coffee. Besides this, Timor Global also established nurseries and demonstration plots, as well as built a factory for processing coffee with warehouse and laboratory facilities. The firm has 10 trucks and other vehicles and processing machinery, and has invested over two million dollars in Timor Leste (MAFF 2006). Now the firm employs 80 permanent staff and between 100-150 casual staff, mainly working in coffee grading.

In the long term Timor Global plans to invest over USD 12 million in Timor Leste over five years and to employ more than 1000 people (MAFF 2006). The company's core business will be 3000 ha of coffee plantation which they propose to rehabilitate using modern techniques for growing premium grade coffee, with old shade trees replaced and some high value teak planted. Most of this plantation coffee was abandoned when the Indonesians left and is now basically unmanaged; the coffee is only harvested opportunistically.

Unlike other firms which have expressed interest in investing in Timor Leste, Timor Global has demonstrated a commitment by already investing in the country and establishing a productive business. "This is only the start," explained the owner and Director of Timor Global. He further added: "We have clients ready to buy coffee, quality peanuts, cassava chips and sago, and in large quantities".

The products Timor Global handle include coffee, peanuts, pepper, mungbean, black bean, cloves, maize and soybean. The reason for Timor Global choosing these products is because these products grow well in Timor Leste and have the potential for export.

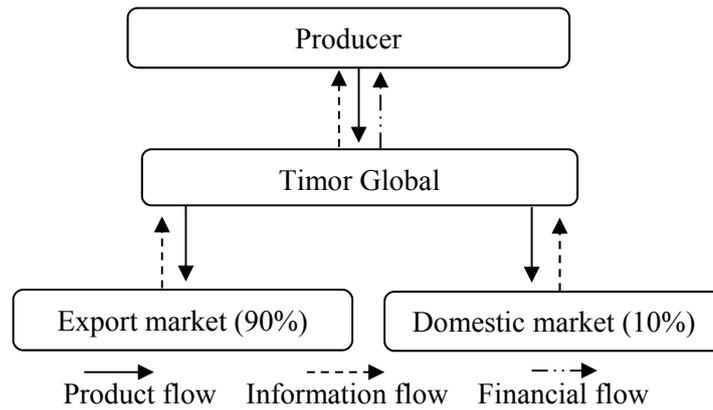
Under this model, Timor Global assisted farmers in organizing themselves into groups. They also initially provided inputs (e.g., seeds, fertilizers and chemicals); mechanization equipment (e.g., tractors); link them with micro finance; and provide them with training (e.g., on quality standards, farm management, book keeping, marketing and equipment management and maintenance). In return, farmers have to sell their produce to Timor Global at an agreed price. The inputs and equipment provided to farmers are paid back by farmers after harvesting. Currently, this contract arrangement is only for the peanuts program which is being piloted for the next three years. According to Timor Global, if this contract farming is successful, this will lead to the arrangement being extended to other commodities.

Timor Global buys all produce as long as the produce meets the standard they set up. All the produce are brought by farmers to Timor Global agents which are then delivered to the warehouse in Ermera. All farmers, individual or groups, can sell

their products to Timor Global. There are no criteria for the inclusion and exclusion of farmers in selling their products to Timor Global. The products bought by Timor Global are then exported to Singapore before being sold in Singapore or further exported to other countries. The major buyers are from Singapore.

In terms of competitors, there are many businesses operating in these commodities. These include CCT, Timor Corp., Delta Cafe and Peace Wing Japan. Despite competitors running their businesses in the same commodities, the services offered by Timor Global is different from the competitors. For example, for coffee, Timor Global established a processing station to process the coffee before they sell it to them. The price offered to farmers is higher compared to prices of competitors. For peanuts, Timor Global provides mechanization equipment, inputs and technical assistance on how to manage the crops and conducted daily maintenance to the tractors, while farmers provide the land and manage the crops. The product is then divided after harvesting, with 40 per cent for Timor Global and 60 per cent for farmers. If farmers want to sell their produce, Timor Global is willing to purchase them any time. This arrangement gives Timor Global an advantage as other companies only purchase products during harvest time. Bernard and Spielman (2009) pointed out that given the right incentives and contracting systems, small farmers can participate successfully in emerging value chains. The same study argued that thousands of small farmers benefited because of a combination of effects such as improved access to inputs, credit, extension services, technology adoption, as well as from productivity spillover effects on other crops and enhanced income stability.

The peanut distribution system for Timor Global is simple - farmers sell their products directly to Timor Global because there is a contract agreement between both parties. Figure 7.5 shows 90 per cent of the products handled are for export market and the rest are sold in the domestic market.



**Figure 7.5: Timor Global supply chain for peanuts**

One of the logistical problems faced by Timor Global in accessing products from farmers is the difficulties in transporting the products to the warehouse in Ermera. Given the difficulties in the terrain such as poor road condition and occurrence of landslides, farmers and transporters face significant challenges in delivering the product on time and in good quality. This results in inefficiencies in the supply chain, thus reducing income. For example, getting mungbean from Suai district to Ermera takes one to two days. Because of this, cost of transport is higher and the quality of the produce deteriorates.

The critical challenges faced by Timor Global includes corruption, bad and/or lack of infrastructure, lack of government regulation in marketing of agricultural products, village mentality, lack of economics of scale and low skills of most of the rural population. As a new nation, corruption in some government bodies adversely affects the business in terms of costs and timing of delivery. For example, the process in getting documentation for export and import takes time and increases cost because of the long bureaucratic procedure that needs to be followed.

The poor quality and general lack of telecommunication infrastructure in rural areas is another challenge faced in implementing Timor Global’s business initiative to link with farmers. As some of the districts do not have access to telephones, both the farmers and Timor Global need to spend extra time and cost for acquiring information. In addition, the village mentality wherein any programs or initiatives such as those introduced by Timor Global are considered as government programs or

donor-funded programs, and therefore they expect special concessions. For example, if the company wants to employ them, they ask for a high pay even if their skills are very low.

A further challenge is farmers are not able to supply Timor Global with the minimum quantities required by the firm's clients. For example, the minimum order for peanuts is 500t per year which is very difficult to achieve.

### **7.2.5 Government-supported program: the Agriculture Service Centre**

The Agriculture Service Centre (ASC), established in 2004, is a new strategy in the development of agriculture which was recommended by the World Bank and administered by the Ministry of Agriculture, Fisheries and Food (MAFF). ASC is a business which was designed to operate on a commercial basis and to become a self-sustaining business. The Agriculture Service Centre can offer farmers goods, supplies and services that they need at full cost recovery.

The enterprise is based on the concept of non-subsidized agriculture where farmers engage within a system of a free-market in which produce is sold at market value. ASC is also designed to supply agricultural equipment to farmers needing tractors, as well as inputs and veterinary services. As stated by the World Bank, ASC will provide urgently needed inputs, services and technical assistance and training to the rural communities (Lao Hamutuk 2000). Apart from the services mentioned, ASC also helps farmers by buying their produce and introducing small business arrangements in the agriculture sector in Timor Leste.

The organizational structure of ASC is comprised of a board of directors (e.g., representatives from the church, women's groups, civil society, traditional leaders, the business community, District Agriculture Officer and each of the sub districts heads); a manager; an accountant; and a marketer. It was a requirement that the board be made up of Timorese nationals who must originate from communities in which ASC is located and operated (Lao Hamutuk 2000). To be operational, the

enterprise should have a minimum membership of 3500 farmers and the membership is open and free to anyone who wants to join in. The ASC organisational structure is meant to meet the fundamental basis required to increase agricultural production, i.e., to involve a large number of rural producers and set up businesses operating as commercial 'for profit' entities. With this structure, there is a potential for building self-reliant, sustainable enterprises, servicing large numbers of small farmers (Lao Hamutuk 2000).

ASC offers training to farmers including administration and management, product quality improvement and storage. In addition, services for rice procurement and milling are also provided. All of the services are not free and farmers have to pay for it. ASC is the sole supplier of inputs - a crucial business for ASC and the rice industry in Maliana district. According to Larsen (2006), ASC operates efficiently and provides considerably cheaper inputs than input suppliers from Dili. The ASC also runs a well-managed storage operation.

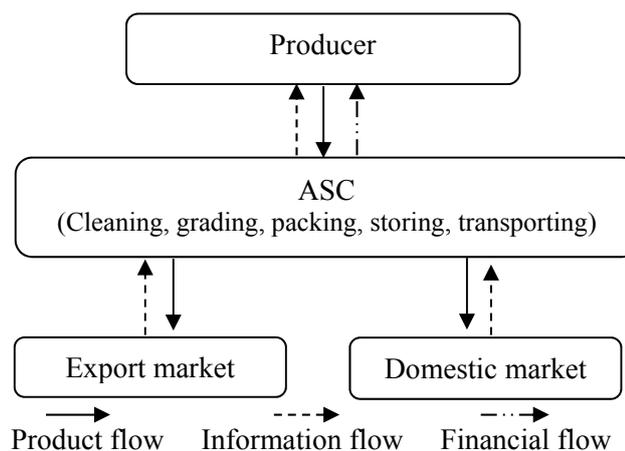
The products handled by ASC are paddy rice, maize, mungbean, soybean, copra, candlenut and coffee. The choice of products is because they are potentially aimed at the domestic market as well as the export market. For instance, rice and maize sell in the domestic market and mungbean, soybean, copra, candlenut and coffee are destined for the export market, particularly to Indonesia. In 2008, the ASC purchased 140t of paddy rice, 3t of maize, 3t of mungbean and 1.7t of soybeans (Larsen 2006).

The Agriculture Service Centre operated in three different districts in Timor Leste including Maliana in the west, Aileu in the south and Viqueque in the east. The reason for choosing these districts is because of the potential for certain products that exist in these areas. For example, in Maliana ASC targeted paddy rice, maize, mungbean and soybean, Aileu was chosen for coffee while Viqueque for copra and candlenut. The businesses operating in Maliana covers farm inputs, micro-credit scheme, hand tractor services and rice procurement and milling operation. In Aileu, ASC only operates to provide farm input supplies and services. Meanwhile in Viqueque, the business targeted farm input supplies, hand tractor services, rice milling operation and procurement of industrial crops (e.g., copra and candlenut).

The services provided by ASC facilitate farmers in each of the areas in improving their production and also encourage farmers to sell their produce to the market.

The ASC competes with other businesses including local traders and Timor Global. However, ASC products and services are unique as they include registered farmers on the board and deal directly with farmers. By having specialized areas of operation on certain commodities, an advantage of ASC is that it can buy farmers' produce easily compared to other businesses. For example, with ASC office and procurement services situated in Maliana, Aileu and Viqueque, it is easier to organize farmers to deliver their produce to ASC. For farmers, the advantage is that their produce will be distributed to the buyers with lower cost spent on transport.

When ASC buys produce from farmers, the only criteria used for inclusion or exclusion of the product is quality. If the quality fulfils the standard criteria then ASC will buy all the produce. All farmers can sell their produce to ASC. The procedure for buying is that farmers deliver their produce to a central point (each village has one centre point) and then ASC collects and transports the produce to a warehouse. After delivery, ASC will process and then store the products before selling them to traders/buyers, as shown in Figure 7.6. The processing activities may include cleaning, grading, packing, storing and, finally, transporting to the produce to buyers. Transporting the produce to buyers is facilitated by ASC.



**Figure 7.6: Supply Chain of ASC (all products)**

In terms of getting the products from farmers in rural areas, there are no logistical problems faced as the location where ASC operates is close to the farmers. In terms of the buying and selling prices, prices vary according to the type of products. For example, soybean is bought at 50 cents per kg and sold at 75 cents per kg as shown in Table 7.1.

**Table 7.1: ASC buying and selling price for agricultural products in 2008**

Product	Price (\$/kg)		Buyers
	Buy	Sell	
Paddy rice	0.30	0.75	Ministry of Commerce
Maize	0.30	0.40	Care International and Concern (NGO)
Mungbean	0.50	0.55	Timor Global
Soybean	0.50	0.75	Export to West Timor (Indonesia)

For export products, the prices are based on the world price and the Indonesian price. In the case of products sold domestically through government agencies, for example, the prices are set by the Ministry of Agriculture and the Ministry of Trade and Commerce.

The challenges faced in this model include long bureaucratic processes in dealing with government, ownership of the business is not clear and unavailability of inputs supply. Most of the products, particularly paddy rice, are bought by government agencies. However, while government purchases large quantities of paddy rice, there is a long period between delivery and when money is released so payment is often delayed for a long period. Payment arrangements from the government take four to six months to be finalised. This affects other activities, for example, subsequent purchasing of products from farmers. This presents an enormous challenge for ASC. For example, the delay of payment from government further affects ASC procurement activities. Given that ASC has already spent a lot of money to buy paddy rice from farmers, it is critical for the money to be released quickly so they can continue to manage the business in a sustainable manner. If ASC runs out of cash it means they have to stop purchasing farmers' produce. So, to do business with government, it is important for businesses to have extra cash reserves or access to credit.

Another challenge faced is the ownership of the business. The ownership of ASC is still not clear (i.e., whether it is under the control of the World Bank, MAFF, or if it is purely a private business). This uncertainty affects the decision making and management of ASC itself. The decision related to the management of the business needs to come from MAFF. The reason is that MAFF is responsible for the management as well as controls the operations of ASC. Clear ownership of the business is needed so that any issues that arise can be solved immediately.

The importation of a large quantity of rice by the government also presents a significant challenge for ASC. The importation of rice to ensure food security in the country has an adverse impact on ASC and local farmers in terms of their endeavour to increase rice production. Many farmers lose motivation to grow paddy because the price of imported rice is much cheaper than the price of local rice, thus consumers prefer to buy imported rice. Another challenge is that farm inputs are not available locally and, therefore, they need to be imported from Indonesia. The importation of inputs requires significant expenditures in terms of time, effort and money.

Other challenges are that farmers continue to grow the same crops which are not responding to market demand, the low production, the poor quality of produce and poor infrastructure. A further challenge is the strong import competition which resulted in low commodity prices, making it cheaper to import than to purchase domestically produced products.

#### **7.2.6 Farmers coming together: the case of Cooperativa Haburas Fronteira**

Cooperativa Haburas Fronteira is a local cooperative operating in the district of Maliana which is known for its potential for production of paddy rice and good irrigation systems. The establishment of this cooperative was needed to support farmers to increase their production and link their produce to the market. The

products handled by the cooperative include paddy rice (the main product), maize and water melon.

The catalyst in getting this cooperative started was the lack of buyers for local produce, particularly an over-supply of local rice in the district of Maliana. The situation motivated a number of East Timorese people who work in the Centre for Economic Development (CDEP) to establish a cooperative to buy paddy rice from this area. After a long process of lobbying, the Cooperativa Haburas Fronteira finally officially operated as a cooperative in 2008. The objective of the establishment of this cooperative was to help farmers increase their incomes and, at the same time, promote local products in domestic markets in Timor Leste.

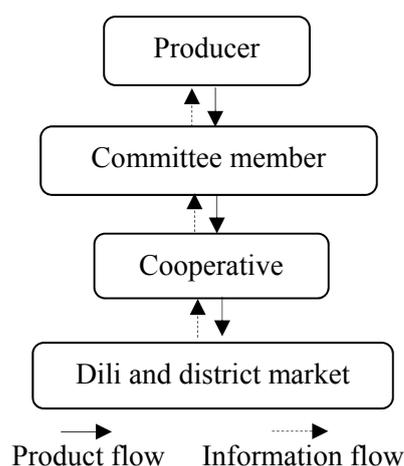
To become a member, it is compulsory to contribute US\$100 to the cooperative which could be paid in eight US\$12.50 instalments. This money is then used to buy basic necessities which are sold in the cooperative shop and also used to buy products from members. Membership of the cooperative has now reached 200 farmers. Apart from the contribution from cooperative members, the capital needed to establish and run the cooperative also comes from donors such as CAFOD from the United Kingdom and TROCAIRE from Ireland.

Services provided by Cooperativa Haburas Fronteira include buying local rice, facilitating the sale of produce by cooperative members, providing training to members, and sale of basic needs to the communities through a cooperative shop. The cooperative operates only in the area of marketing and, unlike the other case studies considered in this research, it does not provide inputs to farmers nor provide other assistance. In terms of selling arrangements, particularly for rice, some buyers come to the cooperative shop to buy, but in many cases, the cooperative transports the product to the buyers using their own vehicles. Most of the produce is sold in domestic markets.

The main competitor to this cooperative is the Timor Leste government itself which imports large quantities of rice into the country and sells it at a low price. Other competitors are traders and businesses that operate in the area selling imported rice.

However, the cooperative's products are differentiated from its competitors. For example, the cooperative buys rice or other grains from farmers, processes the product and packs them in different sizes of bags (e.g., one, two, five, ten, fifteen, twenty five and fifty kilogram bags) with the logo "buy local products". By using this strategy, communities who generally earn less income can afford to buy according to their buying power. To sell the products to the communities, the first thing the cooperative does is to identify the areas that are not reached by imported rice and then distribute their packages to these areas.

The distribution system used is outlined as follows. Producers deliver their products to the centre points approved by the cooperative and then the cooperative collects and delivers to the warehouse for cleaning, drying, milling, packing, labelling and storing before it is distributed to the buyers as shown in Figure 7.7.



The key challenges faced by the cooperative originate from the government program of rice importation and selling the imported rice at a low price (below production costs) which demotivates farmers to increase production. As a result of the low prices of imported products such as rice, consumers prefer not to buy local products even when the quality is better than that of the imported product. With per capita income less than a dollar per day, people tend to buy the product based on price rather than on quality. Consumers prefer to buy low quality imported rice as it is far cheaper. Thus, this government program, while done for food security reasons, does not support local farmers which hinder the development of agriculture in the country in terms of increasing farmers' income, job creation and poverty reduction in rural areas.

Another challenge is the lack of genuine support by the government to farmers which can be seen through government programs that contradict one another. For example, on the one hand there is a government program that is focussed on how to increase the production of local rice through the distribution of large numbers of hand tractors to farmers. On the other hand, the government is also importing large volumes of rice sold to consumers at lower than production cost prices making farmers unable to compete in the marketplace. This affects the local businesses, such as cooperatives and of course the farmers, and results to a lack of motivation to increase rice production.

### **7.3 Comparative analysis of the various LF2M models**

Economies in most of the developing countries rely heavily on the agricultural sector. This is because growths in this sector contributes to the reduction of poverty and enhance the livelihood of resource poor farmers (APAARI & GFAR 2006). However, to achieve growth in agriculture a productivity revolution in smallholder farming is required (World Bank 2008). Increasing productivity can be done through government and private sector support in production and in marketing, particularly linking farmers to markets programs. Through LF2M programs, farmers will be able

to access inputs for production, technical advice in production, access to information and better access to markets (Maerstens & Swinnen 2007; Simmons et al 2005; Patric 2004; Simmons 2003). All of this will contribute to raising crop productivity and quality of products and hence increase farmers' income. As stated by Markelova et al. (2009) the opportunity for smallholders to increase their incomes from agricultural production and related rural enterprises relies on their capability to participate successfully in the markets.

Timor Leste is one of the newest independent countries with an economy that is primarily agriculture. This sector contributes around 30 per cent of non-oil GDP and most of the workforce is employed in this sector (RDTL 2007; UNDP 2006). As the majority of Timor Leste's population live in rural areas, agricultural related activities have been the main source of livelihood for families, with agricultural production mainly geared towards consumption. With agricultural production dominated by low input, low output subsistence farming, agricultural productivity and the quality of product are very low. Improving agricultural productivity and farmer incomes has been a major focus of the government of Timor Leste. To increase production and income of Timorese farmers LF2M programs is needed.

Each of the case studies presented above have several strengths and weaknesses. These advantages and disadvantages are summarised in Table 7.2 below. One common characteristic of these case studies is that all of these models are supporting farmers in facilitating the marketing of their produce either for domestic or international markets. For example, without CCT support, coffee farmers will not be able to access international market as this market is highly competitive. In the case of Zero Star, farmers involved in this chain can access high end markets in Dili. This means that farmers are assured of markets as stakeholders involved in the LF2M programs are ready to buy their produce. As stated by Swinnen (2007) and Shepherd (2006), one of the direct benefits of farmers involved in LF2M programs is an assured market for their produce. The important thing for farmers is that their produce needs to fulfil the standard requirements demanded by customers. In addition, all of the cases presented also provided training and/ or technical assistance to farmers. As most farmers are illiterate or have no schooling at all, providing training and

technical assistance to them is important to improve their skills and knowledge, in particular technical skills in the production side and also marketing of their produce. This is consistent with Mancero (2007) and Rao et al.'s (2004) findings that the skills and knowledge of farmers involved in LF2M have improved, which contributed to the better management of crops and also in ensuring that production is based on what is demanded by the market.

Improved product quality and quantity was also one of the main benefits derived by stakeholders engaged in the LF2M programs. To enter into a market that is highly competitive, the quality and quantity of products need to be assured and maintained. Through the LF2M programs, farmers were able to improve the product quality and quantity. This resulted from the support and technical assistance provided (e.g., inputs and seeds). This is similar to Miyata (2009) and Rottger (2004) finding that farmers who engaged with stakeholders in LF2M programs were able to benefit and this lead to the enhancement in the quality and quantity product. Improving product quality and quantity is important as this is one of the requirements to enter into high value markets both domestically and internationally (Markelova et al. 2009; Lemeilleur & Tozanli 2006; Rao et al.; Rottger 2004).

**Table 7.2: Benefits and issues of the LF2M case studies**

	<b>Strenghts</b>	<b>Weaknesses</b>
Zero Star Uni Pessoal	Access to high end market; marketing risk was reduced; access to inputs and training; regular assistance on production is provided; work in groups; transport is facilitated; access to new seeds and information; improved product quality and quantity	Trader has power over farmers in deciding the price; no premium price paid for good quality products
World Vision	Access to high end market; access to transport to market produce; improved product quality and quantity; training; agricultural tools is provided; access to new seeds and information; work in groups	Lack of sustainability of the program
Cooperativa Café Timor (CCT)	Access international markets; income diversification; access to training and technical assistance; health care assistance; premium paid for good quality product	If there is a good price offered by competitors, cooperative members will sell to them and not to CCT
Timor Global	Assured market; access to inputs and mechanization equipment; access to training and technical assistance; access to micro-finance; written contract agreement; improved quality and quantity of product	Farmers sell to traders that offer a higher price (farmers do not honour the contract)
Agriculture Service Centre (ASC)	Access to training and inputs; assured market; specialised area of operation; lower cost for marketing produce; improved product quality and quantity; access to micro-credit	Farmers continue to produce the same product rather than based on market demand
Cooperativa Haburas Fronteira	Facilitate farmers access to market; access to training; strong ownership from the members; promote local products; improved product quality	Only operate in marketing and therefore it is difficult to increase the production; difficult to find markets for the particular product handled

As shown in the table above, one of the benefits of farmers that engaged with Zero Star is that they received assistance on the production of vegetables on a regular basis. The aim is to increase the production and to maintain quality product

demanding by their customers. As most of the farmers have low skills, assisting them regularly is needed so that the quality requirements demanded by the market can be fulfilled. Abdelai-Martini et al. (2006) argued that LF2M, through domestic traders, can guarantee enough quality and quantity demanded by costumers. This can be achieved through regular assistance provided by the traders. However, one of the issues identified under the Zero Star linkage model is the lack of transparency in terms of the price of the product and the fact that there was no premium price for good quality produce, which means there was no reward for high quality products delivered by farmers. This is in contradiction with some of the previous studies (Miyata et al. 2009; Samaratunga; Tukan et al. 2006; Dannson et al. 2005) which found that farmers involved in market linkage programs received higher prices for their produce which reflect the high quality standard of the products offered. Zero Star did not offer premium price to farmers because of the power imbalance; that is to say, Zero Star has more power over farmers in the transaction process. As the only business operating in the area that provides farmers with support and assistance, Zero Star could control the price. According to Mr. Mendonca (pers. comm., September 2009) if Zero Star did not operate in that area, farmers will have no income; and if farmers wanted to sell their produce they will need to find the market, which in this case meant they will need to spend extra cost for transport. In addition, farmers highly depend on Zero Star in terms of inputs and markets for their produce. As mentioned by some of the farmers, even though the prices offered by Zero Star are low, they continue to sell their produce to Zero Star as they have no other option. Furthermore, the lack of knowledge about market demand and the low levels of education of farmers contributed to their low bargaining position in dealing with Zero Star.

On the contrary, in the case of CCT, for cattle fattening, farmers received a premium price for heavier bulls. The premium price offered reflected the high quality of the product delivered. With the premium price offered, farmers were motivated to manage their cattle in a semi-commercial or commercial business. Because of this, farmers pay more attention and spend more time in looking after cattle as this provides them extra revenue from the business. In addition, apart from an assured market offered by CCT, farmers also benefited from access to health care. This

support was provided by CCT to look after the health of people living in the community in general and CCT members in particular. This program also aimed to stimulate involvement of more farmers with CCT. Despite the advantages offered, some farmers however still do not honour their commitments to CCT. For example at harvesting time, some cooperative members sell their produce to competitors who offer better price. As a result the quantity available to CCT was reduced which affected CCT customers. This issue needs to be addressed as such behaviour can have negative repercussions not only for CCT but also with other members as it may create conflict.

Nonetheless, even though there are some weaknesses in this type of linkage model, cooperatives in general still provide services, including access to farm input supply and marketing produce (Manalili 2003; Hoyt 1989). Lapar et al. (2006) pointed out that LF2M through cooperatives provides opportunities for adding value to products which contribute to higher prices received by farmers.

Another benefit of LF2M is facilitating the services of extension workers to assist farmers both in the production and marketing. This is particularly true where NGO's such as the World Vision model is concerned. Due to international support and funds from NGOs, farmers benefit from external extension help which they may not normally have. In the current study, this support was considered by farmers as a significant contribution in the World Vision model to help them increase their vegetable production, improve quality produce and help them gain access to markets. Compared to other cases, World Vision was the model that took further steps in helping farmers. As there was a general lack of extension workers in most of the rural areas in Timor Leste, providing farmers with an extension worker was valuable in assisting farmers both in the production and marketing. As an NGO, World Vision played an important role as the government was unable to make such arrangements on their own to help farmers (Dixie 2005). The main disadvantage of this linkage model though is the lack of sustainability of the program. This is because as an NGO, they depend mainly on donor support to provide funding for their programs.

Another benefit of LF2M models is access to equipment and credit. For example, in the case of Timor Global, farmers were given access to mechanization equipment (e.g., tractors) and access to micro-finance. Another advantage of the Timor Global model was that there was a 'written contract' agreement. This is the first time in Timor Leste where an agribusiness company signed an agreement with farmers to produce peanuts. In all other cases, there was no written agreement between stakeholders and farmers. Everything was just based on verbal agreement. In this case, farmers owned the land and provided the labour, while Timor Global supplied inputs, technical assistance and tractors for land preparation. Based on the agreement, Timor Global purchased all the products according to the price that has been agreed. This is important as the market for the produce is clear including the prices. Another advantage of this model is that farmers are linked with micro finance institution. This was needed to help farmers reduce some of the problems they face such as lack of capital to support their farm. As pointed by Swinnen (2007) and Patrick (2004), through contract farming, farmers can benefit in terms of income improvement, enhanced access to inputs, improved product quality and better access to markets.

The disadvantage of this linkage model is that there was still lack of commitment to honour the contract that has been signed. For example, at harvesting time some farmers still sell their produce to local traders who offer higher price. The problem is that those traders only purchase the product for a certain period of time and do not guarantee a continuous buying arrangement, thus sustainability in buying the product is not assured. This needs to be addressed as loss of trust between the agribusiness firm and farmers may put this arrangement at risk.

Another advantage of LF2M models as demonstrated by the government supported ASC scheme is lower costs for marketing their produce and better access to inputs. As ASC procurement offices are located in potential agricultural areas which are close to farmers, farmers do not need to spend extra cash for transportation to distribute their produce. ASC also links farmers to micro credit institution. This strategy is important because most farmers lack capital and lack access to transport and roads. With the presence of ASC in local areas, markets for farmers produce are

not only assured but the lower marketing costs also increased the profit earned by farmers. Reducing marketing costs (e.g., transport cost) is also done by World Vision by providing their own transportation to deliver farmers produce to the market, with farmers paying at cost. In this case, farmers are organised together and share the cost of transport. Sharing the resources together in marketing the product can reduce the costs, time and labour.

In the Zero Star case, Zero Star purchased the product directly from farmers using their own transport. This also benefited farmers as they do not need to walk long distances and spend cash on transport to market their produce. This also means that farmers' marketing risk is reduced.

The disadvantage of the ASC model is that it is difficult to organize farmers to grow crops according to what is demanded by the market. The reason is that most farmers lack skills and resources, in particular financial skills, to purchase inputs and seeds. As a result farmers continue to produce the same crops.

A strong sense of ownership is one of the pros of the linkage model of Cooperativa Haburas Fronteira. This is because the cooperative was established to help farmers in that area in selling their produce to the market. Moreover, cooperative members have a financial contribution. Because of this all members feel that they own the cooperative and therefore they need to support it as this will facilitate the movement of their produce to the market. This is in contrast with CCT farmer members who do not have strong ownership of the cooperative. This is perhaps why some of the CCT farmers still opt to sell some of their produce to competitors that offer a higher price. This is despite the fact that CCT provides them with inputs, training and facilitates marketing of their produce. The disadvantage of the ASC model, however, is that they only operate in the area of marketing and therefore it is difficult to increase production.

Another advantage of linking farmers to markets as demonstrated in these case studies is that marketing risk faced by farmers is reduced due to a ready market brought about by the linkage. With farmers' involvement in LF2M programs,

farmers need to increase production and improve the quality of the product. An example from Kenya showed that farmers who engage in LF2M programs not only have an advantage in terms of an assured market but also, the risk they face is reduced (Rottger 2004). This is also supported by Maertens and Swinnen (2007) which described that one of the benefits of farmers' engagement in market linkage programs is the reduction of the risk they faced both in production and marketing.

#### **7.4 Critical success factors of current LF2M models in Timor Leste**

Stakeholders of the LF2M models studied were also asked about the critical success factors of their linkage partnerships. The critical success factors presented in this chapter are based on discussions with these stakeholders, including the managers and employees of the NGOs and the private sector stakeholders (businesses), the relevant government agencies and farmers groups. No attempt for prioritisation of success factors was made; but rather, a discussion of the critical success factors considered important to the success of the business and the program were elicited. The critical success factors of current model of LF2M for all cases are presented in Table 7.3.

**Table 7.3: Critical success factors of current model of LF2M in Timor Leste**

<b>Stakeholders</b>	<b>Critical success factor</b>
<b>Zero Star Uni Pessoal</b>	External support, innovativeness, targeting, infrastructure improvement and support to farmers
<b>World Vision</b>	External support, support to farmers and establishment of CPL
<b>Cooperativa Café Timor</b>	External support, good management and communication, targeting, provision of income opportunity and supporting farmers
<b>Timor Global</b>	Commitment, adequate capital, targeting, introduction of new techniques for growing crops and support to farmers
<b>Agriculture Service Centre</b>	External support, targeting, good management and communication and support to farmers
<b>Cooperativa Haburas Fronteira</b>	External support, targeting, commitment, innovativeness, financial contribution from members and support to farmers

#### **7.4.1 Support to farmers**

Supporting farmers is one of the critical success factors mentioned by all of the stakeholders in implementing their LF2M model. In all cases, the aim was to support farmers increase their production and improve marketing of their produce through capacity building, technical assistance, provision of critical farm inputs, transport facilitation and buying of farmers' produce. Through these various support, farmers were able to increase their production and have better access to markets. For example, with the support from Zero Star, crop production increased; farmers regularly conducted grading, sorting and packing; used improved packaging and handling materials (e.g., crates). This allowed them access to high end markets in Dili which previously was not achievable for them.

#### **7.4.2 External support**

All stakeholders received external support in terms of funding, training and assistance and providing facilities except for Timor Global which is a commercial enterprise. The external support provided the impetus for some of the stakeholders to enhance their business and improve their capacity in responding to what is demanded by the market. Without this support, stakeholders would not be able to manage their business in a sustainable way as most of them lacked capital, skills and knowledge. For example, with the funding and assistance from NCBA (an international cooperative funded by USAID), CCT coffee was able to market internationally and their product were accredited by an international organization as organic coffee. For the product to be accredited internationally certain quality standards must be met and financial fees had to be contributed annually. The support from NCBA made it possible for CCT to fulfil all of these requirements thus enabling the product to be marketed internationally. Without this support CCT would not have been able to reach this market.

### **7.4.3 Targeting**

Another critical success factor is ‘targeting’ as demonstrated by the case of Zero Star, Cooperativa Haburas Fronteira, ASC, CCT and Timor Global. These stakeholders only concentrated on certain products (e.g., CCT and Timor Global on coffee, Zero Star on horticulture crops and ASC and Cooperativa Haburas Fronteira on paddy rice). They also limited the area covered only to areas that have potential for that particular product. For example, coffee in Ermera and Liquica; Paddy rice in Maliana; and horticulture in Aileu, Maubisse and Hatubuilico. By targeting areas that are known as suitable for the crops as mentioned, stakeholders were able to reduce their operational risk. This is important as stakeholders were also able to specialise in the production and handling of the products, maximizing the use of their resources, which may have been difficult if they covered too many products in a number of locations.

### **7.4.4 Innovativeness and responsiveness**

Innovativeness and responsiveness to customer needs is another critical success factor as demonstrated by the case of Cooperativa Haburas Fronteira and Zero Star. After finding the market, packaging strategy was introduced which targeted customers who are ready to buy according to their purchasing power. In the case of Zero Star, after identifying a niche market for home deliveries, they introduced a ten dollar produce box targeting individual households; while in Cooperativa Haburas Fronteira’s case, the target market for their produce were communities who live in remote areas and have no access to imported rice. Based on this, they produced a one, two, five and ten dollar bag of rice distributed to those communities. As most of the Timorese people have an income of less than one dollar a day, the introduction of the packaging strategy gained a loyal market in rural areas. The reason for this success is that the packaging designed by the cooperative took into consideration the buying capacity of the customers. This new market strategy formed the basis of expansion for the business, extending the market reach to new customers. This

particular market innovation focused on regular distribution to individuals and communities through common delivery points (e.g., office, restaurants and kiosks). As pointed by Shepherd (2007), good marketing strategy is needed to develop profitable markets.

#### **7.4.5 Improvement of infrastructure**

A further success factor is the improvement of infrastructure (e.g., cool truck, cold storage and rural roads and bridges) as demonstrated by the CCT and Zero Star case studies. Infrastructure is very important in facilitating farmers' produce to markets. The case of CCT showed that with the improvement of rural roads and bridges, farmers were able to distribute their produce to CCT on time and also maintain the quality of the product. For Zero Star, as they dealt mostly with perishable products, the construction of a cold storage facility and the availability of a cold truck was a critical success factor because these facilities have enabled larger volumes of produce to be procured and stored without significant wastage risks.

#### **7.4.6 Good management and communication**

Good management and communication implemented by ASC and CCT were also amongst the critical success factors for these LF2M models. To deal with a large number of farmers with different education and socio-economic backgrounds, managing the groups and communicating carefully were critical so there was mutual understanding. Through good management and communication, farmers were able to participate and benefit from the program. For example, it was easy to facilitate and organize farmers for training on how to produce products with high quality standard. It was also favourable for ASC to communicate with farmers regarding inputs and access to markets and information as each sub-district has one interim Board of Director who was responsible for organizing and distributing inputs and outputs and providing information to farmers, thus ensuring smooth operations. This

demonstrates how good management and communication can play an important role in LF2M.

#### **7.4.7 Commitment and adequate capital**

Other critical success factors in LF2M were ‘commitment and adequate capital’. The case of Timor Global provides a good example on how to develop the coffee industry in Timor Leste with a long-term vision to produce high value boutique coffee for exports. Unlike other companies who have expressed interest in investing in Timor Leste, Timor Global demonstrated a commitment by investing in the country and establishing a productive business in Timor Leste. In the globalized world which is more competitive and challenging, investment in agriculture which is lacking in skilled human resources, infrastructure, and has high transactions cost is not an easy business. However, Timor Global has committed in investing and assisting small farmers by providing machineries and inputs, buying farmers’ produce, processing it and finally exporting high quality products. This investment showed that in terms of income generation and job creation they contributed a lot to the development of the country.

#### **7.4.8 Creating an economic opportunity**

Creating an economic opportunity for farm families through LF2M is another critical success factor as shown by the CCT case. For example, with an ‘organic’ brand, farmers were able to access specialty markets overseas. This is important as there is an increasing interest in the geographic origin of products and the development of brands that reflect origin (Shepherd 2006), and doing so enabled East Timorese farmers to tap into these markets. Timor Leste has the potential to supply organic product because of the existing production practices that involve low or no chemical use. This offered significant benefits to farmers in terms of a secure market for their produce and also increase in income. In addition, the diversification program

introduced by CCT such as the cattle fattening program provided farmers an opportunity to raise their income. As showed by the cattle fattening model implemented by CCT, farmers spent no cost on this activity. Farmers only looked after and fed the cattle until the standard weight was reached. This is a very successful linkage model because it took into consideration the problems and constraints faced by farmers (e.g., lack of cash, inputs, information and lack of access to market). As farmers already had experience in raising cattle, there were no significant problems faced in the implementation of the program.

Further success factors of the linkage models included the use of new growing techniques to improve yields, fee contributions from cooperative members to support the business to encourage a feeling of ownership and thus loyalty and the establishment of CPL to market farmers' produce as demonstrate by World Vision.

## **7.5 Issues faced in linkage models**

Despite the critical success factors mentioned above, there are some issues that need to be considered in the implementation of LF2M initiatives. These issues include lack of skills and organization, lack of economies of scale and logistical issues.

### **7.5.1 Lack of knowledge and skills**

Most farmers in Timor Leste have no schooling at all and therefore providing training and regular assistance to them were necessary. Improving farmer's skills is important as this leads to a better understanding of production and marketing issues such as increasing production and improving the quality and reliability of the products demanded by customers (Shepherd 2007; Baptista; Wimberger et al. 2005). Investing in capacity building through LF2M programs or initiatives contributed to improvement of farmers' skills in terms of their ability in making strategic decisions on production and marketing activities (Lapar et al. 2006). This means that to

implement an LF2M program, stakeholders need to have extra resources such as funding and staffing to improve farmers' knowledge and skills and to help farmers organise. Lack of knowledge and skills may result in farmers not trusting each other, in particular in marketing their produce. Normally, farmers usually prefer to sell their products individually, but in today's world, this is difficult. As small farmers, operating individually weakens their bargaining power when deal with buyers.

### **7.5.2 Lack of economies of scale**

Another issue that need to be considered is lack of economies of scale. The majority of farmers in Timor Leste are subsistence farmers and the only resource they have is land and labour. However, the average farm land owned by farmers is very small accounting for only about 0.25 ha (MAFF 2004). The lack of economies of scale of such farms in addition to the poor resource endowments make it difficult for them to increase production and guarantee the quantity demanded by customers. This may also provide small farmers more competition in the market (Shepherd 2007). As stated by Bijman et al. (2007) small farmers individually are too small to supply enough quantity to their buying partners such as traders, retailers and processors. In the case of Timor Global for example, they could not fulfil the volume of peanuts (about 500 t) demanded by their customers. This is due to the small scale of production and that farmers are not business oriented.

### **7.5.3 Logistical problems**

Other issue is the logistical problems faced in the implementation of LF2M initiatives. The transport infrastructure in Timor Leste is poorly developed and badly damaged. In rural areas, less than 50 per cent of villages have access to paved roads (Fang 2006) and some villages can only be reached by horseback or foot. According to Shepherd (2007), good feeder roads are important for perishable products for export and for products that needs processing soon after harvesting. Poor quality

roads will have an impact on the distribution of farmers' produce to markets. While improvement of roads can contribute to additional competition faced by farmers in the local market, this can also open opportunities for local farmers to access other major markets (Bijman et al. 2007). With products that are dispersed around the country (e.g., mungbean), it takes more time and cost to bring them to buyers in Dili. Similarly, distribution of farm inputs and information to farmers are also affected by infrastructure. The quality and availability of infrastructure have impacts on the timing of delivery, quality of the produce and cost of moving the products from the farm to the market. For stakeholders that implement LF2M initiatives, it is important to make a proper decision on what product to deal with and the location so that any logistical problems that may arise can be minimized. To be able to compete in domestic and global markets, maintaining the quality of the products and ensuring on time delivery is important to gain customers' confidence.

## **7.6 Implications of the linkage models**

One of the implications of the linkage models as described above is that some of these models can be applied to link vegetable farmers to markets. For example, farmers that joined Cooperative Haburas Fronteira solved some of the problems they faced including lack of access to markets. This model can be applied to the vegetable farmers in Aileu, Maubisse and Hatubuilico in the context of forming a group. By working together farmers can reduce transaction costs in accessing inputs and outputs and accessing information. They can, moreover, improve their bargaining power, reduce risks and improve the quality and reliability of supply (Bijman et al. 2007; Chowdhury et al. 2005; Stockbridge et al. 2003; Verhaegen & van Huylbroeck 2001; Rhodes 1993).

Working collectively can also generate income through the provision of some commercial services to their members such as bulk buying, processing and packaging (Giel 2008). These post-harvest activities are necessary for market access

and need to be coordinated. Penrose-Buckley (2007) and Robbins et al. (2005) added that by working together as a group, farmers can distribute their limited volumes of products to generate enough quantities demanded by emerging buyers and this can define a common price for quality system. According to Weatherspoon and Reardon (2003), farmers that can be organised to work together as a group are able to supply to domestic markets, in particular supermarkets. However, to successfully access this market, it is important for farmers to solve the problem of economies of scale and coordination issues. This is when the action of working collectively in the form of farmer groups can help small farmers to satisfy the stringent requirements and become part of the procurement systems (Markelova et al. 2009). Working collaboratively can also facilitate the collective buying of inputs and further leads to collective product selling in the same market (World Bank 2008; Lapar et al. 2006). Therefore, organizing farmers to work together as a group need to be encouraged by stakeholders as this can solve some of the problems they faced.

In addition, use of existing commodities to increase farmers' income can minimise the risk faced by farmers. The linkage model of CCT on cattle fattening program clearly showed the benefit in raising farmers' income. This model can also be applied to vegetable farmers. For example, most of the vegetable crops such as carrots, cabbage, snow peas and beans are growing well in Timor Leste and the demand is high in domestic markets (DSP/USAID 2006). The LF2M intervention programs need to focus on these crops as the market is clear and farmers have experience in growing these crops. Instead of introducing new crops which needs more inputs and new skills to manage, the existing crops offered less risk compared to new vegetable crops. However, the productivity of most of the vegetable crops is low (MAFF 2004). Therefore, improving the productivity of these crops is important for it to be considered by stakeholders when introducing LF2M programs.

One issue the linkage models need to avoid is the delay in payment to farmers which in some cases, take a number of months. NGOs, government or any private sector businesses need to take the issue of timing of payment into account because farmers are small-scale farmers and often depend on their vegetable farming for their livelihoods to meet the needs of their families.

## **7.7 Concluding remarks**

Economies in most of the developing countries rely heavily on the agricultural sector because of the potential of this sector to contribute to reduction in poverty and enhance the livelihood of resource poor farmers (APAARI & GFAR 2006). However, achieving growth in agriculture requires a productivity revolution in smallholder farming (World Bank 2008). Increasing productivity can be done through government and private sector support in production and in marketing, in particular linking farmers to markets programs. LF2M programs or initiatives enable farmers to access inputs to production, technical advice in production, access to information and better access to markets (Maerstens & Swinnen 2007; Simmons et al. 2005; Patriet 2004; Simmons 2003). All this will contribute to raising crop productivity and product quality and hence increase incomes. As stated by Markelova et al. (2009) the opportunity for smallholders to increase their incomes from agricultural production and related rural enterprises relies on their capability to participate successfully in markets.

The case studies presented in this chapter illustrate how various stakeholders developed linkages with a view to improve access of small-scale farmers to existing and emerging growth markets in Timor Leste. They also demonstrate how an integrated approach involving small-scale farmers as cooperators with the support of private sector, NGO or the government can help to establish small, well-managed business enterprises, promote value addition, diversify products and cater to demand-driven markets based on market analysis and growth. The linkage initiatives described above provides different models of linking farmers to markets. Linking farmers to markets can be an important strategy for income generation, employment and poverty reduction for communities in rural areas in Timor Leste. As a newly independent country with a high percentage rate of poverty and unemployment, LF2M initiatives seem to offer effective ways of improving the income of small-scale farmers and reducing some of their marketing problems as these initiatives provided a clear market for their produce. Through LF2M interventions, farmers can concentrate on increasing production and maintaining the quality and quantity demanded by the buyers as markets are available to absorb their produce.

The current models of LF2M as described above clearly shows the benefit to farmers particularly access to both domestic and international markets. Through the training and assistance in the production and marketing sector the quality and quantity of the produce is improved. Critical success factors of current models of LF2M include external support in terms of funding and assistance, commitment, innovativeness, building skills of farmers, good management and communication, infrastructure improvement and the introduction of new techniques for growing crops. Despite the benefits from LF2M, there are some issues that need to be considered. This includes the issue of low skills and organization capacity, lack of economies of scale and logistical issues. Some of the non-horticulture LF2M models examined can be used by vegetable farmers in selling their produce to the markets. For example, the model of grouping into farmer cooperatives such as the case of Cooperativa Haburas Fronteira to work collectively can improve farmers' bargaining power and reduce their transaction cost. In addition, specialisation in specific commodities proved beneficial and increased farmers' income and reduced the risk faced by farmers.

## **Chapter 8**

### **Effectiveness of Linking Farmers to Market Initiatives in Timor Leste**

#### **8.1 Introduction**

This chapter mainly examines the effectiveness of the LF2M initiatives in Timor Leste. The analysis covers effectiveness of both value chain models for horticulture products as well as models of linking farmers to markets for other commodities. The critical success factors of the models and the challenges faced are also explored and discussed.

Section 8.2 focuses on the effectiveness of LF2M initiatives implemented by Zero Star and World Vision which are the LF2M models on horticultural products. Meanwhile, linkage models for other commodities which focus on coffee, cattle and paddy rice introduced by CCT, Timor Global, ASC and Cooperative Haburas Fronteira are presented in Section 8.3. In each case, the critical success factors from these linkage models are discussed followed by challenges and constraints faced in the implementation of LF2M initiatives (Section 8.4). Finally, this chapter ends with some concluding remarks in Section 8.5.

#### **8.2 Effectiveness of linking farmers to markets initiatives**

To identify whether the LF2M model was effective, a number questions relating to effectiveness were asked through focus group discussions with farmers; in-depth interviews with the coordinator of NGOs (World Vision), the manager and employees of Zero Star, CCT, Timor Global, ASC and the manager of Cooperativa Haburas Fronteira. In the focus group discussion, an open ended question relating to how participants assessed effectiveness of LF2M initiatives was asked. From the

discussion, a number of criteria in assessing effectiveness by different stakeholders emerged. These include profit derived, access to inputs, regular cash payments received and increase in production quantity and product quality.

Interviews were also conducted with an NGO (World Vision), the manager and employees of Zero Star, CCT, Timor Global, ASC and manager of Cooperativa Haburas Fronteira. Using a set of indicators relating to effectiveness which was derived from the FGDs and the literature, respondents were asked to assess the effectiveness of the initiative in terms of services provided, cash on delivery, profit derived, access to training, risk reduction, trust, continuity of the product and timeliness of the delivery of the product. In addition, through an open ended question in the survey with farmers, a number of criteria on effectiveness also emerged. This include increase in production, access to inputs (seeds), access to markets, improvement in farmer skills, improvements in access to technical assistance, improvement in quality of produce, adoption of new technology, reduction in risk, working in groups, access to information and promotion of farmers' produce to high end market. The criteria provided by farmers through the open-ended question in the survey interviews mentioned corresponded with those found from the review of literature. For example, Vinning & Young (2006) found that crop production of farmers involved in LF2M initiatives increased. Silva(2005) and Humprey et al. (2004) found an improvement in profit while Maertens & Swinnen (2007), Minten et al. (2005), Simmons (2003) and Eaton & Shepherd (2001) noted that the risk farmers faced was reduced, plus farmers had better access to market and inputs such as seeds and fertilizer and better access to technical advice (Henson et al. 2008).

The data gathered from the focus group discussions and survey interviews mentioned above were assessed using Nvivo as the responses in this section were mainly qualitative; while responses from the open-ended questions in the interviews and focus group discussions were analysed using qualitative measures. In addition, some of the information collected from the survey were analysed using quantitative measures, for instance percentage, mean scores and cost and return analysis.

## 8.2.1 LF2M models for horticultural products

This section discusses the effectiveness of LF2M initiatives, in particular the value chain models for horticultural products, as demonstrated by Zero Star and World Vision. Quantitative and qualitative analysis were used to analyse the data followed by a discussion of the results.

### 8.2.1.1 Respondents' perception about the effectiveness of LF2M: Case study interview results

Through the case study interviews and discussion with the manager and employees of Zero Star and the coordinator of World Vision on the effectiveness of the LF2M initiative in Aileu, Maubisse and Hatubuilico, a number of factors have emerged. The table below (Table 8.1) summarises the effectiveness of the LF2M initiatives as perceived by Zero Star and World Vision and farmers.

**Table 8.1: Linkage partner and farmers perception on the effectiveness of LF2M**

Perceptions	Linkage partner (Zero Star & World Vision)	Farmers
Improve farmers skills	√	√
Access to high end market	√	√
Access to inputs, technical advice & training	√	√
Risk reduced for linkage partner	√	-
Lowering cost of marketing	√	√
Profit derived for Zero star and World Vision	√	-
Assured product supply	√	-
Availability of land & labour	√	-

√: *Effective*

As shown in Table 8.1, the LF2M initiatives are effective as they contributed to the improvement of farmers skills which led to an increase in production and improved quality of the produce. Farmers also gained access to high end markets, received

technical advice and training. Their production and marketing risk were also reduced. Being part of the LF2M initiative also lowered the cost of marketing and improved access to inputs and profits earned from their farm activities. Zero Star and World Vision also benefited in terms of an assured product supplies and the availability of land and labour. For example, Zero Star did not have to rent the land and hire labour. The arrangement was for farmers to grow crops in their own land using their own labour. This means Zero Star did not have to invest in the land or hire labour. They just provided technical assistance and bought farmers' produce. Through this relationship, farmers were able to ensure regular supply to Zero Star and World Vision and on the other hand can guarantee the product to their customers. This result is consistent with the study done by Shepherd (2006) and Glover (1995), which stated that the benefit stakeholders can gain from their involvement in LF2M initiatives is that the supply of the product is assured without having to make commitments on land and labour resources.

Based on the perception of farmer respondents, the initiative has been effective; they claim that through their involvement in the linkage program they were able to access high end markets, access training, inputs (e.g., seeds) were made available to them, their crop production increased and marketing cost was reduced. Both the linkage partners and the farmers had the same perception that the initiative has contributed to better access to markets for farmers, increase in crop production, access to inputs and training and reduced marketing cost.

#### **8.2.1.2 Horticulture farmers perception about the effectiveness of LF2M: FGD and Survey results**

To determine the perception of respondents regarding the impact of LF2M initiatives in Aileu Vila, Maubisse and Hatubuilico, a list of criteria were chosen based on the review of literature as well as findings from the FGDs. These criteria includes better access to market, access to inputs, increase in crop production and product quality, better access to technical advice, reduce risk, profit earned, better price for the

product and better access for food for the families. Respondents were requested to score each of these criteria on a five-point Likert scale from 'highly disagree' (1) to 'highly agree' (5). Afterwards, they were also given a chance to provide other criteria they use to measure effectiveness through an open-ended question.

The result of the analysis is presented in Table 8.2. Table 8.2 shows that the top five impacts on participant-respondents based on their perceptions include better access to markets, reduction in marketing risk, better access to technical advice and increase in production and income.

**Table 8.2: Mean scores of the impact on farmers of participating in LF2M initiatives**

<b>Impact</b>	<b>Highly disagree (%)</b>	<b>Disagree (%)</b>	<b>Neither agree nor disagree (%)</b>	<b>Agree (%)</b>	<b>Highly agree (%)</b>	<b>N/A (%)</b>	<b>Mean</b>
I have better access to markets	-	-	-	28.2	69.0	2.8	4.71
I have lower risk in marketing	-	1.4	1.4	78.9	16.9	1.4	4.13
I have better access to technical advice	-	-	7.0	90.2	1.4	1.4	3.94
My production has increased	-	1.4	11.3	87.3	-	-	3.86
My profit/income has increased	2.8	-	14.1	76.1	1.4	5.6	3.78
I now face lower risk in production	-	-	64.8	35.2	-	-	3.35
I have better access to seeds	-	-	69.0	29.6	1.4	-	3.32
I receive better prices	11.2	35.2	40.8	9.9	1.4	1.5	2.54
My family has better access to food	21.1	-	1.4	14.1	1.4	62.0	2.27
I have better access to fertilizers	4.2	1.4	1.4	1.4	-	91.6	2.00

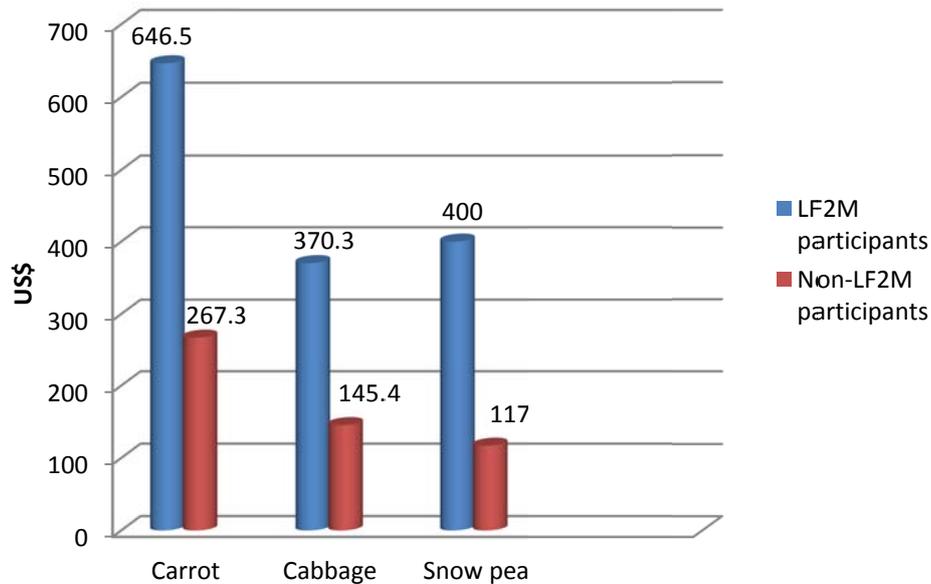
In general, LF2M initiatives had a positive impact on participant-respondents. Most of them generally agreed that, through their participation in the initiative, some of the problems they faced were solved. All of these factors received high mean scores of more than 3.5. For example, from the total of 71 respondents, 69 per cent highly agreed that through their involvement in LF2M initiatives they were able to better access markets; while more than 75 per cent respondents agreed that their engagement in the initiatives resulted in lowering the risk they faced, improved access to technical advice, and increased their production and income. Meanwhile, more than 60 per cent of respondents were not sure whether their engagement in the program contributed to the reduction of their production risk and led to better access to seeds. The program also had lesser impact on price, with about 35 per cent and 11 per cent of respondents disagreeing and highly disagreeing that their involvement in the LF2M initiative resulted to them receiving better prices for their produce. Only about 10 per cent of respondents agreed that they received better prices for their product. Despite this, however, some respondents claim that they will still continue to participate in the linkage program as long as the program helps deliver their produce to the market and provide them with some support and assistance. In addition, through an open ended question in survey interviews respondents are given a chance to provide other criteria they use to measure effectiveness. These criteria's are including improvement of the skills of farmer, enhancement of the quality produce, adoption of new technology, working in group and access to information.

The responses from the FGD and the open ended question from the survey were imported into NVivo for analysis. The results of the text search query results on the effectiveness of linking farmers to markets is summarised in Table 8.3. The results showed that the coverage of these themes is higher for market-oriented production, better access to markets, increase in production and access to technical advice.

**Table 8.3: Text search query results on the effectiveness of linking farmers to markets**

	References	Coverage (%)
Market oriented production	42	16.6
Better access to market	33	11.2
Increase production	21	7.6
Better access to technical advice	11	2.1
Access to seeds	10	1.9
Increase income	4	1.1
Improve skills	4	0.5
Reduce risk	2	0.2

To examine whether there is a difference between the profits received by LF2M participants (those involved in LF2M initiatives) vs non-participants (those selling in traditional chains), a comparison of the costs and returns from vegetable production of the two groups were conducted. The results of the cost and return analysis presented in Appendix 3 revealed that participant-respondents received higher net income per hectare compared to their counterparts that are not involved in LF2M programs. For example, the total net income for carrots cabbage and snow peas were approximately US\$650 per ha, US\$400 per ha and US\$650 per ha, respectively; while non-participants received only about US\$250 per ha, US\$150 per ha and US\$120 per ha, respectively. This finding is consistent with that found in Shandong Province, China, where farmers who participated in the LF2M initiative earned more than non-participant farmers for the same crops (Miyata et al. 2009). Similarly, Swinnen (2007) found that farmers who engaged in contracting arrangements received higher profit than those who were not involved in the contracting arrangement. These positive profit effects came about through the increase in productivity and a significant reduction in the costs of production of participant-respondents. Hazell et al. (2007) argued that if farmers cannot increase their productivity or otherwise reduce production costs, they will lose their income. In this current study, through the initiative, the productivity of carrots has increased by 32 per cent, cabbages by 12 per cent and snow peas by 39 per cent. This in turn translated into increases in farmers' income by 42 per cent for carrots, 34 per cent for cabbage and 55 per cent for snow peas as shown in Figure 8.1. In addition, the cost of production was also reduced by 9.4 per cent for carrots, 34.5 per cent for cabbage and 18 per cent for snow peas.



**Figure 8.1: Comparison of net income per hectare for participants**

### 8.2.1.3 Discussion

Better access to markets, a reduction in marketing risk, better access to technical advice and increase in production and income, all are positive impact of LF2M initiatives introduced in Aileu Vila, Maubisse and Hatubuilico. For example, LF2M initiatives offered farmers access to high end markets in Dili and they also spent less on marketing. Without farmers involvement in the initiatives it would have been difficult for them to reach this market. This is because most farmers' lack capital to pay for transport and their farms generally are located in very remote areas. The introduction of the LF2M initiative by Zero Star and World Vision contributed significantly to the increase in production and income of farmers in the region.

These positive impacts are consistent with some of the previous studies on LF2M. For example, farmers participating in LF2M initiatives through supermarket in Mali and Kenya has granting and maintaining access to markets for small farmers; and the key success for this initiative is the commitment both from farmers and the supermarket (Low et al. 2006; Rottger 2004). In Srilangka farmers that work closely with Food company, the marketing risk they faced was reduced as transport is facilitated and the market is assured (Smaratunga 2006; Patrick 2004); farmers

involved in contract farming their crop production has increased (Birthal et al. 2007) and also increasing in income (Miyata et al. 2009; Lemeilleur & Tozanli 2006). This resulted from the technical support and assistance offered to the farmers.

Although participant farmers in Aileu Vila, Maubisse and Hatubuilico received low prices for their produce, the net income earned is three times higher than non-participants as shown in Table 8.3 above. The higher net income received by participant-respondents was not caused by the higher price of the product; rather, it resulted from the high yield relatively low operating cost per hectare resulting from application of inputs and better production practices. This clearly shows that without facilitating farmers produce to the market and providing the necessary support production and marketing support, it is difficult for farmers to improve their living standard. Without participating in LF2M initiatives, farmers have to invest their own capital to increase crop productivity, money which they often do not have. Thus, the importance of having the LF2M initiative. As stated by IFAD (2003a), supporting intensified production is often not enough to raise rural people's incomes; production is needed to access the markets where farmers can sell their products in order to fully benefit from their investments in increasing productivity.

Increasing the access of poor farmers to markets can enable them to overcome their poverty. However, Shepherd (2007) argued that markets alone are not enough to guarantee success. The program must be capable of showing a profit, both for the linkage partner and the farmers. The result of the cost and return analysis clearly shows that participant farmers that engaged in the LF2M initiative not only have access to high end markets but the profit they earned is higher than non-participants. This is because of the support and technical assistance provided by the stakeholders. For the stakeholders (e.g., Zero Star), the initiative has improved the volume of supply which in turn resulted to higher profits earned. For example, in 2008 Zero Star was able to deliver 25 t of vegetables to high end markets in Dili. Shepherd (2006) argued that, it is not just sufficient to identify the market but farmers need to be in a position to supply a quality and reliable product which is needed by the market. Finding the market and at the same time distributing good quality products on a regular basis to the market is important as this has a greater impact on markets

with greater returns to the farmers. To achieve this, attention needs to be put on value-addition and product development as demanded by consumers (AVRDC & ADB 2005). This is because production driven by market demand can offer better incomes to farmers.

Identifying markets, and consequently gaining access for farmers, is something that most small farmers often cannot do by themselves. This is because most farmers lack skills and capital. The LF2M initiatives introduced in Timor Leste provided an opportunity for farmers in Aileu Vila, Maubisse and Hatubuilico to access the main markets and emerging markets. However for the market to absorb their produce farmers have the responsibility to make sure that the product demanded by the market is available both in terms quantity and quality.

APAARI (2008) asserts that with the focus on product development standards, fulfilling the demand of the market and discovering market access for suitable produce can guide expansion and create more job opportunities for farmers. As shown by the case of Zero Star, by finding the market in Dili (e.g., supermarkets, hotels and restaurants) the volume and quality of produce demanded increased. This further affected the number of farmers needed to supply the produce. As result more workers were needed to grow crops, perform grading, packing and distribution of the produce to customers. This means more jobs for farmers in rural areas. For example, starting with only 20 farmers working with Zero Star in the early years of the intervention, the number has now reached more than 500 farmers in the region. As Porter and Phillips-Howard (1997) concluded in their review on market linkages, farmers were generally better off as a result of their participation in LF2M initiatives.

It can be concluded that farmers who cooperate in the value chain approach mostly have access to high end markets. This is the main impact of the program for farmers in Aileu Vila, Maubisse and Hatubuilico. As most farmers live far from the main market, in addition to the difficulties in accessing transport and lack of information and capital and high transport costs, high value markets are not normally accessible to them. LF2M initiatives provided an opportunity for farmers to access these high end markets. However, to access this market, farmers need to increase their crop

production, improve the quality of their produce, and their production need to be based on what is demanded by the markets. This means farmers need to change their traditional ways of managing crops and the orientation of their farm business to be more market-oriented.

The impact of LF2M programs in Timor Leste, is still far from what is ideally the contribution of successful market linkages, as described by most of the literature (Henson et al. 2008; Maertens & Swinnen 2007; Vinning & Young 2006; Minten et al. 2005; Rao et al. 2004; Simmons 2003; Eaton & Shepherd 2001; Glover; Grosh 1994). However, given the lack of support from the government, the achievement of the current programs is quite significant in terms of increasing production and income, job creation in rural areas and the high volume of the products delivered to high end markets. The results of this study showed that all parties involved benefited from the programs. Farmers received regular cash for their products which translated into an increase in income and the stakeholders also benefitted from the availability of the product in terms of quantity and quality demanded by their customers. As confirmed by Weinberger et al. (2007), the production of vegetable crops can contribute to the commercialization of the rural economy which is characterized by an increase in trade and marketing as far as farmers becoming better integrated into the markets. Through the generation of employment and increase in the productivity of agricultural crops in general, many of the poor in rural areas are likely to benefit.

As the main target of government intervention in agriculture in Timor Leste is the grain sector (e.g., maize and rice), there is a lack of attention on the horticultural sector, in particular vegetables. However, this sector is one of the sectors that can be an engine for economic growth (AVRDC & ADB 2005). The value of product per unit area is higher for horticulture products than the value of cereal or grain crops and in terms of employment; this sector provides approximately twice the number of employment per hectare of production than the production of cereal (Ali et al.; Abedullah et al. 2002; Ali & Hau 2001). This means that high value agricultural products can come a long way in helping smallholders produce enough in a small area of land to help them escape from poverty.

To increase income and reduce poverty and unemployment in Timor Leste, it is important to empower smallholder's to increase production and improve their marketing, in particular vegetables crops (e.g., carrots, cabbage & snow peas) so that they can participate in the emerging market. As pointed out by Rola-Rubzen and Hardaker (2001), the prospect of using agriculture to escape poverty relies, to a large extent, on smallholder's ability to improve productivity and access markets. To increase vegetable production and improve marketing in the region, a number of factors need to be considered. These include improving farm management, increasing investment in irrigation, enhancing the availability of seeds, and improving access to fertilizers and chemicals. Likewise, new technology is required, and harvest and post-harvest handling practices need to be improved. Other enabling factors are regular training in marketing, improvement in infrastructure facilities and access to transport, storage and handling, improving access to information and linking producers and consumers (Jayne et al. 2010; Barham & Chitemi 2009; Shepherd 2007; Faffchamps & Gabre-Madhin 2006; Byerlee et al. 2005; Torres & Anderson 2004). These are important factors that will contribute to the increase in crop productivity and improvements in marketing. In particular, there is a need to improve the support and services in the horticultural production areas as these areas are often more risky, production per hectare is more expensive, and the yields and prices are more variable (Key & Runstein 1999). Because of this, small and poor farmers must be supported in terms of enabling institutional environment including access to credit and access to information (Weinberger & Lumpkin 2005). LF2M initiatives often ease the access to some of the support and services needed.

### **8.2.2 Effectiveness of LF2M models for non-horticulture commodities in Timor Leste**

The other models studied in this research include the CCT model, Timor Global, ASC and Cooperativa Haburas Fronteira. These models are different from the models discussed above because most of them deal with grain and livestock (e.g., coffee, paddy rice, cattle, soybean and peanuts).

The purpose of this section is to highlight other LF2M models in the non-horticultural sector and draw from the lessons learned for their applicability in the horticultural sector of the country.

#### **8.2.2.1 Stakeholders perception on the effectiveness of LF2M: Case study interview results**

To measure the effectiveness of other models of LF2M initiatives in Timor Leste, case studies of non-horticulture LF2M initiatives were also examined. Similar to that conducted with horticulture LF2M participants, a number of criteria were discussed with the Director and employees of CCT, Timor Global, ASC and Cooperativa Haburas Fronteira including services provided, cash on delivery, profit derived, access to training, risk reduction, trust, continuity of the product and timeliness of product delivery. These criteria have emerged from the FGD and from the literature. During the discussion, other factors also emerged such as improvement in farmers' skills, better access to markets and access to inputs. The respondents were asked to measure the effectiveness of their program based on these criteria. These were then analysed, coded and categorised using Text Search Query in NVivo to determine the occurrences of the themes and the emerging patterns.

#### **8.2.2.2 Farmers perception about the effectiveness of LF2M: FGD results**

Based on the analysis, five factors appeared to be the most common emerging theme with regards to the effect of the intervention of LF2M initiatives. These include continuity of the product in the market, increase in production, improving the skills of farmers and better access to market and inputs. As shown in Table 8.4, on average the percentage coverage for the resource and knowledge component is higher than other components (60 per cent). This means that access to resources and knowledge are considered the most common elements that demonstrate the effectiveness of the LF2M initiatives.

**Table 8.4: Text search query results on the effectiveness of linking farmers to markets**

	References	Coverage (%)
Access to resource and knowledge		
Availability of the product in the market	160	95.7
Increase in crop production	170	83.6
Improve farmer skills	188	75.8
Better access to market	121	35.1
Better access to input	51	21.6
Better access to services and assistance	36	15.8
Access to training	29	5.8
Risk faced is reduced	27	7.1
Access to infrastructure		
Improvement in rural roads	56	20.0
Economic and social gains		
Increase in income	48	16.3
Reduce costs	38	10.2
Access to medical care	26	4.9
Regular cash payment	24	4.6
Reduce unemployment	18	4.4
Improve trust	9	0.9
Profit generated	6	0.7

Table 8.5 above shows that based on farmers' perceptions, one of the key effects of LF2M is to improve farmers' skills and knowledge through training. As farmers

explained capacity building also has an effect on other factors as improving farmers' skills and knowledge will change the way they think, act and manage their farm so that the production and quality of their produce is improved. Enhancing farmers skills indirectly leads to availability of the product in the market as the way they produce the product is based on market demand. Better access to resources and knowledge also results to social and economic gains for farmers. For example, increase in production will contribute to higher profits. In some cases, farmers are encouraged to open up new land for cultivation and also intensify production. This means increasing per unit crop production for a piece of land through the use of new seeds variety and the application of inputs such as fertilizers. In fact in these case studies, the increase in production contributed to the increase in profit of farmers. In addition, the assured market for farmers' produce led to lower marketing risk for farmers. Similarly, through the initiative, transport was facilitated and buyers were ready to buy the product. Farmers did not need to think about who will purchase their produce and how they will distribute their produce to the market.

One factor though that will increase the effectiveness of LF2M programs is improvement in infrastructure as this will facilitate the distribution of products to the market and reduce transaction cost. If roads, for example, are in a good condition, this is likely to have a positive effect on quality and timing of delivery of the produce. This will also have an impact on the movement of goods and people and more buyers will come to the production centre to buy agricultural produce. For instance, an example from Vietnam showed that road rehabilitation contributed to an increase in the variety and volume of fruit and vegetables sold in the market, and also encouraged participation in trade and services (ADB 2005). The infrastructure development lowered transaction cost.

The ability of small farmers to successfully engage in the market place can provide opportunities for them to increase their income (Shepherd 2007). According to Minot and Vargas (2007), linking small farmers to markets has become increasingly important as agricultural markets and international trade in most of developing countries are increasingly liberalized. There are also changes in consumer demand resulting from income growth and urbanization, and supermarkets and processors are

increasingly playing an important role in food marketing. Fisher and Qaim (2011) added that a key part of the strategy to promote rural development and poverty reduction should be in improving access to markets for farmers. This finding is consistent with the finding from previous studies conducted in China, Vietnam, Kenya and Syria (Zuhui et al. 2007; Abdelali-Martini et al. 2006; Lapar et al. 2006; Chowdhury et al. 2005). For example, farmers involved with cooperatives in Kenya benefited from the reduction of the cost of transport and a reduction of the per unit cost of collection (Chowdhury et al. 2005); In Vietnam, farmers were able to participate in the market and make a profit by working collectively (Lapar et al. 2006).

The result presented above demonstrates that most of the respondents considered, their involvement in the program beneficial as their farm skills had improved which, in turn, impacted on better management of their farm. This has changed the way farmers produce the products from seasonal production to market-oriented production which is based on market demand. This has influenced the availability of the product in the market in a positive way.

### **8.3 Critical success factors**

Linking farmers to markets initiatives in Timor Leste appear to be effective in improving productivity, market reach, farmers income as well as availability of agricultural produce in the market place. But what are the critical success factors for LF2M initiatives?

This section synthesises the critical success factors that came up in the various LF2M models examined in this research including the Zero Star, CCT, Timor Global, World Vision, ASC and Cooperativa Haburas Fronteira models.

### **8.3.1 Specialization**

One critical success factor is specialisation. Most stakeholders (e.g., CCT, Zero Star, ASC, etc.) specialized only on certain products which have the potential for both domestic and export markets such as the case of Zero Star which concentrated on vegetable products and CCT on coffee. The area covered was also limited, with the business concentrating only on specific products and areas, thereby allowing stakeholders (e.g., ASC and Cooperativa Haburas Fronteira) to reduce their operational costs and maximizing the use of their resources.

### **8.3.2 Management and communication**

Good management and communication between parties involved in the program are essential for the success of the initiatives. The case of ASC and CCT for example, showed how one can manage a large number of farmers from different socio-economic and educational backgrounds. Without proper management and communication it was impossible to achieve their objectives. Good management and communication is also critical to developing mutual trust between parties involved in the LF2M program.

### **8.3.3 External support**

Most stakeholders received external support in terms of funding, grants, training and assistance. The support provided is one of the important factors for the success of the business as these can empower stakeholders in managing LF2M initiatives. Without this support participants indicated that it will be very difficult for them to manage the business due to the lack of capital, lack of skills and lack of management. The CCT case shows how external support facilitated marketing of farmers' produce to international markets and helped farmers maintain the quality of the products.

### **8.3.4 Farmers support**

Support and assistance provided to farmers to increase crop production and improve product quality are also critical. As most farmers in rural areas are illiterate, improving their skills and knowledge through training is important so that they can manage their farm effectively. The skills farmers gained from the training they received as part of the program enabled them in enhancing their management practices and produce according to the production calendar. This, in turn, translates into an increase in production and ability to provide regular supplies of quality products which are able to compete in the market. The program provided advantages including technical support both in production and marketing, improving access to inputs, seeds and tools, and facilitating transport to market farmers produce. The case of World Vision demonstrated how they assisted farmers to increase production by providing regular assistance to farmers and, at the same time, facilitating their transport to deliver their produce to Dili market. In the Zero Star case, for example, apart from the support mentioned above, they also provided (sold) basic stuff such as rice, oil, and other basic goods to farmers who are geographically very remote and where other businesses or traders could not do due to poor access to roads. Because of this, trust between both parties was improved. Trust is needed in this business as it contributes to long-term relationship between buyers and farmers, leading to enhancement of the livelihood of farmers (Mafuru et al. 2007).

### **8.3.5 Commitment**

Apart from the support and services provided to farmers, one aspect that is also important is commitment to developing the business in Timor Leste. Without commitment, the program may only succeed for a few years. In the case of Timor Global, an example of their long term commitment is their willingness to develop the coffee industry in Timor Leste. They made a large capital investment in the industry by introducing modern growing techniques and expertise to assist farmers' improve their crop production. The case of Cooperativa Haburas Fronteira also showed how

people come together and commit to help farmers access markets by establishing a cooperative. As pointed by Mafuru et al. (2007) and Ngugi et al. (2006), commitment is one of the factors that contribute to the successful involvement of small farmers in emerging markets.

### **8.3.6 Infrastructure**

Improving infrastructure is another critical factor in promoting success if LF2M, particularly in rural areas. Infrastructure is important so that farmers can transport their produce to the market. As stated by Henson et al. (2008), improved infrastructure is significantly important for smallholder access to high-value market and sustains their participation over the time. The case of CCT shows that, because of the LF2M intervention, the infrastructure in the areas where they operate was improved. This facilitated timely delivery of their products to CCT. This shows how important rural roads are in facilitating market linkage activities and the movement of information, goods and services. Similarly, Zero Star established a cold storage facility in Dili and used cold trucks to facilitate their procurement operations in the mountains. This is important because these infrastructure allowed Zero Star to process their products before delivering them to their clients.

### **8.3.7 Fee contribution**

One of the critical success factors particularly in the case of cooperatives is the fee contribution from its members. The case of Cooperativa Haburas Fronteira showed that it is important for members to contribute in terms of funding so that they can feel ownership of the cooperative. This also means that, as a business, they cannot depend fully on external funding. Even though the income of most of the population in rural areas is low, cooperative members were ready to contribute.

### **8.3.8 Innovativeness**

To be able to respond to customer demand, stakeholders need to be ready to innovate so that they can compete with other businesses. For instance, the case of Zero Star showed that identifying a niche market and preparedness to innovate to respond to the market opportunity can have pay-offs. Introducing a US\$10 packaging box targeted at household clients opened new markets for Zero Star. Similarly, to compete with imported rice, Cooperativa Haburas Fronteira developed a packaging strategy in different sizes so that low income families can afford to buy, thus capturing a niche market.

## **8.4 Challenges and constraints**

Despite some critical success factors, stakeholders still faced some challenges in their programs. The challenges faced in LF2M programs were elicited from discussions with some farmer groups and officials and staff of the linkage partners (e.g., Zero Star, CCT, Timor Global, ASC, World Vision and Cooperativa Haburas Fronteira).

To find out the emerging patterns and themes identified by respondents in this study (including farmers, NGO and government representatives and businesses), Text Search Query analysis was used using NVivo. Based on the analysis, ten main challenges emerged which include low production and low quality, high marketing costs, lack of government support and expensive transport costs as shown in the Table 8.5.

**Table 8.6: Text search query results of the challenges faced in linking farmers to markets programs**

	References	Coverage (%)
Low production and low quality	187	94.63
High marketing costs	139	60.19
Lack of government support	136	46.37
Expensive transport costs	82	26.83
Low skills and poor management	45	19.89
Lack of input suppliers	54	19.05
Lack of inputs	68	14.97
Low prices	67	13.57
Lack of information	53	10.07

Low production and quality are challenges that generally emerged from the response of stakeholders, with a rate of about 95 per cent. This was caused by low levels of input use, lack of skills, lack of capital and lack of information. The majority of farmers did not apply fertilizers and chemicals due to lack of capital and low purchasing power. Moreover, inorganic fertilizers and certified seeds were not available locally and, if they were, were very expensive. Thus farmers had to rely more on traditional chemicals and seeds. Indeed these inputs have a significant impact on the crop production. Lack of farmers' ability to purchase inputs results in difficulties in solving some of the problems they face such as pests and disease. This in turn results in low productivity of the crop. A study conducted by Rola-Rubzen et al. (2010) in Timor Leste found that one of the main reasons for the poor productivity is the low levels of input use in the farm. To increase crop productivity, inputs such as seeds, fertilizers and chemicals are needed.

Another challenge faced by farmers is the high marketing costs. As a result of poor infrastructure (e.g. roads and bridges) and lack of access to transport, the cost of transport is quite high. Rural roads are important for the distribution of goods and services needed for agricultural production and for transporting farmers produce to the market. As pointed out by ISHS (2005), deficient roads, inadequate storage chains and lack of communication infrastructure prevents farmers from accessing

information and inputs and reduce their ability to distribute produce to the market on time. The inadequate infrastructure in the region presents major constraints not only in the form of high transaction costs but also prevents producers and consumers from accessing local and regional markets effectively. As Mafuru et al. (2007) pointed out, poor road infrastructure limits the volume that can be transported to the market and this increases the cost of transport. Poor roads also undermine farmers' ability to purchase inputs and sell their outputs (IFAD 2003a).

## **8.5 Conclusion**

The horticulture sector, in particular vegetables, is very important in raising rural incomes and reducing poverty. Because of this, the Timor Leste government needs to reconsider its strategy in developing its agriculture. High value agricultural products such as fruit and vegetables should become priority in the development process as this sector contributes to the creation of employment and reducing poverty in rural areas. With growth of small scale industry such as Zero Star and Cooperativa Haburas Fronteira, more jobs could be created, offering more income to small-scale farmers.

LF2M initiatives introduced in Aileu Vila, Maubisse and Hatubuilico has contributed to better access to markets, employment for rural communities and regular income for farmers. The survey and focus group discussions revealed that the LF2M initiatives in the main have been effective. They resulted to better access to markets, increased crop production, improved access to technical advice and improved farmers' skills. Other positive effects included reduction of marketing risk faced by farmers and encouragement of market oriented production. As a result of the intervention, crop production increased and farmers were able to distribute their produce to the main market in Dili and enter export markets. This in turn contributed to higher profit for farmers which translated into increase in income for farmers and hence, reduce poverty in the country.

Despite the effectiveness of LF2M initiatives in raising farmers income, there are a number of factors that needs to be improved, including remuneration in terms of better price offered for good quality produce, improving access to inputs (e.g., fertilizers and chemicals) and access to credit.

The high demand for local vegetable products and the relative advantage of land and cheap labour offered in this region, horticulture represents a significant opportunity for growth and economic expansion in Aileu Vila, Maubisse and Hatubuilico. A major challenge faced is the poor infrastructure and the lack of access to critical inputs such as fertilisers and chemicals.

To link farmers produce in these areas to markets they need to engage in value chains. This is important because by understanding the concept of value chain farmers are able to compete in the market, produce the product efficiently and they are able to enter into global market (Kaplinsky and Morris 2000). Given the unique social and economic conditions in Timor Leste, horticultural farmers can link to markets through domestic traders, collective groups, NGOs and even government-supported programs.

# Chapter 9

## Summary, Conclusion and Recommendations

### 9.1 Introduction

This chapter is devoted to the summary, conclusion and recommendations of the study. Following this introductory Section 9.2 briefly summarises the research, outlining the coverage of each of the chapters. This is then followed by the main findings of the study in Section 9.3 in relation to the supply chains, current models of LF2M and effectiveness of LF2M initiatives in Timor Leste. Finally, the conclusion, implications and recommendations are presented in Section 9.4.

### 9.2 Summary of the thesis

The aim of this study is to analyse the supply chain of horticulture products in Timor Leste and consider various ways of more effectively linking farmers to markets. The research problem this study focused on is on how farmers and markets for horticulture product can be linked more effectively in Timor Leste to enhance their income and contribute to the Timor Leste Government's goal of poverty reduction. Hence, this study tried to answer the question of what are the ingredients that will lead to successful linking of farmers to markets in Timor Leste.

Chapter 1 provided an introduction and covered the background and study objectives followed by an elucidation of the research problem. The conceptual framework and research approach of the study were also presented and discussed. The main issue faced by horticulture farmers in Aileu, Maubisse and Hatubuilico is the limited market opportunities. Current agricultural programs in Timor Leste concentrated more on how to increase production with little or no focus on how to link production to marketing.

In Chapter 2 the background and issues in Timor Leste were discussed. The discussion covered a historical background on Timor Leste's economy from the Portuguese time to post independence and the issue of poverty. This chapter also described the agricultural sector, potential commodities such as paddy, coffee, horticulture and livestock and the contribution of the agriculture sector to the economy of Timor Leste. Since Portuguese times until Timor Leste achieved independence, the economy has been dominated by the agricultural sector. This sector is the main source of income for the majority of the population in the country. The contribution of agriculture to GDP is around 40 per cent. The main farming activities include paddy rice, maize, coffee, horticulture and livestock. Despite agriculture being the main source of income, agricultural production continues to be dominated by low input and output subsistence farming systems. Given the reliance of the majority of people on a poorly performing agricultural sector, it is not surprising that poverty levels are high. The poverty rate in the country is about 41 per cent with a large proportion of the population earning less than one dollar a day. Government policies and programs that supported the agriculture sector were presented. It was argued that to improve the agricultural sector, developments in production should be accompanied by parallel developments in marketing.

Chapter 3 presents a review of literature of linking farmers to markets. The topic discussed covered the concept of market linkages, advantages and disadvantages of linking farmers to markets and opportunities offered to develop linkages. The types of linkages were also examined with the focus on contract farming, cooperatives, supply chain and other linkage models. In addition, studies on LF2M were also presented.

Linking farmers to markets offer a number of advantages to farmers including an assured market, access to inputs and credit, a reduction in the risk faced by farmers, better access to information and access to technical advice. Farmers engaging in the linkage often also improve their skills, improve bargaining power, have better payment options and improve their access to transport. Linking farmers to markets could be done through domestic traders, cooperatives, contract farming

arrangements, linking to supermarket/processors, linking through exporters and marketing boards.

Chapter 4 then reviewed the approaches for analysing supply chains. The main topic discussed included qualitative research methods (e.g., case study analysis, focus group discussions, in-depth interviews and participant observation), quantitative research methods (e.g., survey) and mixed methods research. Mixed method approach is a method that can provide a good understanding of the research problem and explore ideas of the respondents in more depth. This method can also offer a stronger analysis combining qualitative and quantitative analysis.

The research methodology was then presented in Chapter 5. The chapter outlined the site selection, population and sample size, survey and case study design and questionnaire design. In addition, the data gathering methods employed in the study were also discussed followed by data analysis and the ethical considerations for the research. The data analysis methods included supply chain mapping, marketing margin analysis and cost and return analysis.

This study was conducted in Aileu Vila, Maubisse, Hatubuilico, Dili and Baucau, Timor leste with the total sample of 895 respondents composed of farmers, institutional buyers and other downstream buyers. The sampling technique used was random sampling and purposive sampling using snowball techniques. Primary data were collected through the case study interviews, FGDs and the survey. Secondary data were also gathered through various institutions involved in the agricultural sector.

The results of the study were presented in Chapters 6 to 8. Chapter 6 dealt with the supply chains for carrot, cabbage and snow pea in Aileu Vila, Maubisse and Hatubuilico. Aspects discussed in this chapter include information on the study sites, characteristics of farmers and farm production and marketing. The traditional supply chains and the value chains initiated by the private sector and NGOs in the study areas were compared.

Chapter 7 presents current models of LF2M in Timor Leste. Six cases which represent six models that currently operate in buying farmers produce and selling them to both domestic and export markets were presented. In addition, for each cases, the background of the key players in the chain (such as NGOs, Government, private sector), products handled, services provided and the distribution system for the product were presented followed by the synthesis of the lessons learned.

The LF2M models presented included a cooperative model (with external funding), a private sector model, a government-supported LF2M model, an NGO-supported model and a local farmer cooperative model. Factors that contributed to the success of these linkage models were then presented. These factors included financial and in-kind assistance or support from external agencies, identifying niche economic opportunities, specialization on existing products which have market potential, and innovative marketing strategies to gain entry into the market and expand market reach.

Chapter 8 discussed the effectiveness of LF2M initiatives in Timor Leste. The analysis covered effectiveness of both value chain models as well as linkage models for other commodities. The critical success factors of the program and the challenges faced were also explored and discussed. The study found that the LF2M models both for the horticulture crops and the non-horticulture crops have been effective particularly in terms of improving farmers' income. Through the LF2M programs farmers benefited in terms of better access to markets, risk reduction, better access to technical advice, increased production, improved skills, improved product availability in the market and better response to what is demanded by the market.

The cost and return analysis also showed that farmers that participated in the LF2M programs received higher net income per hectare than those who were not involved in LF2M programs.

### **9.3 Main findings of the research**

The objectives of this study were:

- (1) To map the supply chain for carrots, cabbages and snow peas;
- (2) To examine current models of linking farmers to markets;
- (3) To assess the effectiveness of various models of linking farmers to markets in Timor Leste;
- (4) To identify policies and strategies that will improve market linkage of small farmers in Aileu Vila, Maubisse and Hatubuilico.

The key findings of the study are outlined below:

#### **9.3.1 Mapping the supply chain for carrots, cabbages and snow peas**

The study found that there are two general classifications of supply chains for carrots, cabbage and snow peas – traditional chains and modern chains that tap into emerging markets. For the purpose of this study, the former was referred to as the traditional chain, while the latter, the value chains.

The study found that most of the vegetable farmers in this region are still practicing traditional supply chains which tend to be long and complicated and involve many chain players. In this chain, farmers depend largely on traders to buy their produce and rely on the traders as the source of information on input and output prices. In the traditional chain farmers also rely on local markets to sell their produce. They rarely conduct any grading and sorting activities. As a result farmers have no access to high value markets, no access to training and no access to information and capital. Furthermore, traders have no direct links to supermarkets and hotels and restaurants. Traders experience difficulty in entering high value markets as this market requires high quality products and consistent delivery of supplies which they are unable to meet.

A more modern chain had just recently been introduced at the time of the study, initiated through development aid programs. The chain introduced by Zero Star and

World Vision was an improved chain which took into account what is needed by consumers and the product specifications as demanded by the market. In this chain the need of customers in terms of the types of products and the volume needed, and the quality requirements are fed back to farmers. Farmers involved in these value chains perform basic cleaning, sorting and packing after harvesting their crops and then deliver the products to the linkage partner (e.g., Zero Star/ World Vision). Following this, Zero Star/ World Vision re-process (e.g., clean, wash, grade, pack, label, store) the products and transport them from the production centre to Dili. More than 50 per cent of the products are delivered to hotels/ restaurants and the rest are distributed to supermarkets, to private homes via home deliveries and to the Dili market retailers. This chain accommodates the needs of the players involved in the chain and it benefits all of them. Farmers get paid weekly, Zero Star guarantees regular supply and better quality products to their customers and consumers have access to good quality products throughout most of the year.

The LF2M initiatives introduced for vegetables in the study site has improved the supply of carrots, cabbage and snow peas in these areas. Even though the number of farmers engaged in the initiative is small, it has changed the way they distribute their produce to the market which used to be more complicated and earned farmers less money. Through the new chain, farmers were able to access inputs (seeds), perform better crop management practices, pay more attention to quality issues and utilise recommended standards and packaging. In the value chain, Zero Star/ World Vision provided information and financial assistance on a regular basis to farmers and assisted them to increase their production. However, in the case of Zero Star, information on price for example, did not reach farmers. Nonetheless, players involved in the value chain earned higher incomes than those that operated in traditional chains. As a result of LF2M initiatives, farmer's income improved which in turn, is expected to contribute to poverty reduction in the region

### **9.3.2 Current models of linking farmers to markets**

Six case studies presented in this study illustrated various models of linking farmers to markets for agricultural products (horticulture and non-horticulture). Zero Star and World Vision dealt with horticultural products; CCT with organic coffee, Bali cattle and vanilla; Timor Global dealt with peanuts, pepper, organic coffee, mungbean, soybean and maize; ASC with paddy, copra, candlenut and coffee; and Cooperativa Haburas Fronteira dealt with paddy, maize and water melon. The objective of the case studies is to examine various models of linking farmers to markets and to determine critical success factors.

All models involved developing partnerships between farmers and a key partner that facilitates the linkage, whether it be privately owned/ motivated or government and/or NGO-supported. In all cases, one of the key objectives of the partnership is to improve access to existing and emerging growth markets. The types of LF2M models included the cooperative model (e.g., CCT), private sector initiated linkage model (e.g., Timor Global and Zero Star), government-supported program model (e.g., ASC), NGO supported program (e.g., World Vision) and local farmers' cooperative model (e.g., Cooperativa Haburas Fronteira).

The study found that a common characteristic of the linkage models is that all key partners provided support and assistance to farmers to increase their crop production and link the produce to the market. A number of services were also delivered to farmers, including training and technical assistance, seed distribution, introduction of new technologies, transportation, and connecting farmers with financial institutions.

The study found that the advantages of linking farmers to markets included enabling farmers' produce to reach new markets, improvements in farmers' knowledge and skills through training, access to technical assistance and improved quantity and quality of the produce.

As pointed in Chapter 7, the current models of LF2M offer significant benefits to farmers in terms of production increases, an assured market, skills improvement,

accessibility to production inputs and increase in income. Factors that led to the success of current LF2M models include external support for funding and assistance, innovative marketing strategies applied to gain new markets, specialising with existing products and in some cases, diversification to increase farmers' income.

The lessons that can be learned from current models of LF2M are that LF2M programs need to focus on existing commodities which have good and reliable markets as this will lessen the risk faced by farmers. Secondly, working together as a group can empower farmers' bargaining position in dealing with traders. This will also reduce the cost of transport and transaction cost. Being innovative and strategic is also critical to compete in the market.

### **9.3.3 Effectiveness of linking farmers to markets**

To examine the effectiveness of the LF2M initiatives a set of criteria were asked to the farmers through focus group discussions, in-depth interviews with NGOs and other key partners. These criteria included whether the initiative increased income/profit both for farmers and the linkage partner, improved access to inputs, improved payment (e.g., regular cash payment received, cash on delivery), increased production, improved product quality, improved access to training and improved farmer skills, reduced risk, and improved access to new technology and information.

The results of the analysis showed that the LF2M initiatives in general have been effective in Timor Leste. Firstly, farmers access to new markets have indeed improved. As majority of the farmers lack capital and access to transport which affected their ability to reach markets, the initiatives offered farmers an assured market for their produce to high end markets. This can be seen in the more frequent and more regular delivery of products, sometimes on a weekly basis as transport was facilitated. This also meant that the cost of transport and transaction cost was reduced as farmers only dealt with the buyers that supported them in production. Secondly, farmers had better access to technical advice. Technical advice on how to

manage their farm and increase crop production were provided to farmers so that they could produce what is required by the market. As most farmers used to practice traditional ways of managing the farm, the support they received via the linkage partnership clearly helped them in terms of changing the way they manage the crop so that they can fulfil the quantity required by the market. The technical advice they received resulted in the increase of production of participant farmers. Thirdly, the initiative was also effective as there was an improvement in the skills of farmers as a direct result of the technical advice. Through the training provided, the skills of participant farmers improved which translated into changes to the way they manage their farm which is now oriented towards what is demanded by customers. All this further contributed to the increase in farmers' income. As shown by the cost and return analysis, the net income of farmers that participated in the LF2M initiatives were three times higher than non-participant farmers for the same crops.

Majority of respondents agreed that, their involvement in the LF2M initiative solved some of the problems they faced. Results of the qualitative analysis showed that the top most commonly perceived impacts of stakeholders (farmers and linkage partners) of the LF2M initiatives are better accesses to markets for farmers, reduction in marketing risk, better access to technical advice and increase in production and income. The impacts mentioned resulted from the support and assistance provided, such as inputs, seeds, transport, extension, training and an assured market for their produce. Farmers were also able to supply good quality products as needed by the market and deliver the products based on the agreed schedule.

#### **9.4 Conclusion and policy implications**

This sub-section presents the conclusion, implication and policy recommendations and issues for further research. In addition, a brief outline of the lessons learned is also presented.

### **9.4.1 Conclusion**

The results of this study shows that linking farmers to markets can enhance smallholder farmers' access to markets and lead to an increase in farmers' income in Timor Leste. Increasing agricultural production is important; however this by itself is not sufficient to increase the income and assist poor farmers to rise out of poverty. Increased production and linking farmers to markets should come hand in hand. This study showed that linking farmers to markets can successfully increase farmers' income and also stimulate the quantity and quality of production and marketing management of farmers. As income increases, farmers become more motivated to do better for their farm which will also result in the availability of products demanded by the market. Involvement in LF2M initiatives may not necessarily result in a better price for the product, but they do guarantee a place in the market for produce of an acceptable quality.

There are a number of critical factors that lead to successful linking of farmers to markets in Timor Leste. These are external support in terms of funding and assistance, commitment by partners, innovativeness, focussing on existing commodities, specialization, management and communication, provision of support to farmers and improvement in infrastructure.

The approach of involving more farmers in the initiatives significantly contributed to achieving better understanding of the challenges faced by each player in the marketing chain. For small farmers to sustain their inclusion in dynamic markets, they should adhere to private standards demanded by the markets. They should also be able to make deliveries consistently. As pointed by Fisher and Qaim (2011) and Shepherd (2007). All year round production is a key requirement if farmers are to continue supplying high value markets. For small farmers in Timor Leste to have a feasible future, a concerted effort by the government, NGOs and the private sector is needed.

Given the major role of agriculture to the livelihoods of most Timorese people, any approach for reducing poverty in this country should stress the rapidly growing

agricultural sector. Growth in agriculture is the key to alleviating poverty and improving the livelihood of resource-poor farmers (World Bank 2008; Hazell *et al.* 2007; Humphrey 2006). Indeed, Timorese farmers certainly need governments and donors to provide investments with the aim of increasing the productivity of agriculture. However, if they do not take into consideration the need to link the produce to the market, the investment could depress commodity prices and farm incomes. Hence, for Timorese farmers to endure and flourish, they need to discover approaches to meet new demands in the supply chains and to get inputs, credit and technical skills from stakeholders at a price that is competitive.

The challenge ahead is, first, how to enhance the output and input markets and services in the financial sector to solve the failure of the markets; second, how to build a channel linking the production of small farm households and the high end markets (e.g., supermarkets) so that the products from small households can go directly to supermarkets; third, how to offer the support services that are necessary to largely spread small subsistence farm into an engine of economic development; and four, how to improve the quality and safety of the product produce by small farm households and enable them to get more added value. To meet these challenges it is important for farmers, NGOs and private companies to work together and also improve involvement of MAFF and other public agencies.

However the research also uncovered a number of issues that need to be dealt with to improve the effectiveness of the linkage programs. One, in some cases, there is no premium for good quality which can be a disincentive for farmers in the long run. Secondly, there is lack of commitment from farmers to honour contracts which could jeopardise the partnership, and thirdly, the sustainability of some programs, particularly the externally-supported programs is questionable.

Additionally, the key partners also faced problems in implementing LF2M initiatives. These problems pertain to the lack of skills and organizational capability of farmers, the lack of economies of scale and logistical issues. Other challenges faced by farmers are unavailability of inputs (e.g., fertilisers, seeds) locally, lack of information, poor infrastructure and communication facilities, low output prices,

limited buyers, high marketing costs, lack of capital, and lack of government support particularly on marketing of agricultural products.

To improve the effectiveness of LF2M initiatives, it is important to deal with these challenges and barriers to increase the effectiveness of LF2M initiatives.

#### **9.4.2 Policies and strategies to improve effectiveness of linking farmers to markets**

The findings of this study have a number of implications for enhancing the effectiveness of linking farmers to market initiatives for horticulture products in Timor Leste. Below are some policies and strategies for dealing with the issues and for promoting effective LF2M initiatives and/ or partnerships.

##### **9.4.2.1 Lack of commitment to honour contracts**

Contract farming agreements are meant to put in place the conditions for farmers and agricultural firms' roles and commitment to work together in a mutually beneficial way in aspects set up in the contract. However, the implementation of contract farming in Timor Leste has been problematic as some farmers do not honour the contract. To solve this issue, NGOs and private companies that engage in LF2M programs need to look at better ways of enforcing the contract. One way for farmers to honour the contract is through developing stronger relationships to enhance 'mutual trust' between parties engaged in the contract rather than simply through legal contracting arrangements. Such arrangements can be seen in countries like Nigeria and Kenya where people tend to consider mutual trust more important than legal contracts. Contracting based on legal contract and mutual trust can work hand in hand, though would also depend on the culture, farmers' education and legal policies in the contract. Another way to encourage farmers to honour contracts is for the legal contracting arrangements to be signed not only by farmers individually but perhaps with the guarantee of someone in the community that is considered the oldest and most respected. This is to secure the contract. The reason is that farmers

in Timor Leste, for cultural reasons, often listen to that person before making decisions. Involving that community elder is likely to make parties engaged in contract farming respect and honour the contract.

#### **9.4.2.2 No premium price for good quality**

To produce good quality products, farmers need to put in extra investments in their farm in terms of either time, effort or money. Thus they expect that their investments will be rewarded in terms of receiving better price for their produce. However this is not currently happening because even though the product has higher quality there is only a limited number of a buyer engaged in the transaction process so buyers control the price. In addition, information on prices of agricultural products are not readily available and do not reach farmers in rural areas. Therefore it is important that information reaches farmers so they can use it to bargain with buyers for a better deal. Thus, the need for infrastructure developments, including information and communication infrastructure. For farmers to get a better price for quality produce, factors such as accessibility to roads and transport need to be addressed. Similarly, communication via extension workers (on production and marketing) is needed. The development of price information system perhaps disseminated through radio and television are also some strategies that can address the issue of better information flow back on quality requirements and corresponding prices to farmers. Furthermore, to get a premium price, farmers can work together so they can have stronger bargaining power in dealing with buyers. Without consideration of the factors mentioned above it is difficult for farmers to receive a premium price for their products. Offering a premium price is important as this will further stimulate farmer's capability in terms of managing their farm as a business enterprise. Farmers will be more innovative in producing and marketing their produce.

#### **9.4.2.3 Unavailability of inputs locally**

The unavailability of inputs such as seeds, fertilizers and chemicals impact on crop production. To increase production and productivity it is important to make these inputs available in rural areas. The private sector needs to be encouraged to engage in the provision of these inputs. One way this can be done is by facilitating private sector (business) to engage in the supply of agricultural inputs to expand their operations in potential agricultural areas.

#### **9.4.2.4 Limited buyers and low output prices**

As mentioned previously the limited number of buyers appears to negatively impact the price offered to farmers due to the power imbalance. There is lack of competition amongst buyers and as farmers have no alternative market, they often accept whatever price is offered to them, however low that may be. Buyers are often able to manipulate the price. To address this problem, the government needs to intervene in terms of improving infrastructure such as roads that link agricultural areas with potential markets. More investment on infrastructure is needed so more buyers can enter markets and farmers will also have more access to other markets. This will encourage competition and will benefit farmers in terms of getting a better deal on prices for their produce.

#### **9.4.2.5 High marketing costs**

To reduce marketing costs it is important for farmers to work together as this will have a benefit in terms of reducing the cost both in production and in marketing, information sharing and thus enable economies of scale. It is also important to develop mechanisms to enhance farmers' capacity for efficient marketing and accessibility to financial institutions. Due to lack of transport and expensive cost of transporting products, collaboration of farmers in putting together their produce to

sell to the market is important in reducing transport cost. Again, the issue of infrastructure plays an important role in the reduction of marketing costs. If the road is good and accessible there will be more transport moving around to collect agricultural products. Thus, the government needs to invest more on improving rural infrastructure in Timor Leste.

#### **9.4.2.6 Lack of capital**

To help farmers who face financial difficulties and address the lack of capital to purchase inputs and invest in agriculture, market institutions such as rural banks and micro credit institutions that support farmers in rural areas need to be enabled to operate in rural areas so that farmers will have better access to rural financial institutions. Of course this will not necessarily guarantee the problem of lack of capital, but it will improve farmers' access to finances if they choose to. Of course further studies need to be conducted to see whether the presence of rural financial institutions including micro-credit schemes will have a beneficial effect on farmers and ease their problem of lack of capital.

#### **9.4.2.7 Lack of skills and organization capability of farmers**

For implementing partners of LF2M, one of the key problems is the lack of farmers' skills in production and in organization. Because of this they encounter difficulties in the implementation of the LF2M initiative. To solve this problem, it is important to provide regular training and assistance to farmers on technical skills in production and marketing and build their capacity in working in groups such as how to work and manage a group of farmers.

#### **9.4.2.8 Lack of economies of scale and logistical issues (for key partners)**

Another problem faced by key partners in the implementation of the LF2M initiatives is the small scale of individual farms, the dispersion and the logistical issues involved in bringing together commodities from these farms. Implementing partners need to spend extra costs to bring the product to Dili particularly because of the poor condition of the roads. The roads are also not accessible and therefore it takes time for products to reach the market. One way to solve this issue is to organize small farmers into rural producer's organizations (e.g., cooperative or farmers groups). As most farmers have small land and are geographically dispersed, organizing them into rural producer groups can help in aggregating their output and consolidating them for marketing purposes. This will help achieve economies of scale in marketing and help them bargain better terms in the marketplace. Marginal farmers in India have shown that they can solve the problem of economies of scale by organising themselves into collective institutions. In addition, in terms of the logistical problems related to the movement of products from rural areas to Dili, again improving rural roads and bridges will be critical in solving this issue.

#### **9.4.2.9 Poor infrastructure and communication facilities**

As alluded to several times in this thesis, to facilitate the flow of farmers produce to the market, it is important to improve the infrastructure in rural areas in Timor Leste. This includes physical infrastructures such as roads and bridges to link rural areas to market centres, market facilities in rural areas, and communication infrastructure such as cell towers). More investment in roads and other marketing infrastructure can reduce both the time and cost of getting produce to market and will also bring more goods to local markets as well as encourage potential intermediaries to enter into marketing of vegetable products. As these are public goods, the government needs to invest in rural areas in this regard.

### **9.4.3 Concluding remarks**

This study clearly demonstrates the contribution of LF2M initiatives, including increasing farmer's income, providing job opportunities for rural communities and poverty reduction. The cases presented in the study revealed that small farmers can access high end markets with appropriate linking mechanisms to markets. However, to be viable, there is a need for appropriate physical infrastructure, a supportive policy and regulatory environment, as well as an engaged private sector actively contributing to the development.

To improve LF2M initiatives in Timor Leste there is a need for the government to create a policy environment that is conducive to promote production and improve the marketing system through training, research and provision of extension services, roads, transportation systems and addressing land tenure issues. Likewise, due to the public nature of potential impacts, the government should set the food quality standards, and handle quality certification. The government should promote appropriate policies that can improve the business climate in general and encourage private sector participation. This may include initial assistance in forming marketing groups, more support targeting extension and research in the agriculture sector, modification of the system of finance to meet the credit needs of small farmers, enhance policies on risk management and improve education and training of smallholder farmers (Hazell 2007). The government needs to provide an enabling environment for investment and encourage private sector participation.

### **9.4.4 Study limitations and areas for future research**

This study focused on the analysis of supply chains for horticultural produce with the view of analysing mechanisms for linking farmers to markets, but it did not look at informal contracts in detail, nor volumes demanded by the market, or information on the product attributes from consumers' point of view about the product. Most of the LF2M initiatives introduced in Timor Leste are based on informal contracts, while

the literature on LF2M initiatives is mostly on formal contracting arrangements. Likewise, this study did not quantitatively analyse the impact of the LF2M initiatives. Based on these limitations, below are some future areas for research.

Firstly, what is the role of formal and informal contracts and how can it be operationalized to enhance the effectiveness of LF2M initiatives in Timor Leste? Secondly, what is the volume of horticultural products demanded by the market? As this study dealt with supply chain and linking farmers to markets, it is important to investigate the volume of the product needed by the market in a season or year. Thirdly, were consumers happy with the quality of the horticultural products delivered? What are the attributes consumers are looking for when buying horticultural products? These aspects need to be further investigated so producers will know what quality attributes is needed by their customers. Lastly, further quantitative investigation of the impact of LF2M programs is needed as although the present study applied mixed methods to look at effectiveness of the LF2M initiatives, the focus is more on qualitative measures. A study focussing on quantitative impact assessment of LF2M will provide a more rigorous analysis of the effects of LF2M initiatives on smallholder farmers' welfare and on poverty alleviation in the country.

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## Appendice

### Appendix 1: Principal function of CCT structure

#### **The CCT federation**

- Begin the wet processing of the coffee cherry within twelve hours of harvest.
- Transport the processed wet parchment to drying fields, and sun dry to about 12% moisture.
- Transfer the dry parchment to storage warehouses where it is held until it can be taken to the dry processing factory.
- In the dry processing facility, mill and sort the dry parchment to export quality green beans.
- Warehousing of green coffee beans until they are transferred to shipment container.
- Preparation of all documentation for export.
- Handle all green bean coffee in accordance with organic requirements and maintain the organic certification audit trail from factory door to export shipment.
- Provision of extension advisory services to all certified CCO members and the training of CCO staff.
- Assist CCOs with the efficient operation of their activities and with organizational matters.
- Operation of shade tree seedling nursery and the propagation of other commercial trees.
- Operation of a vanilla “start” distribution facility with its related procurement, processing and marketing of cured, sun-dried vanilla beans.
- Operation of a pilot program for TERADP’s cattle fattening activity.
- Financial control of all operational funds for the annual harvests and the payment of dividends and fees to the CCOs and farmer groups at conclusion of season.
- Implementation of health care program

#### **Primary Cooperatives Societies (CCO)**

- ❖ Receive and weigh “red ripe” coffee cherry from certified members and pay them in cash.
- ❖ Transport of coffee cherry to CCT’s wet processing facilities.
- ❖ Handle all coffee cherry in accordance with organic requirements and maintain the organic certification audit trail from the farmer to the factory.
- ❖ Assist members in accordance with the “Articles of Association” and by-laws of each CCO.
- ❖ Provision of extension advisory services and training in collaboration with CCT

#### **Farmer Groups**

- ✓ Assist members to comply with OCIA and other international organic certification standards.
- ✓ Assist with the procurement/collection of the annual coffee cherry harvest.
- ✓ Assist with the dissemination of information on production and harvesting activities.

Source: NCBA 2003

## Appendix 2: Net margin for various participants in the Zero Star supply chain

Description	Value (\$/kg)	Percentage of consumer buying price (%)	Percentage share of profit margin (%)
<b>Farmers</b>			
Selling price	0.30	27.27	
Production cost (\$/kg)	0.07	6.36	
Profit margin	0.23	20.91	76.67
<b>Zero Star</b>			
Buying price	0.30	27.27	
Selling price	0.65	59.09	
Marketing margin	0.35	31.82	
Marketing costs	0.05	4.54	
Profit margin	0.30	27.27	46.20
<b>Supermarket</b>			
Buying price	0.65	59.09	
Selling price	1.10	100.00	
Marketing margin	0.45	40.91	
Marketing costs	0.10	9.09	
Profit margin	0.35	18.20	31.80
<b>Consumer</b>			
Buying price	1.10	100.00	

**Appendix 3: Cost and return analysis for carrots, cabbages and snow peas (\$/ ha)**

<b>Crops</b>	<b>Respondents participating in LF2M initiatives (N= 71)</b>						<b>Respondents not participating in LF2M initiatives (N=729)</b>						
	<b>Yield (kg)</b>	<b>Price (\$/kg)</b>	<b>Gross income (\$)</b>	<b>Total operating cost (\$)*</b>	<b>Net income (\$)</b>	<b>Net income per kg (\$)</b>	<b>Crops</b>	<b>Yield (kg)</b>	<b>Price (\$/kg)</b>	<b>Gross income (\$)</b>	<b>Total operating cost (\$)*</b>	<b>Net income (\$)</b>	<b>Net income per kg (\$)</b>
Carrot	2102.0	0.35	735.7	89.2	646.5	0.31	Carrot	1071.5	0.35	375.0	107.7	267.3	0.25
Cabbage	1520.3	0.30	456.1	85.8	370.3	0.24	Cabbage	1072.3	0.30	321.7	176.3	145.4	0.14
Snow pea	1032.2	0.45	460.4	60.4	400.0	0.39	Snow pea	451.2	0.45	203.0	86.1	117.0	0.26

*\* Operating costs include the cost of labour, seeds and inputs (e.g., fertilizers and insecticides)*

**Appendix 4: Types of packaging used for selling the product**



## Appendix 5: Ethics Approval

### memorandum

<b>To</b>	Vicente de Paulo Correia, Agribusiness
<b>From</b>	Miss Linda Teasdale, Manager, Research Ethics
<b>Subject</b>	Protocol Approval RD66-08
<b>Date</b>	27 January 2009
<b>Copy</b>	Associate Professor Fay Rola-Rubzen, Agribusiness



Office of Research and Development  
Human Research Ethics Committee  
Telephone 9266 2784  
Facsimile 9266 3793  
Email hrec@curtin.edu.au

Thank you for your "Form C Application for Approval of Research with Low Risk (Ethical Requirements)" for the project titled "*Analysis of linking farmers to markets for carrots, cabbage and snow peas in Aileu, Maubisse, Hatubuilico and Baucau, East Timor*". On behalf of the Human Research Ethics Committee I am authorised to inform you that the project is approved.

Approval of this project is for a period of twelve months **27-01-09** to **27-01-10**.

The approval number for your project is **RD-66-08**. Please quote this number in any future correspondence. If at any time during the twelve months changes/amendments occur, or if a serious or unexpected adverse event occurs, please advise me immediately.

Miss Linda Teasdale  
Manager, Research Ethics  
Office of Research and Development

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Please Note: The following standard statement must be included in the information sheet to participants:  
*This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number RD-54-0966-08). If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or hrec@curtin.edu.au*

CRICOS Provider Code 00301J