STUDY ON SUPPLY CHAIN OF THE SELECTED VEGETABLES IN MON STATE

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A thesis submitted to the post-graduate committee of the Yezin Agricultural University as a partial fulfillment of the requirements for the degree of Master of Agricultural Science (Horticulture)

Department of Horticulture and Agricultural Biotechnology
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This thesis represents the original work of the author, except where otherwise started. It has not been submitted previously for a degree at any other University.

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DEDICATED TO MY BELOVED PARENTS
U SAW MAUNG SOE AND DAW HLA MYINT

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ABSTRACT

Inefficiency in the supply chain leads to post-harvest losses and wastages which finally results in higher prices paid by consumers and less income to the farmers and other stakeholders. The study was done to analyze the vegetable supply chain and examine performance of major players in the supply chain, to analyze the structures of production costs and profit share of key actors along the chain and to identify constraints for the improvement of vegetable supply chain for benefits of all key actors. Using simple random sampling method, the survey was done on 100 vegetable growers, 11 collectors, 14 wholesalers and 16 retailers from Belin, Mawlamyine, Paung and Thaton Townships. The results showed most of the vegetable growers were smallholder farmers with the average farm size of 0.37 ha. About 50% of vegetable cultivated lands were lowland and farmers have limited access to land and water for year round production of vegetables. During off-season, almost all of the vegetables were imported from other areas such as Shan State, Sagaing Division, Naypyitaw Division, Bago Division, Yangon Division and Thailand. Mostly grown vegetables in Mon State were yard-long bean, cucumber, eggplant, mustard and tomato. The supply chain analysis revealed that the major actors in Mon State were producers, collectors, wholesalers, retailers and consumers. According to the economic analysis for yard-long bean, cucumber, eggplant and tomato, the benefit cost ratio (BCR) were 2.7, 2.8, 2.4 and 1.7 and the profit share got by farmers were 46, 39, 42 and 43%, respectively. Farmers from Mawlamyine Township, which have easy access to wholesale market, got the highest profit (58%) among townships. Vegetable growers faced with pests and disease problem, lack of water during dry season, labor scarcity and high market competition. Supporting services such as training, extension and credit were very weak. On marketing side, insufficient capital, high market competition and fluctuated local supply were mentioned as the major constraints for traders. There were a number of flourishing opportunities for vegetable sector in Mon State such as continuous demand for vegetables not only from local but also from remote townships, feasibility of off-season production and existence of Asian highway.

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CHAPTER I
INTRODUCTION

Agriculture remains the most likely source of significant economic growth in many developing countries. Compared to any other sector within an economy, growth in agriculture productivity, having a direct role in raising real incomes of the rural poor, has been recognized reducing poverty. About 70% of Myanmar's populations live in rural area and rural poor accounts for 84% of the total poor (UNDP 2012). Therefore, broad-based agricultural growth offers a uniquely powerful instrument for accelerating economic growth and improving welfare and food security of vulnerable households (MSU and MDRI/CESD 2013). Being located between South and South East Asia, Myanmar is considered as a strategic location for trade and growth in the region. Moreover, with its diverse and excellent agro-climatic conditions and potentially better resources than many other countries in the region, the future of Myanmar's agricultural sector would be very bright.

Compared to other crop subsectors in agriculture, horticulture offers better opportunities for poverty reduction. Moreover, fruits and vegetables bring abundant economic and social benefits. Drawing on studies from six countries, the production of horticultural products offers better opportunities for poverty alleviation than the production of field crops, for its labor intensive nature. And net farm incomes substantially higher in horticultural smallholder farms than for non-horticultural smallholder farms (Weignberger and Lumpkin 2005). Vegetable production employs about twice as much labor as cereals per hectare of production. Small farmers, rural laborers, and the urban poor stand to gain extremely from these employment opportunities (Munguzwe and Tschirley 2006). Health improvement through nutrition intake from fresh vegetables also has a positive impact. Fruits and vegetables play a significant role in human nutrition, especially as sources of vitamins (A, B6, C, E, thiamine, niacin), minerals, and dietary fiber (Quebedeaux and Bliss 1998). It is helpful in removing micro nutrient deficiencies and works as antioxidants in maintaining the health of vegetable consumers (Rao *et al.* 2001). The world production of fruits and vegetables in 1996 was 98 million tons which increased to 146 million tons in 2007 (FAO 2009). Demand for horticultural products tends to grow rapidly with urbanization and increased income, such growth provides major opportunities for farmers to diversify their production and increase their incomes.

Although vegetables are significant as an engine for economic growth in rural areas, government policy is predominantly focused on staple field crops in Myanmar. The vast majority of vegetable production is presently geared towards domestic markets, which so far has faced little or no competition from imported vegetables. However, with strategic location between two enormous regional markets, India and China, and close proximity to markets in Bangladesh and Thailand, there are immense opportunities to develop a thriving export market. So, there are excellent opportunities for increasing productivity and improving qualities which are expected in order to meet future market demands.

Although there are excellent opportunities for vegetable production, multiple factors challenge the adoption of practices which are needed to bring their products in line with consumer requirements and their competitive position on the markets. The new age consumers are becoming more health conscious in terms of hygiene, source of food, ingredients of processed food, calorie content and use of agro-chemicals. Food safety and quality requirements have an increasing importance around the globe (Kalei 2008). Large scale commercial operations investing in Myanmar may also create significant competition on the local markets. With liberalization of border trade in the ASEAN Economic Community, smallholders will probably face increasing competition from abroad if they are unable to supply sufficient qualities as demanded by markets. This is a really challenging issue for vegetable growers.

To meet high market demands and provide food in proper quality and nutrition, supply chain plays a very vital role in this sector and vegetables become even more important because of perishability and very short shelf life (Negi and Anand 2014). Supply chain is the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hand of the ultimate customer (Christopher 1998). Inefficiency in the supply chain leads to supply chain losses and wastages which finally results in higher prices paid by final consumers and less income to the farmers and other stakeholders. Marketing plays a significant function in the performance of supply chains. Farmers require relevant and reliable infrastructure, labor, technology and coordinated markets in order to effectively market their agricultural products. Farmers benefit from markets if their participation minimizes transaction costs, hence they should focus on production, which they have a comparative advantage (Porter 1985).

Vegetables cultivation in Myanmar is mainly dominated by smallholder farmers. With growing market demands and limited land requirements, smallholder farming system offer good potential for pro-poor growth and the reduction of rural poverty in Myanmar. However with limited knowledge and access to improved technologies, the profitability of many smallholders remain underexploited. According to Emana and Gebremedhin (2007), factors such as inadequate markets, low prices, a lot of intermediaries and inadequate marketing institutions and interaction among farmers make it impossible for small-scale farmers to take part in formal markets.

At the same time, it is essential to modernize and optimize smallholder farming systems and to produce more from intensive farming, in line with a sustainable agriculture in both environmentally and socially efficient manner. It is therefore important to understand that all stakeholders along a particular supply chain need to cooperate and coordinate their activities to satisfy the needs of the end consumer. Herlambang *et al.* (2009) stated that effectiveness is derived from the sum of the contributions of all participants along the chain. Due to the perishable nature of fresh vegetables, particular actors in the supply chain can damage all the efforts taken in another stage to deliver more value to customers. If there is one weak link in the chain, the competitiveness of the overall chain is endangered. The competitiveness of the private sector depends on how well the market is organized and whether it maximizes productivity along the entire chain of activity, from inputs of raw materials to marketing of final goods (Chemonics International 2009).

In Myanmar, problems in the vegetable supply chain hinder the potential gains that could have been attained from the existing opportunities. Mon State is located in the Southern part of Myanmar and there are many small-scaled growers engaged in vegetable cultivation for their livelihood. Due to the limited access of knowledge and improved technology, vegetable growers cannot perform for year round production. During off-season, vegetables were imported from various parts of Myanmar. Moreover, Mon State is near to the border region of Thailand, some vegetables were imported illegally from Thailand throughout the year. According to this situation of vegetable sector of Mon State, various actors along the vegetable supply chain were vulnerable to market competition. However, no research has been done on this sector to highlight problems and opportunities to upgrade the vegetable supply chain. In this regard, vegetable supply chain analysis is an interesting process and this study

was done to investigate the supply chain analysis of major vegetables produced in major vegetable growing townships of Mon State. Therefore, the study was carried out with the following objectives;

(1) To analyze the supply chain and examine performance of major players along the supply chain of selected vegetables in Mon State
(2) To analyze the structures of production costs and profit share of key actors along the chain and
(3) To identify constraints for the improvement of vegetable supply chain for benefits of all key actors

CHAPTER II
LITERATURE REVIEW

2.1 Concept of Supply Chain and Supply Chain Management

Supply chain consists of multiple parties/firms, both upstream (i.e., supply) and downstream (i.e., distribution), and the final consumer. It is the planning and control of the flow of total materials from suppliers to manufacturers to distributors and finally to the end users (Jones and Riley 1985). Supply chain refers to all those activities associated with the transformation and flow of goods and services, including their attendant information flows, from the sources of raw materials to end users (Ballou 2004).

The key elements involved in a supply chain are customer value, competitive advantage and integration and coordination. Customer needs can be met efficiently with Efficient Customer Response (ECR) which is based on efficient assortment, replenishment, promotions and new product development. These all are dependent upon the range of products, its pricing, and management of space in the retail outlet. Competitive advantages to any firms come through enhancement of productivity and value. Advantage of productivity accrues by achieving the better results with minimum resource utilization compare to others. Value emanates by providing customized products or services, reliability and responsiveness, which require innovation and resources (Christopher 1998). Integration and Coordination comes through partnership in the supply chain which requires healthy interactions among the partners over time, with sharing of information, risks and rewards (Ellram and Krause 1994).

According to Simchi-Levi *et al.* (2008), supply chain management (SCM) may be defined as a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying service level requirements. It involves many independent organizations and develops through intra- and inter-organizational integration and coordination encompassing the initial stage to the end user. It includes a two-way flow of materials, services and informations, and the related managerial and operational tasks. It aims at providing high value to customers with appropriate resource utilization, and building competitive advantage (Cooper *et al.* 1997).

2.2 Review of Supply Chain of Vegetables

Grismsdell (1996) examined the supply chain of various horticultural commodities which as developed efficiently by British Field Products Ltd, over the year. He outlined the six fundamental requirements for an efficient supply which were scale of operation; strategic alliances, production, flexibility, continuity of supply, quality control and communications and concluded that mutual awareness by all the stakeholders was one of the best ways forward for sustainability. Cadilhon *et al.* (2003) developed a conceptual framework for the analysis of vegetable supply chains in a South East Asian context by highlighting the particular role of trust and collaboration among stakeholders in the Ho Chi Minh City vegetable marketing system. The critical factors in the development of improved fresh food marketing systems were domestic legal and policy factors, international trade policies and food markets, history, geography, and cultural and social norms.

Talamini *et al.* (2005) studied about the growing concern about food safety and indicated that supply chains play predominant role in the productive process. Supply chain management may contribute substantially toward a more uniform process throughout the chain, facilitating the sharing of information and productive practices. Buurma and Saranark (2006) conducted two supply-chain development projects in Thailand. Firstly, they introduced certification system for food safety in order to improve their competitive position and to consolidate their image of a quality supermarket. And they managed an integrated quality chain in order to comply with the increasing food safety requirements in the European Union and Japan. Consequently export volumes and numbers of smallholders and laborers are rapidly growing. Dhawan (2010) studied Supply chain management in vegetable marketing in Bangalore and he pointed out that lowest marketing cost and least price spread with modern supply chain followed by cooperative and traditional supply chain formats respectively.

Narasalagi and Hegade (2013) studied on profitability of supply chain formats in vegetable marketing in Karnataka and observed that higher total returns and net returns were found in cooperative retail format followed by modern retail format. Modern supply chain was found to be more efficient than cooperative and traditional supply chain. Waiyawuththanapoom and Tirastittam (2013) studied on the factors which effect the management of the fresh vegetable supply chain and the problems and obstacle of the fresh vegetable supply chain in Nakorn province. They found that

the key processes of the fresh vegetable supply chain were in the supply sourcing process and manufacturing process. The quality of the seed, weather, hygiene of the quality control process and hygiene of the packing location are the most important factor of the supply chain of fresh vegetable for exporting of Nakorn Pathom province. Singh and Mishra (2013) examined to assess the challenges and problems of supply chain of vegetables. Farmers are not getting requisite realization of price commensurate to their efforts due to lack of storage facilities, poor market information and unorganized faulty supply chain. A better solution can be the Public Private Partnership for the supply chain development.

Negi and Anand (2014) examined the status of supply chain efficiency in fruits and vegetables sector in India and discussed the need and importance of efficient supply chain in this sector. It was suggested that the supply chain is highly inefficient which is leading to huge losses and wastages and less income to the stakeholders. Fruits and vegetables sector in India is rapidly increasing and presents a huge opportunity to the stakeholders and entrepreneurs through setting up the cold chain infrastructure and food processing units. Bahinipati (2014) highlighted that supply chain analysis also needs to focus on the sustainability of change in the management of procurement activities and information and communication technology (ICT) infrastructure supporting the e-market service mode, and builds a collaborative control framework that could provide insight to the managers of the food producing industries. Pattnaik (2015) investigated on sustainability issues associated with the supply chain management of green vegetables and fruits in Reliance Fresh. The result revealed that Reliance Fresh needs to emphasize in planning for cold storage, warehousing, transportation, marketing as well as maintaining the conditions of hygiene, quality, freshness and healthy consumption.

2.3 Marketing Channel and Marketing Margin

Rosenbloom (2004) stated that a marketing channel is the external contractual organization that management operates to achieve its distribution objectives. These are various routes that products or services use after their production until they are purchased and used by end users. Therefore, marketing channels, i.e. distribution channels are all those organizations that a product has to go through between its production and consumption (Kotler *et al*. 2006). Channels of distribution provide downstream value by bringing finished products to end users. This flow may involve

the physical movement of the product or simply the transfer of title to it. Also known as a distribution channel, a distribution chain, a distribution pipeline, a supply chain, a marketing channel, a market channel, and a trade channel (Ostrow 2009).

Pelton *et al.* (2014) defined marketing channel as an array of exchange relationships that create customer value in the acquisition, consumption, and disposition of products and services. This definition implies that exchange relationships emerge from market needs as a way of serving market needs. Channel members must come to the marketplace well equipped to address changing market needs and wants.

Olukosi and Isitor (1990) stated that marketing margin is studied to measure efficiency of markets. It is an attempt to evaluate economic or price efficiency. Generally, it refers to the difference between the retail price and the producer price. The marketing margin showed the fraction of the consumer expenditure on a commodity that is received by the producer and each of marketing agents. Ghorbani (2008) mentioned that marketing margin are important indices in the evaluation of supply chain performance. It is the difference in the price paid by consumers and that received by the producers. Marketing margins are also calculated at different points along the supply chain and then compared with consumer price. It is calculated in relation to the price paid by the consumer and expressed in percentage (Teka 2009).

2.4 Review of Market Performance of Vegetables

Gandhi and Namboodiri (2002) examined regulated wholesale markets for fruits and vegetables in the Ahmedabad city area. Analysis of marketing costs indicated that transport cost and commission are the most important. Analysis of prices at different levels indicates that overall the average share of the farmers in the consumer price is only around 48 percent for vegetables and 37 percents for fruits. A study of the profit margin after accounting for explicit marketing costs shows that the margin is frequently as high as 80 to 90 percent as a percentage of the farmer-consumer price difference. This may indicate significant imperfections and poor marketing efficiency. Hau and Oppen (2004) studied the efficiency of the vegetable market in Northern Thailand. It is hypothesized that the factors influencing market efficiency differ by commodity and that market structures differ significantly among vegetables. Correlation coefficients are expressed as a function of a set of marketing

costs, operational costs, margins and qualitative characteristics of the markets. The results showed that the cabbage, carrot and onion market are similar in structure and the same factors influence the market efficiency of the latter two markets. In comparison the structure of Tomato market is different and adheres to a different set of assumptions than the other three.

Murthy *et al.* (2007) studied marketing losses and their impact on marketing margins, focusing on Banana. The result revealed that the share of profit margin of producer, wholesaler and retailer reduced after taking into account the physical loss. Marketing cost has been defined as the major constraints in the wholesale marketing channel and bringing down the costs, particularly the commission charges as demonstrated in the co-operative channel, will help in reducing the price-spread and increasing the producers' margin. Haji (2008) examined economic efficiency and marketing performance of vegetable production in the Eastern and Central Parts of Ethiopia. The results revealed the existence of considerable economic inefficiency in production, poor contract enforcement, and imperfect competition in the marketing of vegetables. Limited access to capital markets, high consumer spending and large family size attributed to low economic efficiency. Traders capture a significant proportion of the marketing surplus due to market power and audacity to absorb risk with this share varying along the degree of perishability and across cities. Sandika (2011) studied impact of middlemen in vegetable marketing channels in Sri Lanka. It was observed that usually when the Retail Price (RP) and Producer Price (PP) increase the marketing margin (MM) decrease and vice versa. It wa clear that when the RP and PP are high the middlemen try to control the market prices by reducing their marketing margin. It may help to protect the consumers directly because RP and PP normally increase due to low supply of the production of vegetable and/or high demand for it. When the prices are low they try to get more benefits by increasing their MM as a rational entrepreneur.

Thompson and Agbugba (2013) studied marketing of tropical vegetable in Aba area of Abia State, Nigeria. The market players include: producers, wholesalers, retailers, commission agents and final consumers. Vegetable marketing is a profitable business venture in the study area. It was also discovered that most of the commission agents in the marketing of ugu (traditional vegetable) and okra were also involved in the wholesale business and hence, contributing to their high margins. Bakari and Usman (2013) examined the marketing of sweet pepper, spinach and tomato in

Yola North and Yola South Local Government Areas of Adamawa State in Nigeria. The study revealed that poor storage, inadequate transportation network and shortage of capital were the major problems facing the respondents. There is need for the government to intervene by providing the marketers with adequate transportation network, good storage facilities and loans to facilitate their business. The marketers on their side should form cooperatives to give them a better bargaining power in their business. Mogaji *et al.* (2013) conducted research in marketing performance and efficiency of evaporative-preservation cooling system for fresh tomato marketing in Ondo State, Nigeria. The result revealed that profit margin for users of evaporative cooling system is significantly different from users of traditional mode of preservation. Disaggregated wholesaler's profit margin for users of traditional preservation method implies that they are not efficient compared with users of evaporative cooling system. Given the wide tropical variability in temperatures and relative humidity, evaporative cooling system is of economic importance towards commodity marketing development in Ondo State, Nigeria.

Ebiowei (2013) studied for determining the marketing margin and examines the determinants of net return of watermelon marketing in Yenago metropolis of Bayelsa State in Niger Delta Area of Nigeria. Marketing of watermelon in the area was profitable with monthly marketing margin. Marketing efficiency and BCR was 0.588 and 1.53 respectively, marketing of watermelon was inefficient. The price of water melon had positive and significant relationship with net return. Major constraints of watermelon marketing were spoilage of fruits, transport risk, small size watermelon, irregular supply, and inadequate capital. Kelechi *et al.* (2013) studied market structure, conduct, channel and margin of dry season Okra vegetable in South-Eastern Nigeria. Eight marketing channels were identified. From the Gini coefficient model, which determined the level of concentration in relation to the structure of the markets of wholesale and retail markets, there were no barriers to entry and exit in and out of the markets during the dry season period. There was a high percentage (93%) in the marketing margin of the marketers.

Pandey *et al.* (2013) estimated the price spread producers and market intermediaries share in the consumer price in the channel: Producer, commission agent, retailer and consumer in potato marketing at Shimal. The result showed that the producer realized around 73 percent share in consumer's price. The retailer and commission agent earned profit of about 3.5 and 8.0 percent of the consumer's rupee.

The price spread and marketing efficiency was found to be about 27 percent and 3 respectively. Adenuga *et al.* (2013) studied the marketing efficiency and determinants of marketable surplus in vegetables production in Kwara state, Nigeria. The results revealed that educational level of the household head, farming experience, spoilage at farm and household were the significant determinants of marketable surplus in vegetable production in the study area. It is recommended that daily local markets with small processing units and motor able roads be established near the vegetable farms to minimize marketing loss.

Kumar *et al.* (2014) conducted the study of economic of production and marketing of vegetables at Maccapaha and Calicut of the south Andaman island of Andaman district, found out that, marketing cost was highest for cabbage, followed by tomato, snake gourd due to the fact that they are transported from far off islands to the main consumption point where they were located. The margin to both the wholesaler and the retailer was highest in ginger and lowest in basal and marsa. Yooyen *et al.* (2014) studied marketing system and obstacles of selected fresh vegetables passing the Good Agricultural Practice (GAP) system as well as marketing analysis for development to organic farming. According to the marketing system, 94.76 percent of both chili and onions were sold to the local middlemen. Marketing margin of chili was 20 baht per kilogram and chili selling was independent. The marketing margin of onion was 14.25 baht per kilogram and onion selling was operated by cooperatives. The quality and quantity of production were considered as serious problem for the development to organic farming.

CHAPTER III
RESEARCH METHODOLOGY

3.1 Description of Study Area

The study was conducted in Mon state that is located in the southern region of Myanmar. Mon state is situated between latitudes 14˚ 52′ North and 17˚ 32′ North and longitudes 96˚ 51′ East and 98˚ 13′ East. The total area is about 12296 km^2 with a population of 2,050,282. It is sandwiched between Kayin State on the East, the Andaman Sea on the West, Bago region on the North and Tanintharyi region on the South, and has a short border with Thailand's Kanchanaburi Province at its South-Eastern tip. The state's capital is Mawlamyine.

Mon state has a tropical climate. As it is located in the low altitude zone near the sea and has temperate weather. Seasonal changes in temperature are not high. Annual rainfall in Mon state is 202 inches. Rain is especially heavy in July and August. Mon state has a cultivated area of nearly 4.5 million acres (18,000 km^2), mostly under rice. The second major crop is rubber. The total vegetable cultivation area is about 13738 ha in 2014. Although Mon state has a low vegetable cultivation area than other states of Myanmar, many smallholder farmers engaged in vegetable cultivation for their livelihood. The major vegetables growing in Mon State were yard-long bean, cucumber, eggplant, tomato and mustard. But the cultivated crop type varies with townships and seasonal conditions.

For the study sites, four major vegetables supplying townships (Mawlamyine, Paung, Thaton and Belin) in Mon state were purposely selected. Ten villages from four townships were selected as the specific study sites. They were Daukyap, Zotethoat, Aninepon, Minywar, Chautmile, Yewinekyun, Zarkaton, Shanywarkyi, Padainywar and Shanywarlay (Appendix 1). Most of the vegetable growers were smallholder farmers.

3.2 Data Collection and Sampling Method

The data were collected by personal interview using structured questionnaire. Various actors along the chain were selected and surveyed by using simple random sampling method. The survey was conducted during the period from November 2013 to January 2014. Total sample size of 141 was interviewed, including 100 vegetable growers, 11 collectors, 14 wholesalers and 16 retailers (Table 3.1 and 3.2).

The primary data such as socio-economic of the sampled households, data on vegetable production, marketing system, prices of vegetable supplied, distance to the market, access to market information, credit facility, extension services and types of buyers and sellers were collected at the farm level. For the investigation of marketing cost, marketing margin of various stakeholders and marketing channels, marketing agents such as collectors, wholesalers and retailers were interviewed.

Table 3.1 Sample villages and number of vegetable growers from selected townships of Mon State

No.	Township	Village	No. of vegetable growers
1	Mawlamyine	Minywar	5
		Choutmile	10
2	Paung	Zarkaton	10
		Yewinekyun	8
3	Thaton	Shanywarkyi	17
		Padainywar	8
		Shanywarlay	12
4	Belin	Dauakyap	10
		Zotethoat	10
		Aninepon	10
Total			100

Table 3.2 Number of market participants in selected townships of Mon State

No.	Township	No. of respondents		
		Collectors	Wholesalers	Retailers
1	Mawlamyine	-	4	4
2	Paung	3	2	4
3	Thaton	4	4	4
4	Belin	4	4	4
Total		11	14	16

3.3 Method of Analysis

Both qualitative and quantitative data were tabulated in Microsoft Excel program. Then the data were re-entered into the Statistical Packages for Social Science (SPSS) software. Descriptive statistics and econometric analysis were used to analyze the data collected from vegetable producers and traders.

3.3.1 Cost and return analysis

Enterprise budget is used in the economic analysis (Olson 2009). The evaluation and focus on the economic and technical performance of an individual farm enterprise is called an enterprise budget which is used to examine the profitability of specific farm enterprise and to compare the profitability of existing and proposed enterprises. The cost and return analysis was used to determine the profitability of the crop in the study areas. Both cash and non-cash items were included in the estimation of material cost and labor cost. Family labor is non-cash labor cost item. Non-cash items for material cost were own seeds, working animals, Farm Yard Manure (FYM) etc. kept by farmers at farm. Cash payment for labor included hired labor and payment for land preparation.

Profit measures were estimated by using the following formulae:

1. RAVC = TR – TVC
2. RAVCC = TR – TVCC
3. GM = GB – TC
4. BCR = TR/TVC
5. Return per unit of cash cost = TR/TVCC

Where,

RAVC	=	Return Above Variable Cost	TR	=	Total Revenue
RAVCC	=	Return Above Variable Cash Cost	TVC	=	Total Variable Cost
GM	=	Gross Margin	TVCC	=	Total Variable Cash Cost
BCR	=	Benefit Cost Ratio	GB	=	Gross Benefit
TC	=	Total Cost			

Other measurements used in economic analyses are as follows;

Total Variable Cash Cost = Total material costs + Total hired labor cost

Total Variable Cost = Total variable cash cost + Total family labor cost

3.3.2 Analysis of profit shares

Farmer profit share (%) = (P_f / P_T) x 100

Collector profit share (%) = (P_c / P_T) x 100

Wholesaler profit share (%) = (P_w / P_T) x 100

Retailer profit share (%) = (P_r / P_T) x 100

Where,

P_f = Profit of the farmer

P_c = Profit of the collector

P_w = Profit of the wholesaler

P_r = Profit of the retailer

P_T = Total profit (farmer + collector + wholesaler + retailer)

3.3.3 Marketing margin analysis

Marketing margin was used to determine the efficiency of vegetable marketing enterprise in the study area. Marketing margin of vegetable is the difference between the price paid by the ultimate consumer and the price received by the vegetable farmer, or the difference between the producer price (farm gate price) and the retail price. It measures the share of the final selling price that is captured by a particular agent in the marketing chain (Mendoza 1995). Marketing margins consist of marketing functions such as grading, packing, loading, unloading, transportation, storage, and levies. The data on marketing costs are needed to disaggregate the gross marketing margin of an enterprise at different marketing stages. This provides information on the costs of particular marketing functions, which can be compared with costs incurred by other enterprises to assess the operational efficiency (Scarborough and Kydd 1992). The following indicators were used in the analysis.

(a) Marketing Margin = Selling Price – Buying Price

(b) Profit Margin = Marketing Margin – Total Marketing Cost

CHAPTER IV
RESULTS AND DISCUSSION

4.1 Supply Chain of Vegetables in Mon State

The supply chain map highlighted the involvement of diverse actors who were participated directly or indirectly in the supply chain. The direct actors were those involved in commercial activities in the chain (input suppliers, producers, traders, consumers) and indirect actors were those who provided financial or non-financial support services, such as credit agencies, business service providers, government, NGOs, cooperatives, researchers and extension agents (KIT *et al.* 2006).

The supply chain map of vegetable sector of Mon State was shown in Figure 4.1. Functions included input supply, production, marketing and consumption. The primary actors who were performing production and marketing activities along the supply chain of vegetable sector in Mon State were farmers, collectors, wholesalers, retailers and consumers. There were also governmental and non-governmental supportive actors who supported vegetable supply chain directly or indirectly. The supporters provided especially for training and finance. The main supporters of the vegetable supply chain in the study areas were government, private Agrochemical Company and informal credit suppliers such as collectors and wholesalers.

4.2 Description of Sample Farmers

4.2.1 Demographic and socio characteristics of the sample farmers in selected townships of Mon State

The demographic and socio characteristics such as age, farming experience, schooling years and gender issue of sample farmers were shown in Table 4.1. In the study area, the average age of the sample farmer was 48.96 years and the average experience in farming was 27.44 years. Most of the sample farmers were with primary education level; average schooling year was 4.23 years. Therefore, the education level of farmers was not high enough for better management of crop production. The F-test showed that there was no significant difference in the average age, experience and schooling years among townships. The percentages of gender of vegetable growing household heads were 88% male and 12% female, respectively. There was no significant difference in gender issue of household heads among townships.

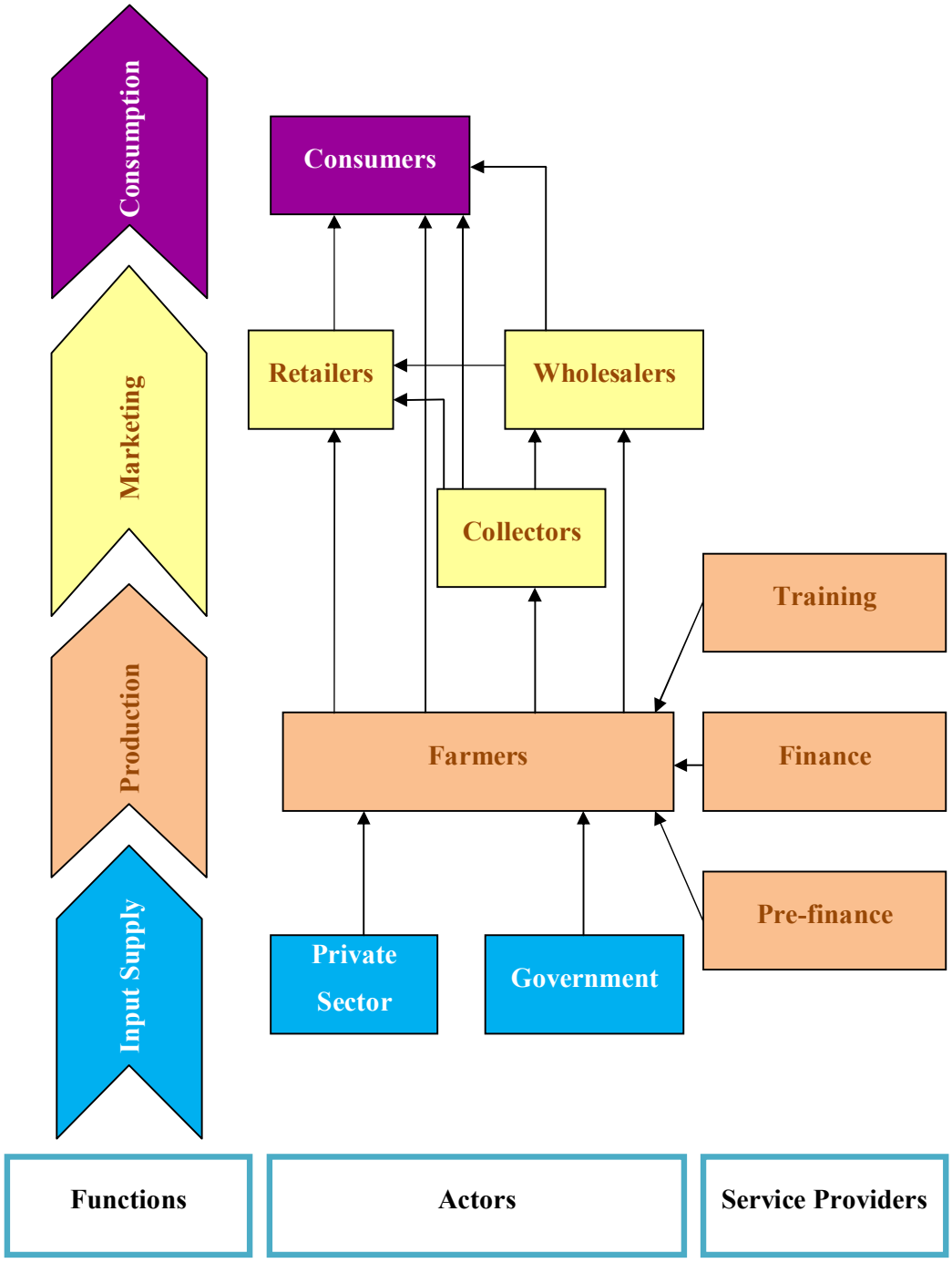

Figure 4.1 Supply chain map of vegetables in Mon State (2014)

4.2.2 Farm and household assets of the sample farmers in selected townships of Mon State

Land ownership of sample farmers in the study area were shown in Table 4.2. The average ownership of lowland (paddy land) was 1.2 hectares ranging from 0.2 to 40.47 hectares, upland (Ya) was 0.27 hectares ranging from 0.03 to 2.43 hectares and orchard was 0.09 hectares, ranging from 0.2 to 5.26 hectares. In terms of cultivated land type of sample farmers, 42% of farmers cultivated in lowland, 38% of farmers in upland, 10% in orchard and the remaining 10% in both lowland and upland (Figure 4.2). The average farm size of growing vegetables was 0.37 hectare and ranging from 0.04 to 1.29 hectares (Table 4.3). Therefore, it can be said that vegetable growers in Mon State were smallholder farmers.

The farm and household assets of the sample farmers were presented in Table 4.4. Farm assets such as plough and harrow were observed in Belin and Paung Townships. The percentages of sample farmers who owned plough and harrow were 10% and 27.78% of total respondents in Belin and 6.67% and 22.22% of total respondents in Paung Township, respectively. The cattle used for land preparation was not found in Thaton Township and the cart used for transportation was only found in Paung Township. It was observed that farmers who had farm assets such as plough, harrow, cattle and cart were paddy growers. The grass mower used for weeding was found only in Paung Township. But water pump and sprayer used for vegetable cultivation were found in all townships. There was no significant difference in owning the asset of water pumps among townships and there was highly significant difference in owning sprayers among townships. The percentages of sample farmers who own sprayer were 80% of total respondents in Belin, 66.67% of total respondents in Mawlamyine, 44.44% of total respondents in Paung and 45.95% of total respondents in Thaton Township, respectively. Household assets such as motor cycle, mobile phone and television were observed in all townships. Farmers who used motor cycle for transportation was observed in Belin (70% of total respondents in Belin) and Mawlamyine (53.33% of total respondents in Mawlamyine) than that of Thaton (24.32% of total respondents in Thaton) and Paung (16.67% of total respondents in Paung). There was highly significant difference in owning the asset of motor cycle and television but there was no significant difference in the asset of mobile phone among townships. Therefore, advanced machine like grass mower for weeding in vegetable cultivation was not observed much and farmers were currently practicing traditional production practices in the study area.

Table 4.1 Demographic and socio characteristics of sample farmers in selected townships of Mon State

Variables	Unit	Belin (N=30)	Mawlamyine (N=15)	Paung (N=18)	Thaton (N=37)	Total (N=100)	F test
Age	Year	48.33 (7.42)	47.87 (9.97)	47.00 (8.49)	50.86 (7.57)	48.96 (8.11)	1.18^{ns}
Experience	Year	24.20 (14.16)	30.40 (12.11)	24.17 (12.14)	30.46 (14.4)	27.44 (13.79)	1.75^{ns}
Schooling years	Year	4.37 (1.86)	5.20 (4.16)	3.67 (1.78)	4.00 (1.5)	4.23 (2.26)	1.47^{ns}
Gender							χ^2 test
Male	%	76.67	93.33	88.89	94.59	88.00	0.13^{ns}
Female	%	23.33	6.67	11.11	5.41	12.00	

Note: value in the parenthesis is standard deviation, ^{ns} not significant

Table 4.2 Land ownership of sample farmers in selected townships of Mon State (ha)

Farm size	Belin (N=30)	Mawlamyine (N=15)	Paung (N=18)	Thaton (N=37)	Total (N=100)
Paddy land					
Minimum	0.20	0.20	0.40	0.80	0.20
Maximum	40.47	0.81	2.43	8.09	40.47
Mean	2.75	0.24	1.38	0.24	1.20
Dry land					
Minimum	0.04	1.21	-	0.03	0.03
Maximum	2.43	1.21	-	1.62	2.43
Mean	0.40	0.08	-	0.37	0.27
Orchard					
Minimum	-	0.20	-	-	0.20
Maximum	-	5.26	-	-	5.26
Mean	-	0.59	-	-	0.09

Table 4.3 Vegetable farm size of sample farmers in selected townships of Mon State (ha)

Farm size	Belin (N=30)	Mawlamyine (N=15)	Paung (N=18)	Thaton (N=37)	Total (N=100)
Mean	0.36	0.36	0.5	0.33	0.37
Minimum	0.04	0.08	0.12	0.04	0.04
Maximum	1.21	0.8	0.8	1.29	1.29
F test			**1.43^{ns}**		

Note: ^{ns} not significant

Table 4.4 Farm and household assets of sample farmers in selected townships of Mon State

Items	Percent of respondents				χ^2 test
	Belin (N=30)	Mawlamyine (N=15)	Paung (N=18)	Thaton (N=37)	
Plough	10.00	-	27.78	-	14.25***
Harrow	6.67	-	22.22	-	11.74***
Cattle	13.33	6.67	27.78	-	10.98***
Cart	-	-	11.11	-	9.29***
Grass reaper	-	-	11.11	-	9.29***
Water pump	73.33	73.33	55.56	59.46	2.57^{ns}
Sprayer	80.00	66.67	44.44	45.95	10.01***
Motor cycle	70.00	53.33	16.67	24.32	20.03***
Mobile phone	20.00	46.67	33.33	27.00	8.19^{ns}
Television	86.67	66.67	55.55	40.54	15.24***

Note: *** significant at 1% level, ^{ns} not significant

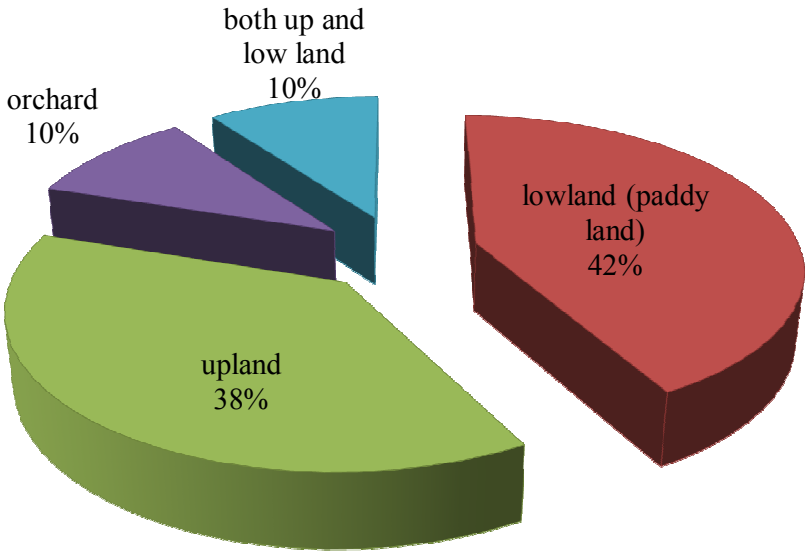

Figure 4.2 Cultivated land types of sample farmers in selected townships of Mon State (2014)

4.2.3 Access to supporting services in selected townships of Mon State

Supporting actors are those who provide supporting activities to farmers. Supporting activities include procurement, human resource management, technological development and infrastructure. Although these activities are not directly involved in production, this may increase effectiveness or efficiency of the chain, from production to consumption and these may be more fundamental to the improvement of agriculture and rural life (Porter 1985). In the study areas, some training and credit services were found as supporting activities.

4.2.3.1 Training and extension services

It was found that training and extension services for vegetable growers were very weak in the study areas. For training services, only 4% of total respondents that was in Thaton Township had training experience and there was no exposure to training services in other townships (Table 4.5). The respondents in Thaton Township mentioned that the training was from Agrochemical Company and they were given on how to use their products, application of fertilizers, pesticides and fungicides. However, training duration was too short mostly one day. This type of training was done casually so that farmers were hard to run into training. There was no training for vegetable production system, post-harvest handling and crop management in the study area.

Regarding extension service, all respondents answered that they had no experience in attending training conducted by governmental extension services. If farmers need any technical advice for their production, they went and mostly asked to input suppliers and sometimes, they asked to neighboring farmers. Therefore, the information they got from their environment sometimes works well and sometimes it did not solve for their field problems.

4.2.3.2 Financial services

In the study area, government, collectors and wholesalers were found as financial supporting actors. But the support from government was mostly for paddy farmers. In Belin and Paung Townships, about 77% and 72% of farmers answered that they received loan from government (Table 4.5). All these farmers were paddy growers. In Mawlamyine and Thaton Townships, only 13% and 8% of farmers received credit. The credits received were from collectors and wholesalers as

pre-finance for vegetable production. In the study area, it was also found that almost all of the farmers had to borrow money for their vegetable productions. Therefore, private lenders were main source of credit for most of vegetable growers. These findings revealed that formal credit institutions were inactive in credit advancement for vegetable growers in study area. This led to producers' inability to operate more effective business.

4.2.4 Production status of different vegetables in selected townships of Mon State

In the study area, different kinds of vegetables were produced depending on the geographical condition and seasons. Some growers produced different kinds of vegetable, while some produced only one kind. Mostly grown vegetables in the study were presented in Table 4.6. In Belin Township, yard-long bean (46.6%), cucumber (33.3%), mustard (40%) and coriander (33.33%) were mostly cultivated than other types of vegetables. Major vegetables for Mawlamyine Township were Yard-long bean (53.3%), eggplant (53.3%), mustard (53.3%) and cauliflower (40%). Cucumber (38.8%), eggplant (33.3%) and tomato (88.8%) were mostly grown vegetables in Paung Township. In Thaton Township, mostly cultivated vegetables were cucumber (35.1%), eggplant (56.7%) and bottle gourd (32.4%). Yard-long bean, cucumber, eggplant, tomato and mustard were widely grown vegetables by sample households in the study area. Among the major vegetables, the analysis was focused on yard-long bean, cucumber, eggplant and tomato based on the market demand and potential.

Table 4.5 Access to services by sample farmers in selected townships of Mon State

Variables	Items	Percent of respondents				Total (N=100)
		Belin (N=30)	Mawlamyine (N=15)	Paung (N=18)	Thaton (N=37)	
Training received	**Yes**	-	-	-	11	4
	No	100	100	100	89	96
Exposure to extension agents	**Yes**	-	-	-	-	-
	No	100	100	100	100	100
Access to credit by the government	**Yes**	77	13	72	8	41
	No	23	87	28	92	59

Table 4.6 Major vegetables grown by sample farmers in selected townships of Mon State

No.	Items	Percent of respondents				Total (N=100)
		Belin (N=30)	Mawlamyine (N=15)	Paung (N=18)	Thaton (N=37)	
1	Eggplant	13.3	53.3	33.3	56.7	39.0
2	Yard-long bean	46.6	53.3	22.2	27.0	36.0
3	Cucumber	33.3	26.6	38.8	35.1	34.0
4	Mustard	40.0	53.3	-	27.0	30.0
5	Tomato	20.0	6.6	88.8	-	23.0
6	Lady finger	23.3	33.3	11.1	5.4	16.0
7	Bottle gourd	3.3	-	-	32.4	13.0
8	Cauliflower	23.3	40.0	-	-	13.0
9	Coriander	33.3	-	-	5.4	12.0
10	Chili	10.0	-	11.1	8.1	8.0
11	Radish	20.0	-	-	-	6.0
12	Ridged gourd	3.3	13.3	5.5	2.7	5.0
13	Pumpkin	3.3	-	16.6	2.7	5.0
14	Water cress	16.6	-	-	-	5.0
15	Lettuce	3.3	-	-	-	1.0

4.2.5 Growing time of four major vegetables in selected townships of Mon State

Growing time of yard-long bean in the study areas were presented in Table 4.7. It was found that growing time were differed among townships. In Belin Township, 72% of farmers started to grow yard-long bean in October, and a few farmers grew in August, September, November and January. Therefore, October was the major growing time of yard-long bean in Belin Township. In Mawlamyine Township, 50% of farmers cultivated in July, 25% of farmers grew in October, 12% of farmers grew in November and 13% of farmers grew in December, respectively. Therefore, July and October were growing time of yard-long bean in Mawlamyine Township. All farmers in Thaton Township started to grow yard-long bean in November. Therefore, it can be regarded that the dry season, October and November were the major growing time of yard-long bean for Mon State.

Cucumber production was not observed in the summer season, March and April (Table 4.8). Winter season was the major growing season of cucumber in Belin and Thaton Townships. However, rainy season was major growing season for Mawlamyine and Paung Townships. The differences of growing time among townships were mainly depended on the availability of land (geographical condition) and water.

The growing time of eggplant also differed among different townships (Table 4.9). In Belin Township, 50% of the sample farmers started to grow in September and others in November. In Mawlamyine Township, some of the sample farmers started to grow in February, some in June and some in November. But the percent of respondents grew in June (57%) was the highest. All the farmers in Paung Township started to grow in November and, thus June and November were the growing time of eggplant in Thaton Township.

In the case of tomato, production was found only in Belin and Paung Townships. All of the sample farmers in Belin Township grew tomato in December (Table 4.10). While in Paung Township, sample farmers grew tomato in October (13%), November (56%) and December (31%) Therefore, it can be said that winter season (October, November, and December) was the major growing season of tomato in the study area and the remaining seasons can be regarded as off-season. During off-season, tomato from other states (especially from Shan State and also including Sagaing Division, Naypyitaw Division, Bago Division, Yangon Division and

Thailand) had imported for local consumption. Therefore, there were a number of flourishing opportunities for vegetable sector in Mon State such as continuous demand for vegetables not only from local but also from remote townships, feasibility of off-season production. The existence of Asian highway in Mon State also favored for export of vegetables from Mon State.

Table 4.7 Frequency of growing time of yard-long bean in selected townships of Mon State

Growing time	Percent of respondents				Total (N=36)
	Belin (N=14)	Mawlamyine (N=8)	Paung (N=4)	Thaton (N=10)	
January	7	-	-	-	3
February	-	-	-	-	-
March	-	-	-	-	-
April	-	-	-	-	-
May	-	-	-	-	-
June	-	-	-	-	-
July	-	50	50	-	16
August	7	-	-	-	3
September	7	-	-	-	3
October	72	25	50	-	39
November	7	12	-	100	33
December	-	13	-	-	3

Table 4.8 Frequency of growing time of cucumber in selected townships of Mon State

Growing time	Percent of respondents				Total (N=35)
	Belin (N=10)	Mawlamyine (N=5)	Paung (N=8)	Thaton (N=12)	
January	10	20	-	-	6
February	10	-	-	-	3
March	-	-	-	-	-
April	-	-	-	-	-
May	10	-	62	-	17
June	10	60	38	-	20
July	-	20	-	-	3
August	10	-	-	-	3
September	-	-	-	-	-
October	50	-	-	-	14
November	-	-	-	100	34
December	-	-	-	-	-

Table 4.9 Frequency of growing time of eggplant in selected townships of Mon State

Growing time	Percent of respondents				Total (N=40)
	Belin (N=4)	Mawlamyine (N=7)	Paung (N=6)	Thaton (N=23)	
January	-	-	-	-	-
February	-	14	-	-	2
March	-	-	-	-	-
April	-	-	-	-	-
May	-	-	-	-	-
June	-	57	-	87	60
July	-	-	-	-	-
August	-	-	-	-	-
September	50	-	-	13	13
October	-	-	-	-	-
November	50	29	100	-	25
December	-	-	-	-	-

Table 4.10 Frequency of growing time of tomato in selected townships of Mon State

Growing time	Percent of respondents		Total (N=22)
	Belin (N=6)	Paung (N=16)	
January	-	-	-
February	-	-	-
March	-	-	-
April	-	-	-
May	-	-	-
June	-	-	-
July	-	-	-
August	-	-	-
September	-	-	-
October	-	13	9
November	-	56	41
December	100	31	50

4.2.6 Sources of seeds and water for vegetable production in selected townships of Mon State

Table 4.11 indicates sources of seeds used for the cultivation of four major vegetables in Mon State. Although farmers in Belin, Mawlamyine and Thaton Townships used their owned seeds (seeds that were collected from farmers' field for next season) for yard-long bean production, farmers in Paung Township used commercial seeds (seeds that were purchased from input suppliers) for their production. For cucumber production, all farmers in the study area used commercial seeds. But in the case of eggplant, all farmers in the study areas used their owned seeds. For tomato production, areas such as Belin and Paung Townships, farmers used both owned and commercial seeds for their production. But the use of commercial seeds (55%) was higher than the use of owned seeds (18%). According to the market demand, some of the farmers used both owned and commercial seeds at the same time for their tomato production. The selection of the sources of seed, in the study areas, mainly depended on the kinds of vegetables that have high market demand and cost of seeds.

Table 4.12 shows sources of water for vegetable cultivation in selected townships in Mon State. In Belin Township, 87% of farmers used water from well and 13% of farmers used water from stream. Similar to Belin Township, farmers in Mawlamyine Township used well (67%) and stream (32%) as water sources. In Paung Township, nearly all of the sample farmers (94%) used water from river and only 6% used well. In Thaton Township, nearly half of the respondents (49%) had well and 51% of respondents relied on water from stream. In the study area, farmers who relied on well and stream as water source always had water shortage in dry season. For watering of vegetables, farmers used water pump. Farmers who do not have their owned water pump could hire from neighboring farmers without payments and some had to pay for hiring. Some farmers used pipe and irrigate water between rows of vegetable cultivation. Some farmers watered their field by themselves, while some hired labors.

Table 4.11 Sources of seeds for the cultivation of selected vegetables in selected townships of Mon State (2014)

Vegetables	No. of farmers	Seed source	Percent of respondents				Total
			Belin	Mawlamyine	Paung	Thaton	
Yard-long bean	36	Owned	100	100	-	100	88
		Commercial	-	-	100	-	12
Cucumber	35	Owned	-	-	-	-	
		Commercial	100	100	100	100	100
Eggplant	40	Owned	100	100	100	100	100
		Commercial	-	-	-	-	
Tomato	22	Owned	17	-	19	-	18
		Commercial	83	-	44	-	55
		Both owned and commercial	-	-	37	-	27

Table 4.12 Sources of water for the cultivation of vegetables in selected townships of Mon State (2014)

Water source	Percent of respondents				Total (N=100)
	Belin (N=30)	Mawlamyine (N=15)	Paung (N=18)	Thaton (N=37)	
Well	87	67	6	49	55
Stream	13	33	-	51	28
River	-	-	94	-	17

4.2.7 Post-harvest activities of farmers in selected townships of Mon State

As post-harvest activities, farmers did not have any special activities. After harvesting, some farmers weighted directly their products for selling. Among four townships, weighing before selling observed only in Belin Township (Table 4.13). However, all farmers in the study area packaged their products for selling. The use of packing material differed based on the location. Some farmers used bags, some used piece of clothes, and some used bamboo baskets.

4.2.8 Average productivity of vegetables per hectare in selected townships of Mon State

The average productivity of vegetables per hectare in the study area was shown in Table 4.14. The average productivity of yard-long bean was the highest in Belin Township (21.78 ton per hectare (t/ha)), followed by Thaton (19.24 ton/ha), Mawlamyine (18.71 ton/ha) and Paung (15.83 ton/ha), respectively. In cucumber production, the average productivity was the highest in Thaton Township (28.07 ton/ha), followed by Mawlamyine (27.68 ton/ha), Paung (25.99 ton/ha) and Belin (25.81 ton/ha), respectively. In the case of eggplant, the average productivity was the highest in Thaton Township (44.04 ton/ha), followed by Mawlamyine (37.98 ton/ha), Paung (32.21 ton/ha) and Belin (22.31 ton/ha). The average productivity of tomato in Paung Township (17.72 ton/ha) was higher than that of Belin Township (15.46 ton/ha). There was not significantly different in average productivity of yard-long bean, cucumber and eggplant among four townships. However, there was significant difference in mean productivity of eggplant among four townships. This might be because the life span and yield of eggplant can be extended by managing carefully, such as giving proper fertilizer application and irrigation. Therefore, the variation of yields mainly depended on the producers how they managed their crops.

Table 4.13 Post-harvest activities of farmers in selected townships of Mon State

Function	Percent of respondents				Total (N=100)
	Belin (N=30)	Mawlamyine (N=15)	Paung (N=18)	Thaton (N=37)	
Weighing	50	-	-	-	13
Packaging	50	100	100	100	87

Table 4.14 Average productivity of vegetables per hectare in selected townships of Mon State

Vegetables	No. of farmers	Productivity (ton/ha)				Total	F-test
		Belin	Mawlamyine	Paung	Thaton		
Yard-long Bean	36	21.78	18.71	15.83	19.24	18.89	2.1^{ns}
Cucumber	35	25.81	27.68	25.99	28.07	26.89	0.7^{ns}
Eggplant	40	22.31	37.98	32.21	44.04	34.14	5.6***
Tomato	22	15.46	-	17.72	-	16.59	4.6^{ns}

Note: *** significant at 1% level, ^{ns} not significant

4.2.9 Cost and return analysis

In this study, enterprise budget was used to analyze cost and return of selected vegetable productions in the study area. Variable costs of production included material input costs, hired labor costs, family labor opportunity costs and interest on cash costs. To determine gross benefit, average yield and average unit price were used. Return above cash cost (RACC), return above variable cost (RAVC) and benefit-cost ratio (BCR) were used as the measurement of cost and return analysis.

4.2.9.1 Cost and return analysis of yard-long bean production in selected townships of Mon State

Cost and return analysis for yard-long bean production in the study area were presented in Table 4.15. The detailed enterprise budget for yard-long bean production in each Township was presented in Appendix 2, 3, 4 and 5. Total material cost was 856,589 kyats per hectare (ks/ha) in Belin Township, 824,326 (ks/ha) in Mawlamyine, 606,136 (ks/ha) in Paung Township and 579,697 (ks/ha) in Thaton Township. The highest material cost in Belin Township was due to high cost of fertilizer and pesticide. Total family labor cost was 910,316 (ks/ha) in Paung, 702,752 (ks/ha) in Thato, 600,876 (ks/ha) in Belin and 102,052 (ks/ha) in Mawlamyine, respectively. It was found that farmers in Paung Township relied more on family labor than other townships for their production. Total hired labor cost was 938,980 (ks/ha) in Mawlamyine, 406,480 (ks/ha) in Paung, 373,931 (ks/ha) in Belin and 260,938 (ks/ha) in Thaton Township, respectively. Total interest cost on cash cost was 70,532 (ks/ha) in Mawlamyine, 49,221 (ks/ha) in Belin, 40,505 (ks/ha) in Paung and 33,625 (ks/ha) in Thaton.

It was found that total gross benefit was 5,905,690 (ks/ha) in Mawlamyine, 4,772,119 (ks/ha) in Paung, 4,694,900 (ks/ha) in Belin, and 4,472,510 (ks/ha) in Thaton. It could be seen that Mawlamyine got the highest gross benefit and this might depend on the price that the farmers receive. It was because of the existence of big wholesale market access for farmers in Mawlamyine Township. Total cash cost was 1,833,838 (ks/ha) in Mawlamyine, 1,279,741 (ks/ha) in Belin and 1,053,121 (ks/ha) in Paung and 874,260 (ks/ha) in Thaton, respectively. Total variable cost was 1,963,437 (ks/ha) in Paung, 1,935,890 (ks/ha) in Mawlamyine, 1,880,617 (ks/ha) in Belin, and 1,577,012 (ks/ha) in Thaton. Return per unit of capital was 3.1 in Mawlamyine, 2.8 in Thaton, 2.5 in Belin and 2.4 in Paung, respectively.

It meant that if one kyat was invested on variable cost, net return would be 2.5 kyats in Belin, 3.1 kyats in Mawlamyine, 2.4 kyats in Paung and 2.8 kyats in Thaton, respectively.

It was found that net return of the respondents from Mawlamyine was the highest among respondents from Thaton, Belin and Paung. According to this cost and return analysis, profitability of growing yard-long bean in Mawlamyine was found to be the most positive and attractive to farmers.

4.2.9.2 Cost and return analysis of cucumber production in selected townships of Mon State

Cost and return analysis for cucumber production were presented in Table 4.16.The detailed enterprise budget for cucumber production in each Township was presented in Appendix 6, 7, 8 and 9. Total material cost in Thaton (1,558,126 kyats per hectare (ks/ha)) was higher than that of Mawlamyine (1,397,103 ks/ha), Belin (1,105,019 ks/ha), and Paung (999,890 ks/ha). The highest total material cost in Thaton was due to high use of fertilizer and pesticide. The lowest total opportunity cost, 48,926 (ks/ha) was observed in Mawlamyine and the highest total opportunity cost, 414,819 (ks/ha), was observed in Paung. In Belin, total opportunity cost was 300,721 (ks/ha), while Thaton was 297,261 (ks/ha). Thaton expensed lowest hired labor cost (255,583 ks/ha) and followed by Belin (435,267 ks/ha), Paung (585, 565 ks/ha) and Mawlamyine (681,502 s/ha). Total interest on cash cost were 83,144 (ks/ha) in Mawlamyine, 72,548 (ks/ha) in Thaton, 63,418 (ks/ha) in Paung, and 61,611 (ks/ha) in Belin.

Respondents from Mawlamyine got the highest total gross benefit (7,165,900 ks/ha) and then followed by Thaton (6,053,950 ks/ha), Paung (5,411,490 ks/ha) and Belin (4,744,320 ks/ha). Although farmers in Thaton used high rate of fertilizer for better yield, total gross benefit was lower than that of Mawlamyine. This might depend on the price that the farmers got for their products. Total cash cost was 2,161,749 (ks/ha) in Mawlamyine, 1,886,257 (ks/ha) in Thaton, 1,648,874 (ks/ha) in Paung and 1,601,897 (ks/ha) in Belin, respectively. Total variable cost was highest in Mawlamyine (2,210,675 ks/ha), followed by Thaton (2,183,519 ks/ha), Paung (2,063,693 ks/ha) and Belin (1,902,618 ks/ha). Benefit-cost ratio (BCR) was 3.2 in Mawlamyine, 2.8 in Thaton, 2.6 in Paung and 2.5 in Belin, respectively.

It was found that net return of the respondents from Mawlamyine was the highest among respondents from Belin, Paung and Thaton. According to this cost and return analysis, profitability of growing cucumber in all townships was a profitable business and it was more profitable than yard-long bean production.

Table 4.15 Enterprise budget of yard-long bean production in selected townships of Mon State (ks/ha)

Items		Belin (N=14)	Mawlamyine (N=8)	Paung (N=4)	Thaton (N=10)	Total (N=36)
Total gross benefit(GB)	(A)	4,694,900	5,905,690	4,772,119	4,472,510	4,961,305
Total material cost	(B)	856,589	824,326	606,136	579,697	716,687
Total family labor cost	(C)	600,876	102,052	910,316	702,752	578,999
Total hired labor cost	(D)	373,931	938,980	406,480	260,938	495,082
Interest on cash cost	(E)	49,221	70,532	40,505	33,625	48,471
Total variable cost (TVC) (F=B+C+D+E)	(F)	1,880,617	1,935,890	1,963,437	1,577,012	1,839,239
Total cash cost (TCC) (G=B+D+E)	(G)	1,279,741	1,833,838	1,053,121	874,260	1,260,240
Return above variable cost (RAVC) (H=A-F)	(H)	2,814,283	3,969,800	2,808,682	2,895,498	3,122,066
Return above cash cost (RACC) (I=A-G)	(I)	3,415,159	4,071,852	3,718,998	3,598,250	3,701,065
Benefit-cost ratio (BCR) (J=A/F)	(J)	**2.5**	**3.1**	**2.4**	**2.8**	**2.7**

Table 4.16 Enterprise budget of cucumber production in selected townships of Mon State (ks/ha)

Items		Belin (N=14)	Mawlamyine (N=8)	Paung (N=4)	Thaton (N=10)	Total (N=36)
Total gross benefit(GB)	(A)	4,744,320	7,165,900	5,411,490	6,053,950	5,843,915
Total material cost	(B)	1,105,019	1,397,103	999,890	1,558,126	1,265,035
Total family labor cost	(C)	300,721	48,926	414,819	297,261	265,432
Total hired labor cost	(D)	435,267	681,502	585,565	255,583	489,479
Interest on cash cost	(E)	61,611	83,144	63,418	72,548	70,181
Total variable cost (TVC) (F=B+C+D+E)	(F)	1,902,618	2,210,675	2,063,693	2,183,519	2,090,126
Total cash cost (TCC) (G=B+D+E)	(G)	1,601,897	2,161,749	1,648,874	1,886,257	1,824,694
Return above variable cost (RAVC) (H=A-F)	(H)	2,841,702	4,955,225	3,347,797	3,870,431	3,753,789
Return above cash cost (RACC) (I=A-G)	(I)	3,142,423	5,004,151	3,762,616	4,167,693	4,019,221
Benefit-cost ratio (BCR) (J=A/F)	(J)	**2.5**	**3.2**	**2.6**	**2.8**	**2.8**

4.2.9.3 Cost and return analysis of eggplant production in selected townships of Mon State

The data of enterprise budget for eggplant production in the study area was presented in Table 4.17. The detailed enterprise budget for eggplant production in each township was presented in Appendix 10, 11, 12 and 13. In Belin Township, total material cost was 2,548,528 kyats per hectare (ks/ha), total family labor cost was 396,287 (ks/ha) and hired labor cost was 400,920 (ks/ha). Total interest on cash cost was 117,978 (ks/ha). And total gross benefit was 5,337,360 (ks/ha). The total variable cost and total variable cash cost were 3,463,712 (ks/ha) and 3,067,425 (ks/ha), respectively. Return above variable cost was 1,873,648 (ks/ha) and return above cash cost was 2,269,935 (ks/ha). The benefit-cost ratio was 1.5. It could be concluded that if one kyat invested for capital in eggplant production, the net return would be about 1.5 kyats in Belin Township.

Total material cost in Mawlamyine Township was 2,579,353 (ks/ha). Total family labor cost was 672,979 (ks/ha) and total hired labor cost was 412,479 (ks/ha). The total interest on cash cost was 119,673 (ks/ha). The total variable cost was 3,784,485 (ks/ha) and total cash cost was 3,111,506 (ks/ha). It was observed that total gross benefit was 11,514,860 (ks/ha), return above variable cost was 7,730,375 (ks/ha) and return above cash cost was 8,403,354 (ks/ha), respectively. The benefit cost ratio in Mawlamyine Township was 3.0.

In Paung Township, total material cost was 2,271,926 (ks/ha). Total family labor opportunity cost was 833,120 (ks/ha) and total cost expensed on hired labor was 648,628 (ks/ha). Interest on cash cost was 116,822 (ks/ha). It was found that total gross benefit was 7,536,550 (ks/ha). Total variable cost was 3,870,496 (ks/ha) and total cash cost was 3,037,376 (ks/ha). Return above variable cost was 3,666,054 (ks/ha) and return above cash cost was 4,499,174 (ks/ha). The benefit-cost ratio in Paung Township was 1.9.

In Thaton Township, total material cost was 2,860,882 (ks/ha) and total family labor cost was 256,398 (ks/ha). Total material cost was highest among townships, this might be due to high cost of fertilizer for production. Total hired labor cost was 306,132 (ks/ha) and total interest on cash cost was 126,681 (ks/ha). It was found that total gross benefit was 10,477,040 (ks/ha). Total variable cost was 3,550,093 and total cash cost was 3,293,695 (ks/ha). Return above variable cost was 6,926,947 (ks/ha)

and return above cash cost was 7,183,345 (ks/ha), respectively. The benefit cost ratio in Thaton Township was 3.0.

The result showed that Mawlamyine and Thaton Townships have the same benefit-cost ratio, 3.0. This was because farmers from Thaton Township got high price for eggplant production. It was suggested that Thaton was major eggplant production area of Mon State and, therefore high demand of eggplant from Thaton Township made farmers got high price. Although the profitability of growing eggplant in Mawlamyine and Thaton were found to be more positive and attractive to farmers, it was also a profitable business for farmers in Belin and Paung Townships.

4.2.9.4 Cost and return analysis of tomato production in selected townships of Mon State

The data of cost and return analysis of tomato production in the study area were presented in Table 4.18. The detailed enterprise budget for tomato production in each Township was presented in Appendix 14 and 15. It was found that tomato was grown only in Belin and Paung Townships. Total material cost was 662,722 kyats per hectare (ks/ha) in Belin and 764,280 (ks/ha) in Paung. Total family labor cost was 336,550 (ks/ha) in Belin and 603,171 (ks/ha) in Paung, respectively. The total cost expensed on hired labor was 791,956 (ks/ha) in Belin and 1,074,391 (ks/ha) in Paung. Total interest on cash cost was 58,187 (ks/ha) in Belin and 73,547 (ks/ha) in Paung.

It was found that total gross benefit was higher in Paung (4,596,060 ks/ha) than that of Belin (3,014,620 ks/ha). Total variable cost was 1,849,415 (ks/ha) in Belin and 2,515,389 (ks/ha) in Paung. Total cash cost was 1,512,865 (ks/ha) in Belin and 1,912,218 (ks/ha) in Paung. Return above variable cost was 1,165,205 (ks/ha) and return above cash cost was 1,501,755 (ks/ha) in Belin. In Paung, return above variable cost was 2,080,671 (ks/ha) and return above cash cost was 2,683,842 (ks/ha). The benefit cost ratio was 1.8 in Belin and 1.6 in Paung.

The result showed that tomato production in Paung was more profitable than that of Belin. For Belin Township which was the furthest distance with wholesale market that high intermediaries level between producer and consumer made farmers less profitable.

Table 4.17 Enterprise budget of eggplant production in selected townships of Mon State (ks/ha)

Items		Belin (N=14)	Mawlamyine (N=8)	Paung (N=4)	Thaton (N=10)	Total (N=36)
Total gross benefit(GB)	(A)	5,337,360	11,514,860	7,536,550	10,477,040	8,716,453
Total material cost	(B)	2,548,528	2,579,353	2,271,926	2,860,882	2,565,172
Total family labor cost	(C)	396,287	672,979	833,120	256,398	539,696
Total hired labor cost	(D)	400,920	412,479	648,628	306,132	442,040
Interest on cash cost	(E)	117,978	119,673	116,822	126,681	120,288
Total variable cost (TVC) (F=B+C+D+E)	(F)	3,463,712	3,784,485	3,870,496	3,550,093	3,667,196
Total cash cost (TCC) (G=B+D+E)	(G)	3,067,425	3,111,506	3,037,376	3,293,695	3,127,500
Return above variable cost (RAVC) (H=A-F)	(H)	1,873,648	7,730,375	3,666,054	6,926,947	5,049,256
Return above cash cost (RACC) (I=A-G)	(I)	2,269,935	8,403,354	4,499,174	7,183,345	5,588,952
Benefit-cost ratio (BCR) (J=A/F)	(J)	**1.5**	**3.0**	**1.9**	**3.0**	**2.4**

Table 4.18 Enterprise budget of tomato production in selected townships of Mon State (ks/ha)

Items		Belin (N=14)	Paung (N=4)	Total (N=36)
Total gross benefit(GB)	(A)	3,014,620	4,596,060	1,902,670
Total material cost	(B)	662,722	764,280	356,751
Total family labor cost	(C)	336,550	603,171	234,930
Total hired labor cost	(D)	791,956	1,074,391	466,587
Interest on cash cost	(E)	58,187	73,547	32,933
Total variable cost (TVC) (F=B+C+D+E)	(F)	1,849,415	2,515,389	1,091,201
Total cash cost (TCC) (G=B+D+E)	(G)	1,512,865	1,912,218	856,271
Return above variable cost (RAVC) (H=A-F)	(H)	1,165,205	2,080,671	811,469
Return above cash cost (RACC) (I=A-G)	(I)	1,501,755	2,683,842	1,046,399
Benefit-cost ratio (BCR) (J=A/F)	(J)	**1.6**	**1.8**	**1.7**

4.3 Description of Marketing Agents

4.3.1 General characteristics and marketing activities of collectors in selected townships of Mon State

Along the vegetables supply chain, collectors played as intermediaries for farmers in marketing of vegetables. Collector level was not found in Mawlamyine Township, especially for the four kinds of vegetables in the study. During this survey, some of the farmers from Mawlamyine Township mentioned that sometimes, they sold some of their products such as mustard and cauliflower to traders. But this was not usual and data from such collectors were not obtained. Therefore, the data of activities of collectors were collected from Belin, Paung and Thaton Townships.

Table 4.19 shows age, experience and schooling years of collectors. An average age of collector was 47.91 years. The average schooling years was 5.45 years, the collectors were in middle education level. They had average business experience of 20.64 years. Volumes of vegetables traded per day by collectors were varied among townships (Table 4.20). For yard-long bean and cucumber, the volume traded by collectors (1082 kg and 1102 kg) in Belin Towhship was higher than that of the other townships. For the crop eggplant, volume traded by collectors (622 kg) in Thaton Township was the highest. Because of high production of tomato in Paung Township, volume of tomato traded by collectors in Paung Township (425 kg) was higher than that of in Belin Township. The traded volume by collectors was mainly depended on the area where the crop was produced.

It was observed that collectors in the study areas did not trade vegetables from outside Mon State. Their supply sources were only from farmers in Mon State (Table 4.21). Collectors traded only seasonal vegetables. Wholesalers and retailers were their main customers (Table 4.22). It was found that some collectors had collection house in purchasing vegetables. But some collectors performed their purchasing activities at farmer's field and laid their vegetables on road side for transportation to market places (Table 4.23). All collectors used credit system in purchasing vegetables. In selling vegetables, collectors used both cash down payment and credit system. But most of the collectors used credit payment system (56% of respondents). All collectors used motorcar as transportation vehicle. About 20% of respondents in Thaton Township used motor cycle for transportation of their vegetables. It was found that weighing, washing and packaging were general functions, carried out by collectors.

Table 4.19 Age, experience and schooling years of collectors in selected townships of Mon State

Variables	Unit			Total (N=11)
	Belin(N=4)	Paung(N=3)	Thaton(N=4)	
Age (year)				
Minimum	43	43	47	43
Maximum	51	46	55	55
Mean	**47.25**	**44.67**	**51.00**	**47.91**
Experience (year)				
Minimum	16	15	17	15
Maximum	23	20	30	30
Mean	**20.25**	**17.33**	**23.50**	**20.64**
Schooling years (year)				
Minimum	4	4	4	4
Maximum	5	6	10	10
Mean	**4.75**	**5.00**	**6.50**	**5.45**

Table 4.20 Volume traded per day by collectors during in-season in selected townships of Mon State (kg)

Vegetables	Unit			Total (N=11)
	Belin(N=4)	Paung(N=3)	Thaton(N=4)	
Yard-long bean				
Minimum	817	82	163	82
Maximum	1306	114	212	1306
Mean	**1082**	**98**	**188**	**488**
Cucumber				
Minimum	817	408	229	229
Maximum	1388	490	294	1388
Mean	**1102**	**463**	**261**	**622**
Eggplant				
Minimum	261	196	229	196
Maximum	278	327	1388	327
Mean	**269**	**256**	**622**	**245**
Tomato				
Minimum	245	376	-	245
Maximum	327	490	-	490
Mean	**286**	**425**	**-**	**369**

Table 4.21 Supply sources of selected vegetables for collectors in selected townships of Mon State

Supplier	Percent of respondents			Total (N=11)
	Belin(N=4)	Paung(N=3)	Thaton(N=4)	
Farmers in Mon State	100	100	100	100

Table 4.22 Customers of collectors in selected townships of Mon State

Customer	Percent of respondents			Total (N=11)
	Belin(N=4)	Paung(N=3)	Thaton(N=4)	
Wholesalers in Mon State	50	50	75	58
Retailers in Mon State	50	50	25	42

Table 4.23 Marketing activities of collectors for selected vegetables in selected townships of Mon State

Activities	Percent of respondents			Total (N=11)
	Belin (N=4)	Paung (N=3)	Thaton (N=4)	
Place of purchasing				
Collection house	-	100	100	67
Farmer's field	100	-	-	33
Type of transaction in purchasing				
Credit system	100	100	100	100
Type of transaction in selling				
Cash down payment system	50	33	50	44
Received half of the payment in cash down and the rest in credit	50	67	50	56
Mode of transportation				
By car	75	100	80	85
By motor cycle	25	-	20	15
Function				
Washing	-	50	44	31
Weighing	-	-	12	4
Packaging	100	50	44	65

4.3.2 General characteristics and marketing activities of wholesalers in selected townships of Mon State

Wholesalers played as a key role in the distribution of crops from producers/collectors to retailers and also consumers. Wholesalers also had the connection with wholesalers from other Township for importing vegetables so as to be able to support vegetables continuously in the market. Among the four townships, Mawlamyine market was a big and main wholesale market for Mon State. Therefore, wholesalers in Mawlamyine market were large-scaled wholesalers. Wholesalers in Belin, Paung and Thaton markets were small-scaled wholesalers and sometimes, they depended on wholesalers from Mawlamyine market for trading of vegetables.

The average age of wholesaler was 40.29 years and education level was middle education level. It was found that some wholesalers in Mawlamyine Township were graduated. They had an average experience of 18.21 years (Table 4.24). If the respondents were educated, they can make more profit as pointed out by Usman *et al.* (2006), that educational level of a trader does not only raise his productivity but also increase his ability to understand and evaluate new techniques and processes for better marketing of his goods. Volume of vegetables traded by wholesalers for four major vegetables was shown in (Table 4.25). Among four townships, volume traded by Mawlamyine Township wholesalers was higher than that of the other townships but not significantly different. The supply sources for wholesalers were shown in Table 4.26. Farmers and collectors were main suppliers for wholesalers in study areas. But, wholesalers in Paung Township also relied on large-scaled wholesalers as suppliers, especially from wholesalers in Mawlamyine wholesale market. When compare to other townships, Paung market was really small and less-developed market. This might be due to nearby Mawlamyine wholesale market and dependency of households on this wholesale market for purchasing of vegetables. Wholesalers outside Mon State also found as suppliers especially for off-season supply. As for customers, wholesalers mentioned both retailers and consumers (Table 4.27).

Wholesalers used both cash down and credit systems in purchasing and selling of their products. For transportation, car and motor cycle were used as transportation vehicles. Vehicles were used for delivery of their products to their customers, retailers in other townships. The common functions performed by wholesalers were grading and packaging.

Table 4.24 Age, experience and schooling years of wholesalers in selected townships of Mon State

Variables	Unit				Total (N=14)
	Belin (N=4)	Mawlamyine (N=4)	Paung (N=2)	Thaton (N=4)	
Age (year)					
Minimum	40	21	40	36	21
Maximum	46	39	43	50	50
Mean	**42.75**	**32.75**	**41.50**	**44.75**	**40.29**
Experience (year)					
Minimum	15	2	16	17	2
Maximum	20	20	18	30	30
Mean	**17.75**	**14.00**	**17.00**	**23.50**	**18.21**
Schooling years (year)					
Minimum	4	9	5	5	4
Maximum	8	12	7	8	12
Mean	**5.75**	**10.75**	**6.00**	**6.00**	**7.29**

Table 4.25 Volume-traded per day by wholesalers during in-season in selected townships of Mon State (kg)

Vegetables	Unit				Total (N=14)
	Belin (N=4)	Mawlamyine (N=4)	Paung (N=2)	Thaton (N=4)	
Yard-long bean					
Minimum	163	653	163	170	163
Maximum	196	686	168	180	686
Mean	**181.67**	**667.49**	**165.75**	**175.14**	**316.33**
Cucumber					
Minimum	327	980	327	327	327
Maximum	343	996	331	343	996
Mean	**336.81**	**990.01**	**329.05**	**333.95**	**521.97**
Eggplant					
Minimum	163.30	656.47	168.20	146.97	146.97
Maximum	181.26	677.70	187.80	195.96	677.70
Mean	**172.69**	**667.49**	**178.00**	**177.59**	**316.21**
Tomato					
Minimum	147	653	163	163	147
Maximum	196	702	171	212	702
Mean	**173.51**	**665.45**	**167.38**	**177.59**	**314.35**

Table 4.26 Supply sources of selected vegetables for wholesalers in selected townships of Mon State

Supplier	Percent of respondents				Total (N=14)
	Belin (N=4)	Mawlamyine (N=4)	Paung (N=2)	Thaton (N=4)	
Farmer	25	17	-	25	17
Collector	50	33	-	25	27
Wholesaler in Mon State	-	-	100	-	25
Wholesaler outside Mon State	25	50	-	50	31

Table 4.27 Customers of wholesalers in selected townships of Mon State

Customer	Percent of respondents				Total (N=14)
	Belin (N=4)	Mawlamyine (N=4)	Paung (N=2)	Thaton (N=4)	
Retailer	50	40	50	50	47
Consumer	50	40	50	50	47
Small-scaled wholesaler	-	20	-	-	6

4.3.3 General characteristics and marketing activities of retailers in selected townships of Mon State

The involvement of retailers in the chain was buying of vegetables, grading, displaying and selling to consumers. Retailers were major actors for linking between producers and consumers. The retailers in the study areas had an average age of 42.06 years. They had an average experience of more than 10 years, ranging from 5 to 20 years. Retailers were primary education levels with average schooling years of 4.87 years (Table 4.28).

Table 4.29 shows volume of vegetables traded per day by retailers during in-season. The average traded volume of yard-long bean was 16.84 kg, cucumber was 20.51 kg, eggplant was 16.93 kg and tomato was 18.27 kg, respectively. Similar to other actors, volume traded by Mawlamyine Township retailer was higher than that of other townships. Retailers purchased their products from farmers and wholesalers, but mostly from wholesalers (Table 4.30). In purchasing, retailers used both cash down and credit system. But the percent of respondents using cash down payment system was more than credit system (Table 4.31). In selling, retailers used only cash down payment system. Weighing and packaging were common functions carried out by retailers.

4.4 Supply Chain of Four Major Vegetables in Selected Townships of Mon State

Figure 4.3 shows supply chain map of yard-long bean in Mon State. Collectors, wholesalers and retailers served as intermediaries between producer and consumer. About 69% of the product flowed to collector, 23% to wholesaler and 3% to retailer. Only 5% of the product flowed directly to consumer. The products from collector flowed equally to wholesaler (43%) and retailer (43%) and only 14% flowed to consumer. For wholesaler, about 50% of the products flowed to retailer and the remaining 50% directly flowed to consumer. In the case of retailer, all the products flowed to consumer. Therefore, it can be seen that in yard-long bean supply chain, more than half of the products flowed from producer to collector and producers had to depend on collectors for marketing of their products for the better price.

Table 4.28 Age, experience and schooling years of retailers in selected townships of Mon State

Variables	Unit				Total (N=16)
	Belin (N=4)	Mawlamyine (N=4)	Paung (N=4)	Thaton (N=4)	
Age (year)					
Minimum	40	39	28	43	28
Maximum	51	47	40	55	55
Mean	**45.75**	**42.25**	**32.75**	**47.50**	**42.06**
Experience (year)					
Minimum	10	14	5	8	5
Maximum	20	20	15	20	20
Mean	**14.00**	**16.50**	**10.50**	**13.00**	**13.50**
Schooling years (year)					
Minimum	4	2	4	5	2
Maximum	5	5	6	8	8
Mean	**4.50**	**3.50**	**5.00**	**6.50**	**4.87**

Table 4.29 Volume traded per day by retailers during in-season in selected townships of Mon State (kg)

Vegetables	Unit				Total (N=16)
	Belin (N=4)	Mawlamyine (N=4)	Paung (N=4)	Thaton (N=4)	
Yard-long bean					
Minimum	8	21	13	16	8
Maximum	16	24	16	20	24
Mean	**12.25**	**22.86**	**14.7**	**17.55**	**16.84**
Cucumber					
Minimum	11	33	15	15	11
Maximum	15	41	18	18	41
Mean	**13.06**	**36.33**	**15.92**	**16.33**	**20.51**
Eggplant					
Minimum	11.43	21.23	13.06	13.06	11.43
Maximum	14.70	26.13	19.6	19.60	26.13
Mean	**13.06**	**23.68**	**15.92**	**15.92**	**16.93**
Tomato					
Minimum	15	26	11	16	11
Maximum	16	29	15	18	29
Mean	**15.51**	**27.35**	**13.47**	**16.74**	**18.27**

Table 4.30 Supply sources of selected vegetables for retailers in selected townships of Mon State

Supplier	Number of respondents				Total (N=16)
	Belin (N=4)	Mawlamyine (N=4)	Paung (N=4)	Thaton (N=4)	
Farmer	20	33	-	33	22
Wholesaler	80	67	100	67	78

Table 4.31 Marketing activities of retailers for selected vegetables in selected townships of Mon State

Activities	Percent of respondents				Total (N=16)
	Belin (N=4)	Mawlamyine (N=4)	Paung (N=4)	Thaton (N=4)	
Type of transaction in purchasing					
Cash down payment system	67	67	80	80	73
Gave half of the cash down and credit	33	33	20	20	27
Type of transaction in selling					
Cash down payment system	100	100	100	100	100
Function					
Weighing	50	50	50	50	50
Packaging	50	50	50	50	50

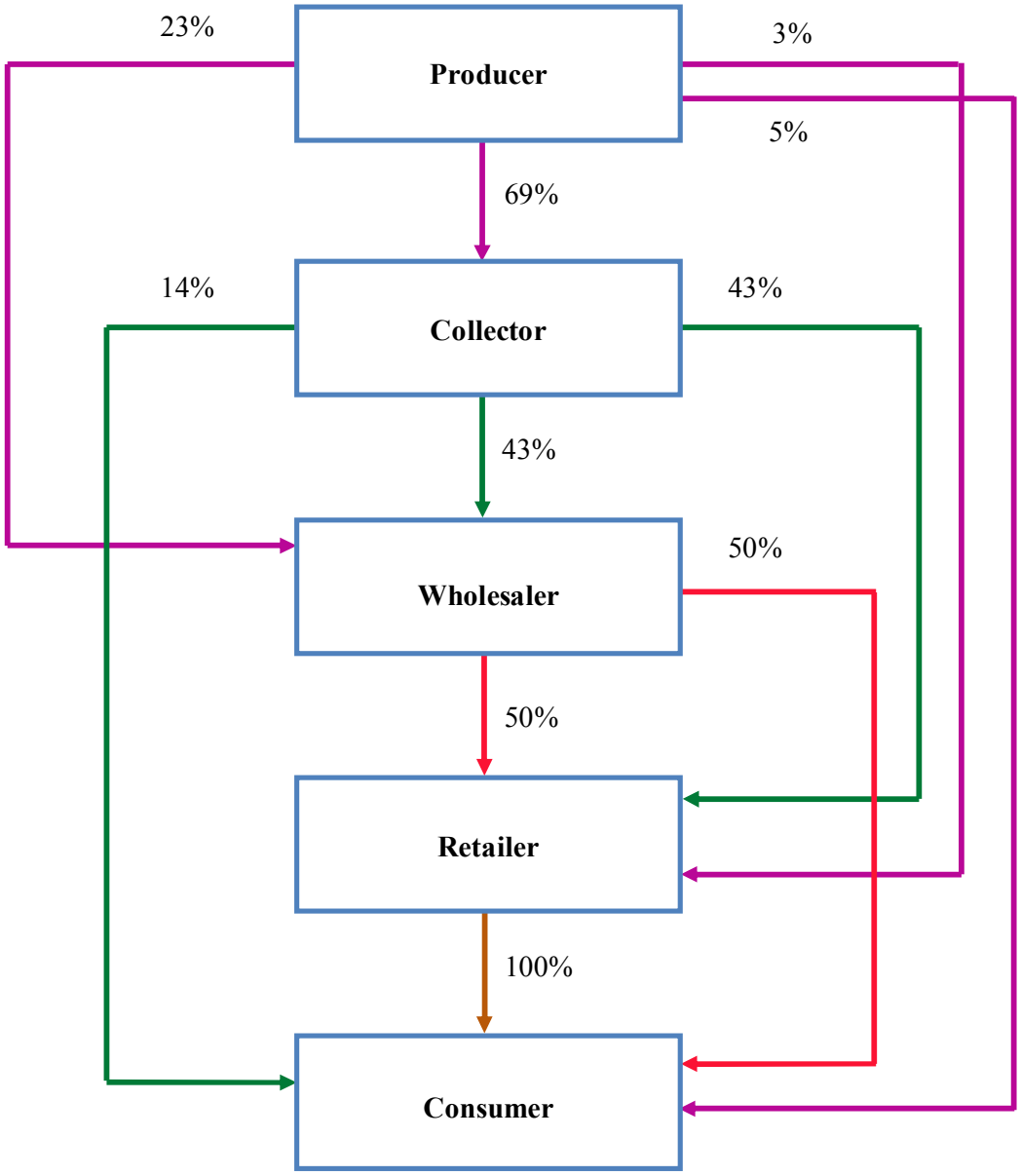

Figure 4.3 Supply chain map of yard-long bean in selected townships of Mon State (2014)

Supply chain map of cucumber was presented in Figure 4.4. Similar to yard-long bean supply chain, collectors, wholesalers and retailers were found as marketing agents between producer and consumer. Producers sold 63% of their products to collector, 24% to wholesaler and 13% to consumer. Collector then distributed 43% of the product to wholesaler, 43% to retailer and 14% to consumer. Wholesalers had two main channels which flow about 50% of the product to retailer and the remaining 50% to consumer. The entire product from retailer flowed to consumer.

In eggplant supply chain, about 72% of the product flowed directly to collector (Figure 4.5). This was because Thaton Township which was the major eggplant production area and farmers from this Township did not have easy access to market for selling of their products. In tomato supply chain, only 28% of the products flowed to collector and 56% of the product flowed to wholesaler (Figure 4.6). Only 16% of the product flowed directly to consumer. Paung Township was the main area of tomato production in Mon State and it was near to Mawlamyine wholesale market. Therefore, the easier access to wholesaler market, the less product flow to middlemen.

4.5 Geographic Flow of Four Major Vegetables in Mon State

Because of the existence of wholesale market in Mawlamyine, vegetables produced from Paung, Thaton and Belin were exported to Mawlamyine Township. Mawlamyine then distributed vegetables to other remaining townships in Mon State. Geographic flow of yard-long bean, cucumber and eggplant were presented in Figure 4.7. It was found that Hpa-an existed as a big market outlet for Mon State because vegetables from Mawlamyine, Thaton and Belin Townships were exported to Hpa-an Township in Kayin State. Vegetables from Belin Township were also exported to Kyaikhto Township in Mon State. Tomato produced from Paung Township was exported to Mawlamyine and Thaton Townships (Figure 4.8). There was also demand of tomato from Hpa-an Township because tomato from Mawlamyine and Belin were exported to Hpa-an Township in Kayin State.

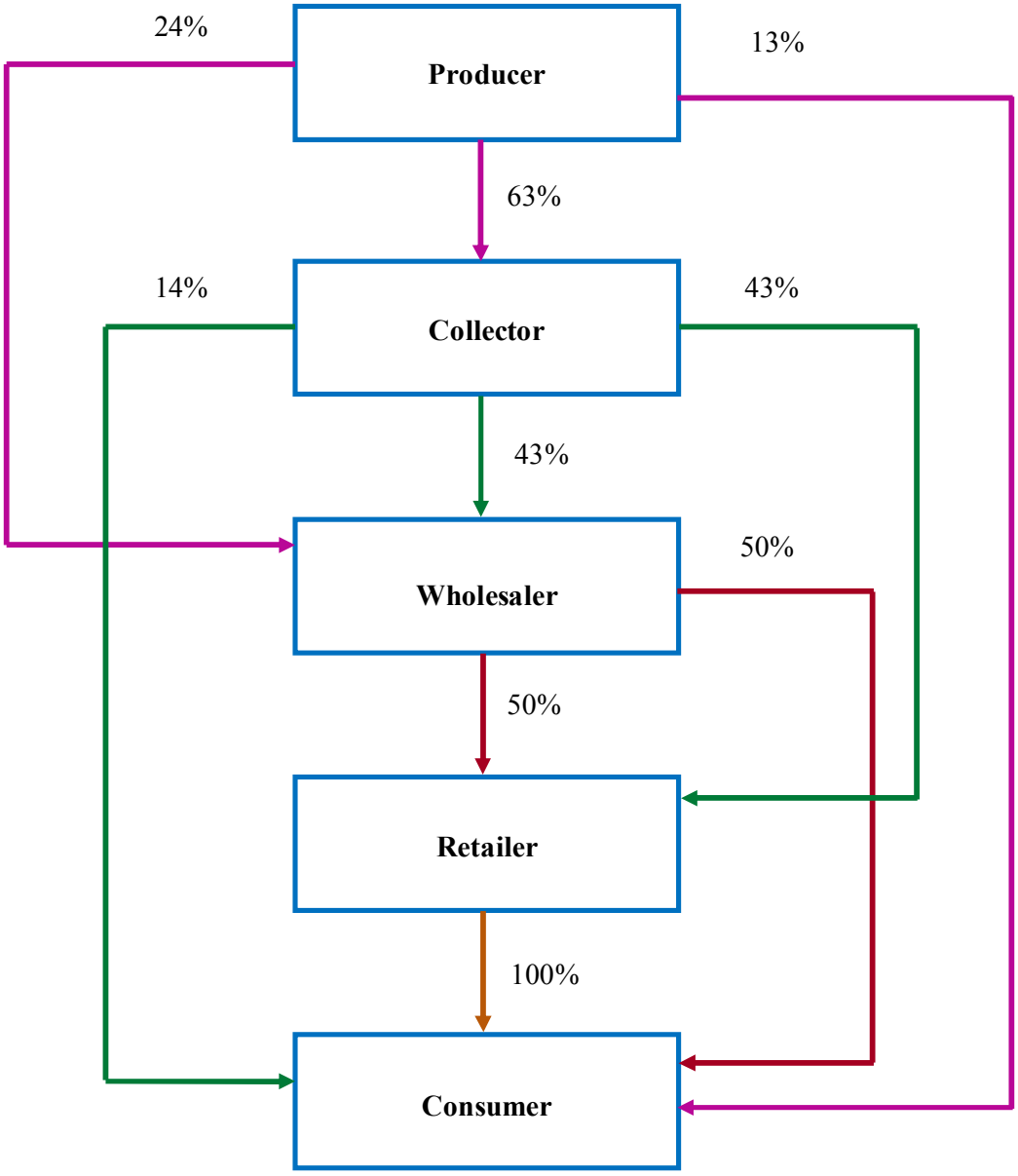

Figure 4.4 Supply chain map of cucumber in selected townships of Mon State (2014)

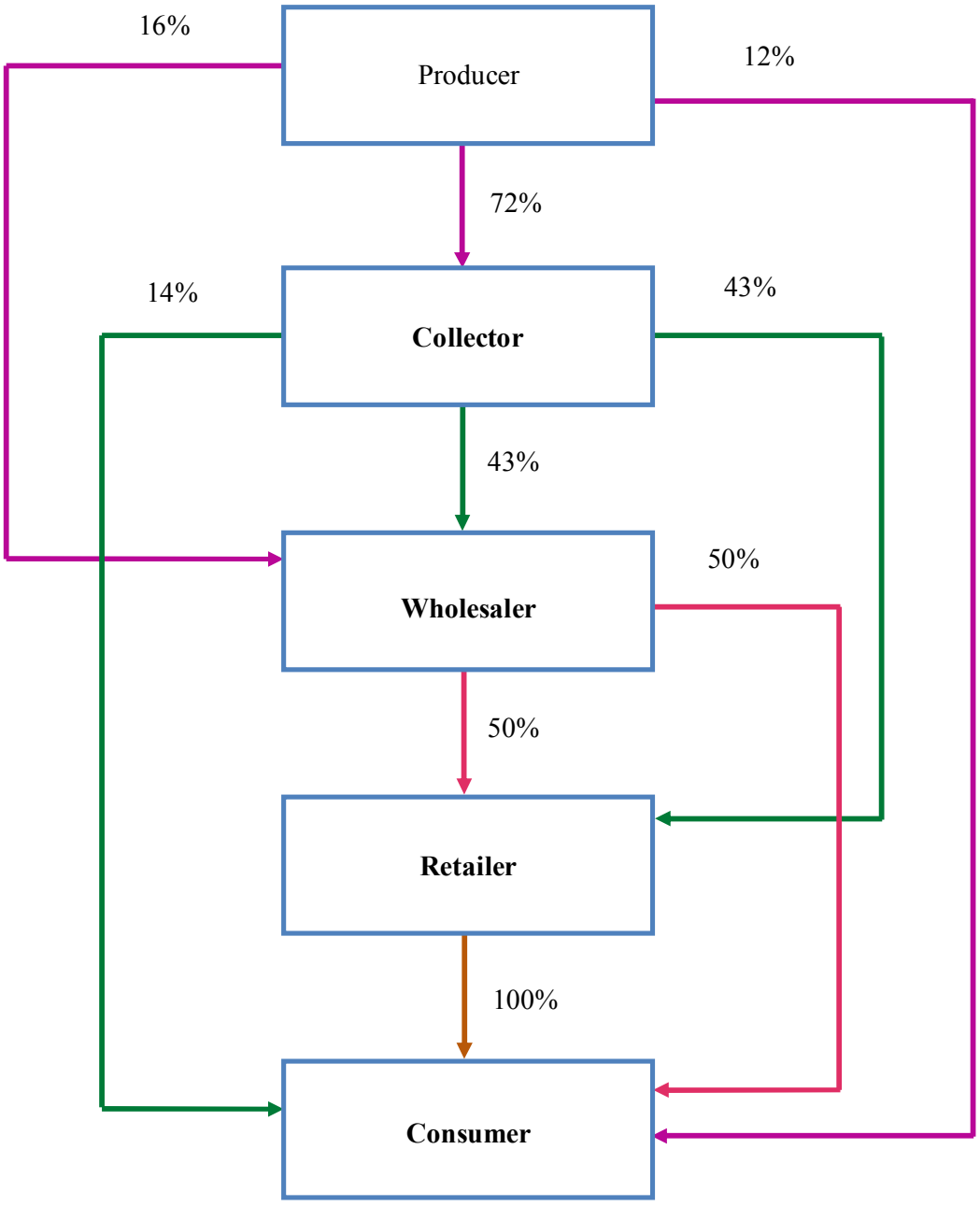

Figure 4.5 Supply chain map of eggplant in selected townships of Mon State (2014)

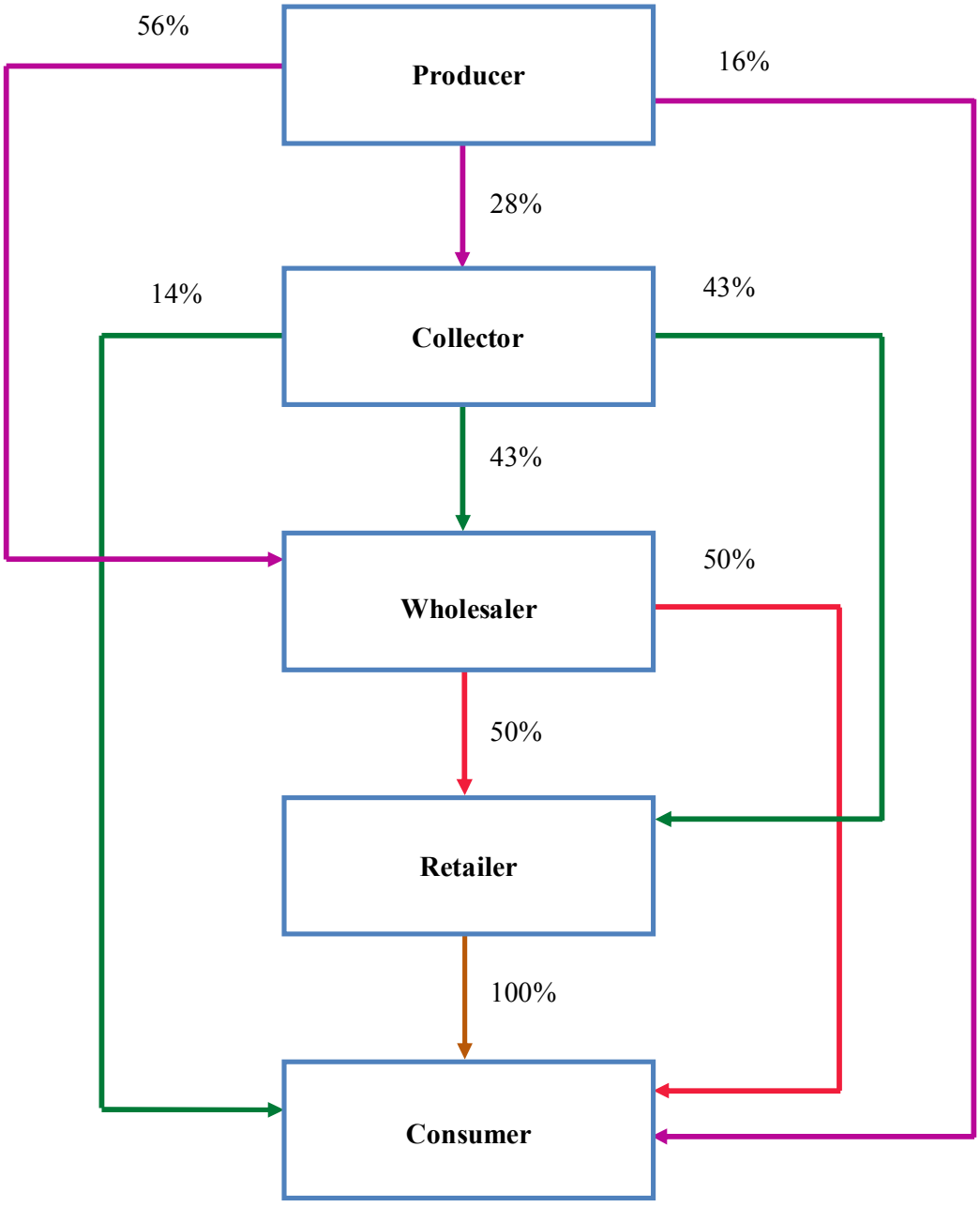

Figure 4.6 Supply chain map of tomato in selected townships of Mon State (2014)

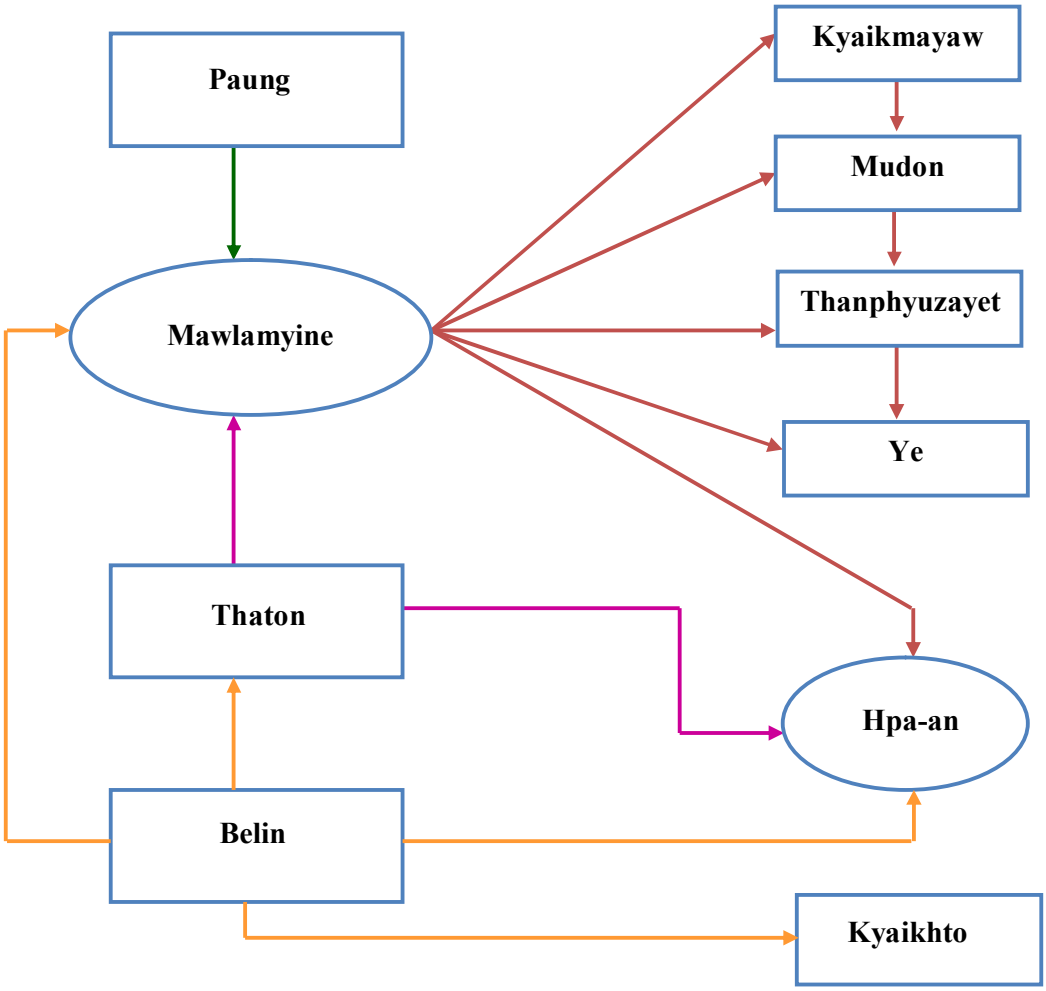

Figure 4.7 Geographic flows of yard-long bean, cucumber and eggplant marketing in selected townships of Mon State (2014)

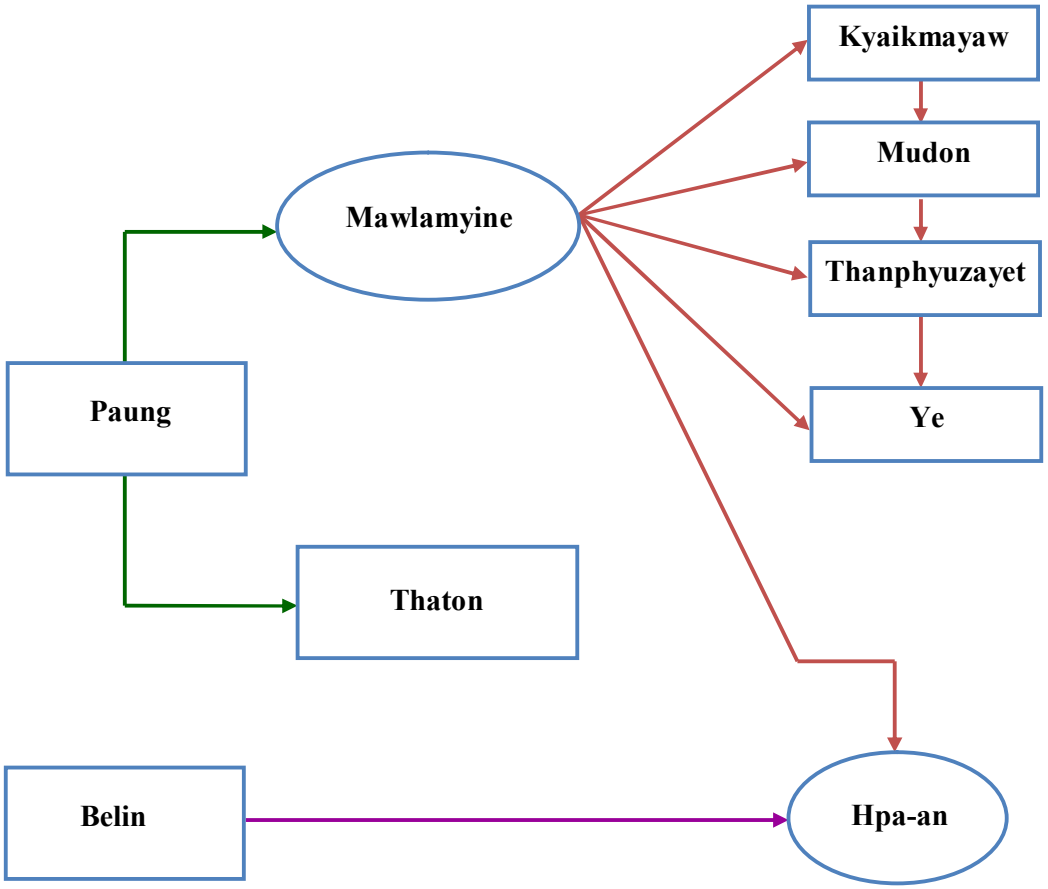

Figure 4.8 Geographic flow of tomato marketing in selected townships of Mon State (2014)

4.6 Performance of Selected Vegetables Market

The performance of vegetable market was measured by the associated costs, returns and marketing margins. In this section, the marketing costs and margins were calculated for main agents in marketing channel of yard-long bean, cucumber, eggplant and tomato. These main actors were producers, collectors, wholesalers and retailers.

The distribution of costs and gross income at different levels was important in the marketing of vegetables. Being highly bio-degradable, fresh vegetables require greater attention during harvesting, packaging, and transporting from the point of production to the final market. The marketing cost of the vegetables mainly involved the cost of post-harvest activities incurred before reaching the consumer. This includes cost of harvesting and packaging (material and labor costs), handling (sorting, cleaning, grading, loading, and unloading), and transportation and tax costs. Generally, these factors constituted a share in the total margin between the final retailer price and the cost of production.

Marketing margin is used to denote the difference between the price paid to the first seller and that paid by the final buyer. Marketing margin can be used to measure the share of the final selling price that is captured by a particular agent along the chain. In order to calculate the marketing margin of an agent, the average price of vegetables for that particular agent was taken. Marketing margins, associated costs and benefit share of supply chain actors and marketing margin through different markets were presented below.

4.6.1 Yard-long bean market performance

4.6.1.1 Marketing costs and profit share of actors along the yard-long bean supply chain in selected townships of Mon State

Table 4.32 indicates different types of marketing cost related to the transaction of yard-long bean by collectors, wholesalers, retailers and the profit share of each marketing actors. The arrangement of marketing costs revealed that the cost for each marketing agents was different. It was found that marketing cost of retailer was higher than that of other actors. This was due to the high cost of loss, 9.16 kyats per kilogram (ks/kg). The most important factors, which influenced marketing costs, were distance between production places and consumption markets, conditions of the roads, seasonality, perishability, packaging, storage and processing (Smith 1992). The cost

of transport was the highest cost for collectors, where packing material cost was the highest for wholesalers. Each of yard-long bean supply chain actors added value to the product as the product passes from one actor to another. In a way, the actors changed the form of the product through improving the grade by sorting, cleaning or washing or create space and time utility. The operating expense for traders (collectors, wholesalers and retailers) was lower than that of farmers. However, the traders simply buying from the farmers and selling to consumers, traders took above 50% of total profit margin. The profit share of collectors, wholesalers and retailers accounted for 10%, 22% and 22%. Yard-long bean producers added 42% of the total value of yard-long bean and took 46% of profit margin.

4.6.1.2 Profit share of yard-long bean supply chain actors in selected townships of Mon State

Profit share of yard-long bean in different townships for each market player was illustrated in Figure 4.9. The detailed calculation of profit share for each township was expressed in Appendix 16, 17, 18 and 19. The figure indicated that collector level was not found in Mawlamyine Township. The profit share was in the range of 32% to 61% for farmers. Farmers from Mawlamyine Township got the highest profit share (61%) and farmers from Belin Township got the lowest profit share (32%). Easy access to wholesale market and lack of collector level in Mawlamyine Township made the farmers more profitable. In Belin Township, profit share of wholesalers (41%) were higher than that of farmers (39%). The lowest marketing margin of famers in Belin Township reflected greater distance to wholesale market, they had inadequate marketing services. This result agreed with previous study that inadequate marketing services such as transport, packing and handling represent as the major obstacles that were faced by the marketing agents (Altoum 2008).

Table 4.32 Yard-long bean marketing costs and profit share of actors in selected townships of Mon State (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	296.18	366.71	475.58
Production cost	(b)	36.17	-	-	-
Marketing cost	(c)	3.36	14.88	11.97	22.74
Labor		2.49	4.46	1.61	4.57
Packing material		0.15	2.18	5.00	3.93
Transport		0.72	4.50	2.54	4.52
Loss		0	3.21	2.02	9.16
Overhead cost		0	0.52	0.54	0.37
Tax		0	0.00	0.26	0.20
Total cost (d=a+c)	(d)	39.53*	311.06	378.68	498.32
Sale Prices	(e)	243	356.26	475.76	594.81
Market margin (f=e-a)	(f)	206.83**	60.08	109.05	119.23
% share of margin	(g)	42	12	22	24
Profit margin (h=f-d)	(h)	203.47	45.20	97.08	96.49
% share of profit	(i)	46	10	22	22

Note: * (d=b+c), ** (f=e-b)

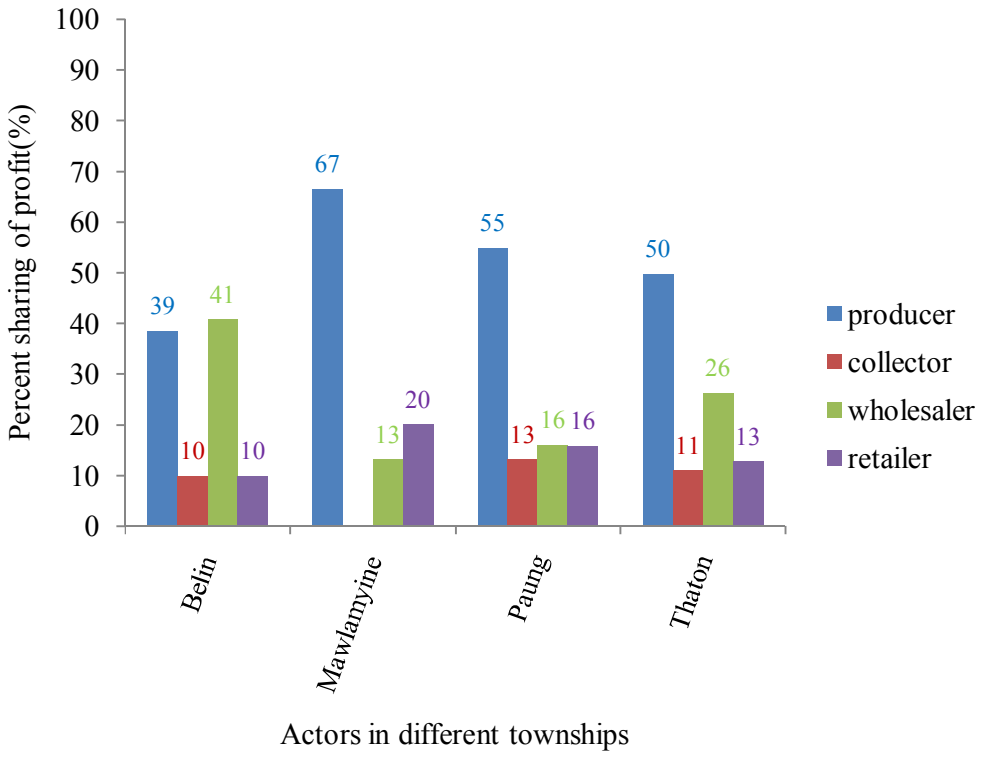

Figure 4.9 Profit sharing of actors in yard-long bean supply chain in selected townships of Mon State

4.6.2 Cucumber market performance

4.6.2.1 Marketing costs and profit share of actors along the cucumber supply chain in selected townships of Mon State

Table 4.33 indicates different types of marketing cost and margin related to the transaction of cucumber by producers, collectors, wholesalers and retailers with the same cost arrangement as yard-long bean supply chain. The marketing cost revealed that the cost of post-harvest loss was the highest cost for collectors and retailers due to the perishable nature of cucumber. The cost of packing material and labor was the highest cost for wholesalers. Cucumber supply chain had the same value adding behavior as yard-long bean supply chain. The result showed that the percentage of marketing margin of producer was 35%, collector was 13% and wholesaler was 23%, while that of retailer was 29%. The marketing margin of retailer was higher than that of other actors, after farmers. This result agrees to the findings of Afolabi (2007) on marketing of a food commodity in Southwestern State of Nigeria, and showed that retailers' marketing margin was much higher than the wholesalers' margin. Although doing all the work of producing cucumber and bearing the associated risks, farmers took only 39% of the profit margin, the remaining 61% of profit share was taken by traders.

4.6.2.2 Profit share of cucumber supply chain actors in selected townships of Mon State

Profit share of cucumber in different township for each market player was illustrated in Figure 4.10.The detailed calculation of profit share for each township was shown in Appendix 20, 21, 22 and 23. In cucumber supply chain, farmers from Mawlamyine Township got the highest profit (51%). Among four townships, it was found that the profit share of collectors was lower than that of the other actors. The percent profit share of collectors ranged from 7 to 17%. This was due to the nature of functions of collectors, they got only commission fees. For the retailers, they could add value as they desired depending on the demand. In Mawlamyine and Thaton Townships, the profit shares of retailers were higher than that of wholesalers, the percent of profit margin ranged from 23 to 33.

Table 4.33 Cucumber marketing costs and profit share of actors in selected townships of Mon State (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	240.83	315.57	433.63
Production cost	(b)	27.22	-	-	-
Marketing cost	(c)	0.61	17.25	13.76	21.62
Labor		0.18	4.23	3.00	4.13
Packing material		0.13	1.94	4.94	4.08
Transport		0.3	4.40	2.57	3.98
Loss		0	6.17	2.51	8.93
Overhead cost		0	0.52	0.51	0.31
Tax		0	0.00	0.23	0.19
Total cost (d=a+c)	(d)	27.83*	258.08	329.33	455.26
Sale Prices	(e)	211	310.51	433.10	582.65
Market margin (f=e-a)	(f)	183.78**	69.67	117.52	149.02
% share of margin	(g)	35	13	23	29
Profit margin (h=f-d)	(h)	183.17	52.42	103.77	127.39
% share of profit	(i)	39	11	22	28

Note: * (d=b+c), ** (f=e-b)

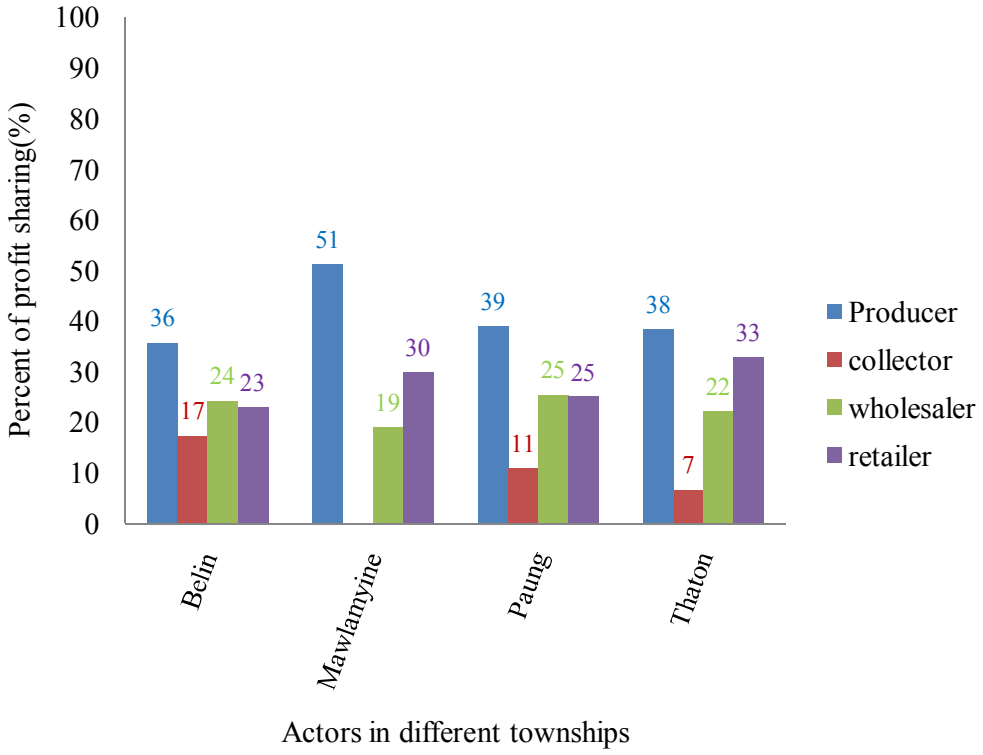

Figure 4.10 Profit sharing of actors in cucumber supply chain in selected townships of Mon State

4.6.3 Eggplant market performance

4.6.3.1 Marketing costs and profit share of actors along the eggplant supply chain in selected townships of Mon State

Table 4.34 shows different types of marketing cost and margins related to the transaction of eggplant by eggplant producers, collectors, wholesalers and retailers where the arrangement of costs were similar to yard-long bean and cucumber supply chain. The result revealed that marketing cost of collectors was highest when compared to other actors. This might be because of the high cost of transportation incurred by collectors. The cost of loss of eggplant was not high for wholesaler and retailer because eggplant could be stored locally for a longer period of time than other crops. Eggplant supply chain had the same value adding behavior as the other vegetables. Traders (collectors, wholesalers and retailers) simply buying from the farmers and selling to consumers, they took 58% of the total profit margin. Although doing all the work of producing eggplant and bearing the associated risks, farmers took 42% of the profit margin. Collectors, wholesalers and retailers were responsible for 12%, 16% and 30% profit margin respectively.

4.6.3.2 Marketing margins of eggplant supply chain actors in selected townships of Mon State

Marketing margin of eggplant in different townships for each market player was shown in Figure 4.11. The detailed calculation of profit share for each township was given in Appendix 24, 25, 26 and 27. Similar to yard-long bean and cucumber, farmers from Mawlamyine Township got the highest profit share (56%). The profit share of retailer was highest in all townships after farmers. And the profit share of wholesaler was higher than that of collectors. It was observed that eggplant was profitable for all the actors along the supply chain. The reason could be that eggplant was the most frequently use vegetable in the study areas and it had long shelf life. The availability of eggplants from other areas during off-season was another reason for supply chain actors to be profitable.

Table 4.34 Eggplant marketing costs and profit share of actors in selected townships of Mon State (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	319.20	402.63	495.64
Production cost	(b)	42.34	-	-	-
Marketing cost	(c)	0.86	16.10	14.12	15.98
Labor		0.3	4.47	2.93	4.34
Packing material		0.14	2.22	5.04	3.98
Transport		0.42	4.61	2.66	3.85
Loss		0.00	4.28	2.71	3.26
Overhead cost		0.00	0.52	0.54	0.36
Tax		0.00	0.00	0.24	0.19
Total cost (d=a+c)	(d)	43.20*	335.30	416.76	511.61
Sale Prices	(e)	249.00	390.98	495.51	660.41
Market margin (f=e-a)	(f)	206.66**	71.78	92.88	164.77
% share of margin	(g)	39.00	13.00	17.00	31.00
Profit margin (h=f-d)	(h)	205.80	55.68	78.75	148.80
% share of profit	(i)	42.00	12.00	16.00	30.00

Note: * (d=b+c), ** (f=e-b)

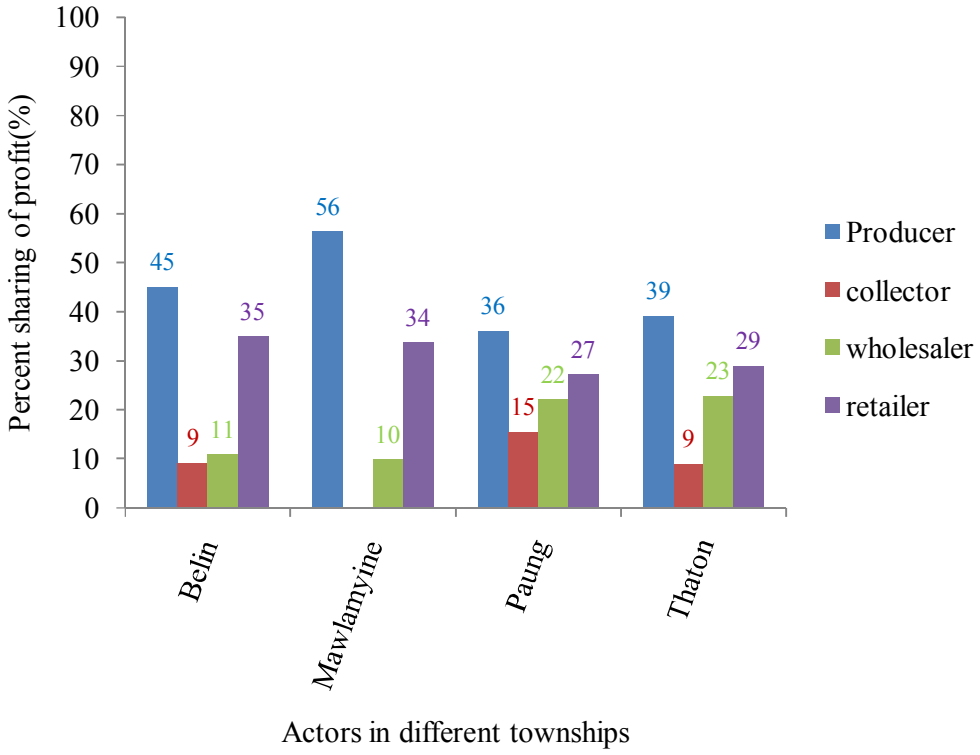

Figure 4.11 Profit sharing of actors in eggplant supply chain in selected townships of Mon State

4.6.4 Tomato market performance

4.6.4.1 Marketing costs and profit share of actors along the tomato supply chain in selected townships of Mon State

Table 4.35 presents different types of marketing cost and margins related to the transaction of tomato by tomato producers, collectors, wholesalers and retailers where the arrangement of costs were the same with yard-long bean, cucumber and eggplant supply chain. The result showed that the cost of marketing was highest for retailers. The cost of post-harvest loss of tomato during handling was 15.74 kyats per kilogram and the maximum post-harvest loss was observed in tomato marketing if it was compared to yard-long bean, cucumber and eggplant. This can attribute to the perishable nature of the crop, in which non-disposal of the products on time could lead to spoilage. This agreed with the findings of Usman and Bakar (2013) who also reported poor storage and processing facilities course excessive losses of tomato at storage in Adamawa State in Nigeria. Tomato supply chain had the same value adding behavior as the other vegetables. Collectors, wholesalers and retailers are responsible for 20%, 13% and 24% profit margin respectively. Farmers got 43% of total profit margin.

4.6.4.2 Marketing margins of tomato supply chain actors in selected townships of Mon State

Marketing margin of tomato in different townships for each market player was given in Figure 4.12. The detailed calculation of profit share for each township was given in Appendix 28 and 29. It was found that producers from Belin Township got more profit share than producers from Paung Township. During the tomato growing season, nearly all farmers from Paung Township grew at more or less the same time. Therefore, it was suggested that higher supply made farmers got low price and less profit accordingly. Prices were the result of the functioning of the market and were determined by supply and demand which, in turn, is influenced by the costs of production, the costs of marketing and consumer preferences. Generally, the price fluctuation of vegetables is higher than other agricultural products (Bambang 2007).

In Paung Township, retailers got higher profit share than farmers. Although farmers had to take all risks of producing crops, they got less profit. It can be seen that the profit share for tomato in Paung Township was not in proper way.

Table 4.35 Tomato marketing costs and profit share of actors in selected townships of Mon State (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	278.73	418.20	495.69
Production cost	(b)	30.33	-	-	-
Marketing cost	(c)	1.36	21.15	14.02	28.32
Labor		0.18	4.86	3.02	4.13
Packing material		0.18	8.24	4.29	3.98
Transport		1.00	7.54	2.87	3.95
Loss		0.00	0.00	3.02	15.74
Overhead cost		0.00	0.51	0.54	0.36
Tax		0.00	0.00	0.29	0.15
Total cost (d=a+c)	(d)	31.69*	299.88	432.21	524.01
Sale Prices	(e)	240.77	394.47	494.79	640.36
Market margin (f=e-a)	(f)	210.44**	115.74	76.60	144.67
% share of margin	(g)	38.00	21.00	14.00	26.00
Profit margin (h=f-d)	(h)	209.08	94.59	62.58	116.35
% share of profit	(i)	43.00	20.00	13.00	24.00

Note: * (d=b+c), ** (f=e-b)

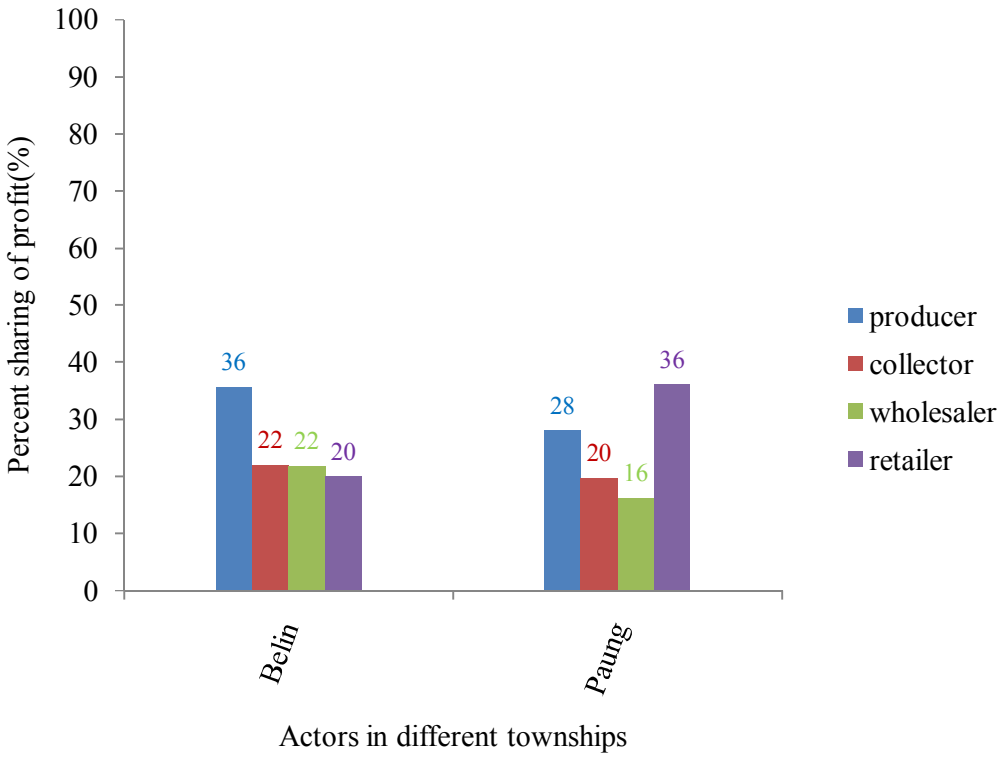

Figure 4.12 Profit sharing of actors in tomato supply chain in selected townships of Mon State

4.7 Constraints of Vegetable Production and Marketing in Selected Townships of Mon State

4.7.1 Constraints of farmers

All of the sample farmers in the study area had to face different constraints in growing vegetables. Table 4.36 showed farmers perception of constraints in vegetable production.

Pest and disease problem

Pest and disease were serious problem for farmers in the study areas. About 33% of respondents answered pest and disease occurrence as a problem (Table 4.36). Farmers used pesticides and fungicides with high concentration for two or three day interval in controlling pest and disease. This might be because of cultivation of the same crop for many years. Some farmers used banned pesticides which were cheaper compared with legal pesticides. Moreover, pests and diseases acquire resistant mechanism to traditional production practices. As a result, farmers had a high cost for pesticide and fungicide, high impact on environment, and finally the vegetables were with poor quality and did not safe for consumption.

Getting unsuitable price and price fluctuation

About 50% of respondents in Belin, 28% in Paung and 11% in Thaton Township answered that they received very low price for their farm produce (Table 4.36). This was because all farmers already known the retail price and always compared with the farm gate price they received. The price was set by wholesalers and famers were price takers in the study areas.

Price fluctuation was a common problem for vegetables. About 14% of total respondents answered this as a problem. This was because of supply and demand. Farmers always got high price at early production season and when the supply was high in the market, the price became low.

Dependency on collector

The respondents were from Belin, Mawlamyine and Thaton Townships which have collector level in marketing of vegetables. Some farmers wanted to sell directly to consumers to get more prices. But there was not easy access to market place for farmers. In production season, supply of vegetables was high, so collectors did not want to take vegetables from farmers. Therefore, farmers had to request collectors to accept their vegetables and as a result, farmers received very low price.

Limited access to land

Land accessibility was a problem for vegetable sector in Mon State. About 17% of respondents in Belin Township, 7% of respondents in Mawlamyine Township and 43% of respondents in Thaton Township answered land accessibility as a problem. Farmers already knew the profit of producing vegetables and they wanted to expand their cultivation for higher profit. But farmers who possessed paddy land cannot cultivate vegetables for year round. In some areas, the extending of plantation crops cultivation also had an impact on vegetable production.

Lack of water during dry season

About 26% of total respondents faced the problem dealing with water supply in dry season. Farmers in the study areas did not have advanced irrigation system and totally relied on natural water access such as well and stream. Because of the lack of water during dry season, most of the farmers can grow only one season for crop production.

Labor scarcity and high weeding cost

Labor shortage is a current problem for agricultural sector in Mon State. Many of the people in Mon State migrated to other countries for more income. The existence of Mon State closed to the border region of Thailand that favored people to migrate. As a result, hired labor rate are very high and sometimes farmers could not hire labor at all.

High weeding cost deals with labor scarcity and which results high operating cost for farmers.

Market competition

About 60% of farmers in Mawlamyine and 11% of farmers in Paung Townships answered market competition as a constraint. Mawlamyine has a big wholesale market and sudden supply from other vegetables surplus areas cause competition. This had an impact on farmers, especially for the price of the produces.

Insufficient capital

Insufficient investment was a common problem for all farmers in the study areas. But only 28% of sample farmers in Paung and 11% in Thaton Townships mentioned this as a problem. Because of insufficient capital, nearly all of the farmers borrowed money with high interest rate for running of their production. After they had harvested their crops, they had to repay for their loan.

Low quality seed

About 7% of respondents in Belin Township mentioned low quality seed. This was occurred in hybrid seed that they bought for their production and the main problem was low rate of germination. Most of the hybrid seeds were imported by input suppliers illegally. Almost all of hybrid seeds came especially from China and Thailand. There is no variety development or country-adapted breeding programs taking place by the private sector in Myanmar. Unlike other agro-inputs which can be used in a wide range of environments, vegetable varieties need to be adapted to the agronomic and marketing needs of specific areas.

4.7.2 Constraints of marketing agents

Table 4.37 shows constraints raised by collectors in their business activities. Insufficient capital and high interest rate for credit are common problems for collectors. Moreover, about 50% of respondents from Belin Township answered that they faced delayed payment from their customer. Delayed payment might lead to low trust between each other. Fluctuated local supply was found as constraints for collectors in Thaton Township. Sometimes, farmers had pest and disease problem and as a result, their production amount was very low. The collectors could not supply with a regular amount and lose market contribution consequently.

In Mawlamyine wholesale market, market competition was mentioned as constraints for wholesalers (Table 4.38). Because of good transportation facilities, sudden supply of vegetables from surplus areas made wholesalers to compete each other. In Belin and Mawlamyine Townships, fluctuation of local supply made wholesalers difficult to manage well. The perishable nature of vegetable was also a constraint for supply chain actors. Retailers also mentioned their perception of constraints in business activities (Table 4.39). Insufficient capital and high interest rate of credit were common constraints in functioning of business. It was found that 40% of retailers in Thaton Township answered consumer preference as constraint. This was because consumer becomes awareness on price and quality, including size, shape and taste in recent years.

Table 4.36 Farmers' perception of constraints in business activities in selected townships of Mon State

No.	Constraints	Percent of respondents				Total (N=100)
		Belin (N=30)	Mawlamyine (N=15)	Paung (N=18)	Thaton (N=37)	
1	Getting unsuitable price	50	-	28	11	24
2	Dependency on collector	33	-	11	27	22
3	Limited access to land	17	7	-	43	22
4	Price fluctuation	7	27	22	11	14
5	Low quality of fertilizer	3	-	11	0	3
6	Lack of water during dry season	3	-	6	65	26
7	Pest and disease problem	50	-	6	46	33
8	Labor scarcity	3	-	33	3	8
9	Market competition	-	60	11	-	11
10	Insufficient capital	-	-	28	11	14
11	High weeding cost	-	-	6	-	1
12	Low quality of seed	7	-	-	-	2

Table 4.37 Collectors' perception of constraints in business activities in selected townships of Mon State

Constraints	Percent of respondents			Total (N=11)
	Belin (N=4)	Paung (N=3)	Thaton (N=4)	
Fluctuate local supply	-	-	50	18
Insufficient capital	25	33	25	27
High interest rate	25	67	25	37
Delayed payment of customer	50	-	-	18

Table 4.38 Wholesalers' perception of constraints in business activities in selected townships of Mon State

Constraints	Percent of respondents				Total (N=14)
	Belin (N=4)	Mawlamyine (N=4)	Paung (N=2)	Thaton (N=4)	
Market competition	-	100	-	-	25
Fluctuate local supply	50	-	-	50	25
Insufficient capital	50	-	100	33	46
High losses	-	-	-	17	4

Table 4.39 Retailers' perception of constraints in business activities in selected townships of Mon State

Constraints	Number of respondents				Total (N=16)
	Belin (N=4)	Mawlamyine (N=4)	Paung (N=4)	Thaton (N=4)	
Insufficient capital	75	100	50	60	71
High interest rate	25	-	50	-	19
Customers preference	-	-	-	40	10

CHAPTER V
CONCLUSION

5.1 Summary of Findings

5.1.1 Supply chain of the vegetables in Mon State

Vegetable supply chain of the study areas revealed that the main actors along the chain were vegetable producing farmers, collectors, wholesalers, retailers and consumers. Vegetable producers were the main actors involved in the production activities. Collectors were engaged in purchasing vegetable from vegetable main producing areas and selling at township markets to wholesalers and retailers. Wholesalers purchased vegetables from farmers and collectors, and sold to retailers and consumers. Retailers purchased vegetables from producers, collectors and wholesalers and sold to consumers. There were also governmental and non-governmental supportive actors who supported vegetable supply chain directly or indirectly. The supporters provided especially for training and finance. The main supporters of the vegetable supply chain in the study areas were government, private Agrochemical Company and informal credit suppliers such as collectors and wholesalers.

5.1.2 Market performance

In the study areas, Mawlamyine wholesale market existed as a big wholesale market for other vegetables producing areas in Mon State. Vegetables from Belin, Paung and Thaton Townships were exported to Mawlamyine wholesale market, and then distributed to other remaining townships in Mon State. It was found that Hpa-an Township in Kayin State existed as a big market outlet for Mon State. The supply of vegetables such as yard-long bean, cucumber and eggplant from producer to collector was higher than 60%, but the supply of tomato from producer to collector was only 28%. Distance from wholesale market was the primary factor for how much product went to intermediaries.

Vegetables produced in the study areas passed through several intermediaries, such as collectors, wholesalers and retailers with little value being added before reaching the end-users. The intermediate buyers obtained the vegetable from the farmers at a lower price and they sold to the consumers at a higher price. The average price that sample respondents received for a kilogram of yard-long bean, cucumber,

eggplant and tomato was reported to be 243, 211, 249 and 240 Kyats, whereas consumers paid was 595, 583, 660, 640 Kyats, respectively. In general, the share of profit margin of farmers were the highest followed by retailers, wholesalers and collectors. But the share of profit also varied depending on the crops and location. Farmers who had easy access to wholesale market got the highest profit share. Belin Township which was located far away from wholesale market access made the farmers got lowest profit. Although Paung Township was not far away from wholesale market, high production of tomato by farmers at the same time made the farmers got low profit share.

5.1.3 Constraints faced by sample farmers and market participants

Constraints hindering the development of vegetable value chain were found in all stages of the chain. At the farm-level, vegetable producers had to face with limited access to land, incidence of pest and disease problem and lack of water during dry season. On the marketing side, insufficient capital, fluctuated local supply, market competition and consumer preference were major problems.

5.2 Recommendation and Policy Implications

5.2.1 Promotion of improved varieties and technology for farmers

The vegetable sector of Mon State, performed by small-scale farmers, urgently needs to be upgraded along the supply chain. Traditional production practices with growing one crop for many years and weak linkage to markets were major issues to be addressed. Moreover, importing vegetables from Thailand with consumers preferred quality was a major challenge. To overcome this problem, the use of improved varieties of vegetables with better technology played a significant role. Worldwide farmers who used improved seeds and adopted new technologies might have the advantages such as improved ability to meet market demands, high productivity, uniformity, tolerance of pests and diseases, better response to fertilizers as well as improved post-harvest handling and storage qualities. Technology dealing with crop production practices and management system was also important for farmers. Effective extension services to promote farmers' adoption to improved varieties and appropriate technologies should be provided. Private sector can take a leading role in promoting the adoption of improved seed varieties and better farm practices, government should encourage the private sector participation as well.

5.2.2 Promotion of vegetables supply chain

Most of the farmers received the highest profit shares in selected vegetables supply chain. Farmers who have participated in market (e.g farmers in Mawlamyine Township) had high share in consumer price, responsible person from agricultural extension should encourage and promote farmers for direct marketing. Market information such as price, demand and supply was important for all market participants. There was a weak linkage among intermediaries, information gap was a major issue. Therefore, government should provide market information in local not only for producers but also for all other market participants. Media such as radio and mobile communication should be used for transmission of price information. Post-harvest losses were high for market participants, so that market infrastructure, storage facilities and knowledge on post-harvest handling should be provided. The study therefore, recommends that further studies should be intensified into effective methods of storage and packaging to preserve the perishable produce to ensure minimum losses along the supply chain. Insufficient capital was also a common problem, therefore both private and public institutions need to provide credit especially for vegetable producers.

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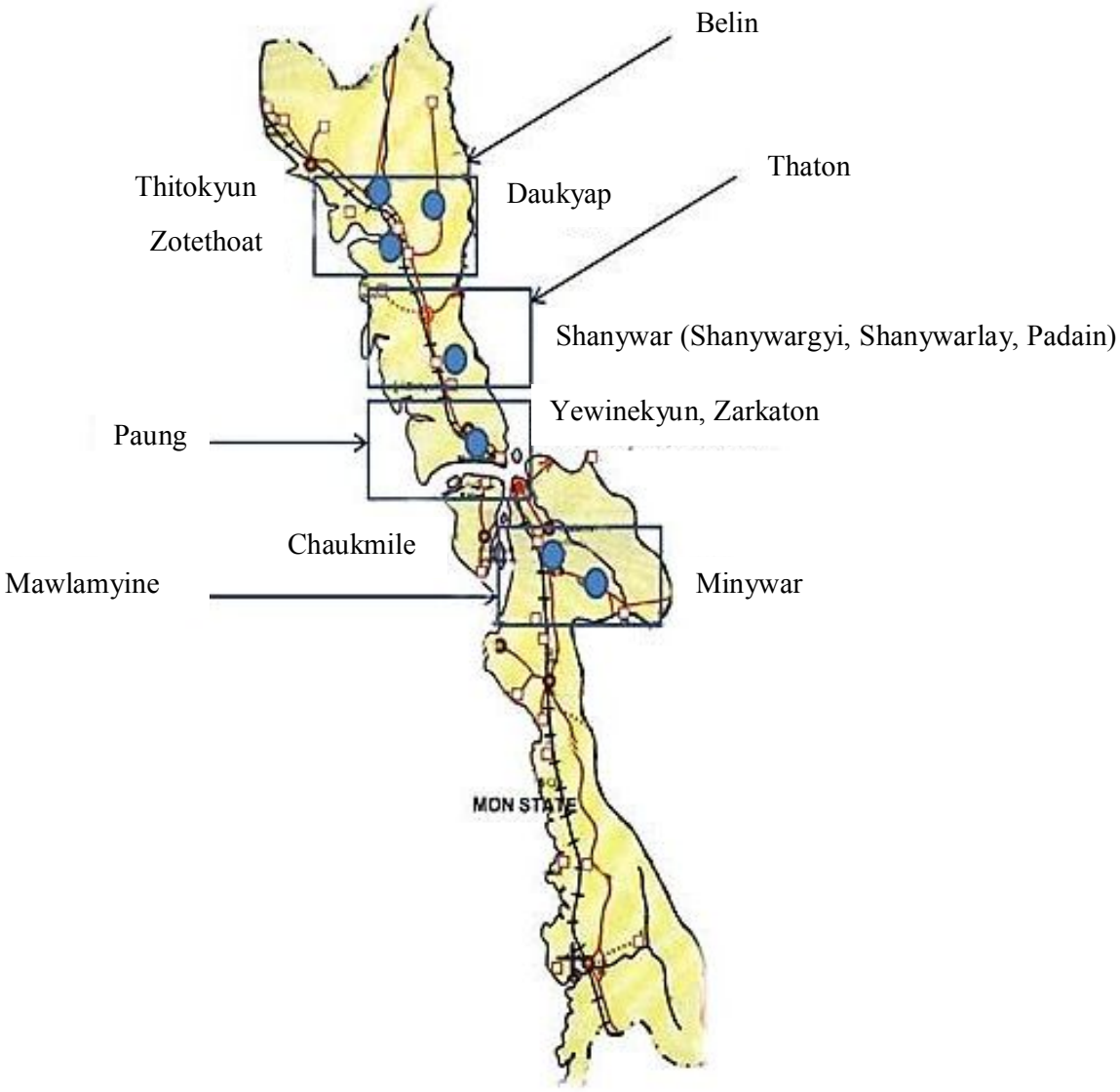
APPENDICES



Appendix 1 Selected study sites (10 villages in four townships)

Appendix 2 Enterprise budget of yard-long bean production in Belin Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**4,694,900**
	Productivity (kg/ha)	21,736
	Price (ks/kg)	216
2	**Variable costs**	
	(a) Material cost	
	Seed cost	59,304
	FYM	110,701
	Base fertilizer	29,652
	Compound	183,842
	Urea	79,319
	Pesticide	145,542
	Fungicide	27,675
	Herbicide	19,415
	Plant hormone	46,949
	Bamboo	111,195
	Fuels	35,582
	Nee	7,413
	Total material cost (a)	**856,589**
	(b) Family labor cost	
	Seeding	13,766
	Watering	57,821
	Weeding	42,254
	Fertilizer application	59,304
	Pesticide application	179,395
	Hormone application	25,946
	Harvesting	222,390
	Total family labor cost (b)	**600,876**
	(c) Hired labor cost	
	Ploughing and harrowing	158,885
	Furnishing planting bed	126,268
	Seeding	17,297
	Watering	19,590
	Fertilizer application	51,891
	Total hired labor cost (c)	**373,931**
	(d) Interest on cash cost	
	Material cost	34,264
	Hired labor cost	14,957
	Total interest on cash cost (d)	**49,221**
3	**Total variable cost (a+b+c+d)**	**1,880,617**
4	**Total cash cost (a+c+d)**	**1,279,742**
5	**Return above variable cost (RAVC)**	**2,814,283**
6	**Return above cash cost (RACC)**	**3,415,158**
7	**Benefit cost ratio (BCR)**	**2.5**

Appendix 3 Enterprise budget of yard-long bean production in Mawlamyine Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**5,905,690**
	Productivity (kg/ha)	18,748
	Price (ks/kg)	315
2	**Variable costs**	
	(a) Material cost	
	Seed cost	37,065
	FYM	247,100
	Base fertilizer	101,805
	Compound	172,970
	Urea	49,420
	Pesticide	42,007
	Bamboo	123,550
	Fuels	41,760
	Nee	8,649
	Total material cost (a)	**824,326**
	(b) Family labor cost	
	Seeding	2,780
	Weeding	31,629
	Fertilizer application	14,826
	Pesticide application	44,478
	Hormone application	8,340
	Total family labor cost (b)	**102,052**
	(c) Hired labor cost	
	Permanent labor	333,585
	Ploughing and harrowing	175,935
	Seeding	22,239
	Watering	45,466
	Weeding	75,118
	Harvesting	286,636
	Total hired labor cost (c)	**938,980**
	(d) Interest on cash cost	
	Material cost	32,973
	Hired labor cost	37,559
	Total interest on cash cost (d)	**70,532**
3	**Total variable cost (a+b+c+d)**	**1,935,890**
4	**Total cash cost (a+c+d)**	**1,833,838**
5	**Return above variable cost (RAVC)**	**3,969,800**
6	**Return above cash cost (RACC)**	**4,071,852**
7	**Benefit cost ratio (BCR)**	**3.1**

Appendix 4 Enterprise budget of yard-long bean production in Paung Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**4,772,119**
	Productivity (kg/ha)	22,300
	Price (ks/kg)	214
2	**Variable costs**	
	(a) Material cost	
	Seed cost	172,970
	Base fertilizer	98,840
	Urea	56,339
	Pesticide	49,420
	Herbicide	16,803
	Bamboo	166,793
	Fuels	37,065
	Nee	7,907
	Total material cost (a)	**606,136**
	(b) Family labor cost	
	Seeding	24,710
	Watering	55,598
	Weeding	42,501
	Fertilizer application	93,898
	Pesticide application	184,090
	Hormone application	27,675
	Harvesting	481,845
	Total family labor cost (b)	**910,316**
	(c) Hired labor cost	
	Ploughing and harrowing	201,387
	Furnishing planting bed	123,550
	Seeding	37,065
	Watering	44,478
	Total hired labor cost (c)	**406,480**
	(d) Interest on cash cost	
	Material cost	24,245
	Hired labor cost	16,259
	Total interest on cash cost (d)	**40,505**
3	**Total variable cost (a+b+c+d)**	**1,963,437**
4	**Total cash cost (a+c+d)**	**1,053,120**
5	**Return above variable cost (RAVC)**	**2,808,682**
6	**Return above cash cost (RACC)**	**3,718,998**
7	**Benefit cost ratio (BCR)**	**2.4**

Appendix 5 Enterprise budget of yard-long bean production in Thaton Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**4472510**
	Productivity (kg/ha)	19,195
	Price (ks/kg)	233
2	**Variable costs**	
	(a) Material cost	
	Seed cost	51891
	FYM	98840
	Compound	177912
	Urea	56833
	Pesticide	59304
	Bamboo	98840
	Fuels	28663.6
	Nee	7413
	Total material cost (a)	**579696.6**
	(b) Family labor cost	
	Seeding	17,791
	Watering	42,995
	Weeding	130,469
	Fertilizer application	60,787
	Pesticide application	155,673
	Hormone application	42,995
	Harvesting	252,042
	Total family labor cost (b)	**702,752**
	(c) Hired labor cost	
	Ploughing and harrowing	162,344.70
	Seeding	14,826.00
	Watering	83,766.90
	Total hired labor cost (c)	**260937.6**
	(d) Interest on cash cost	
	Material cost	23,187.86
	Hired labor cost	10,437.50
	Total interest on cash cost (d)	**33625.368**
3	**Total variable cost (a+b+c+d)**	**1,577,012**
4	**Total cash cost (a+c+d)**	**874,260**
5	**Return above variable cost (RAVC)**	**2,895,498**
6	**Return above cash cost (RACC)**	**3,598,250**
7	**Benefit cost ratio (BCR)**	**2.8**

Appendix 6 Enterprise budget of cucumber production in Belin Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**4,744,320**
	Productivity (kg/ha)	25,925
	Price (ks/kg)	183
2	**Variable costs**	
	Seed cost	164,074
	FYM	112,431
	Base fertilizer	4,744
	Compound	185,325
	Urea	56,833
	Pesticide	74,130
	Herbicide	10,872
	Plant hormone	52,138
	Bamboo	155,364
	Fuels	22,239
	Nee	266,868
	Total material cost (a)	**1,105,019**
	(b) Family labor cost	
	Seeding	17,791
	Watering	25,946
	Weeding	19,768
	Fertilizer application	29,652
	Pesticide application	93,404
	Hormone application	23,722
	Harvesting	90,439
	Total family labor cost (b)	**300,721**
	(c) Hired labor cost	
	Ploughing and harrowing	171,611
	Furnishing planting bed	241,417
	Watering	22,239
	Total hired labor cost (c)	**435,267**
	(d) Interest on cash cost	
	Material cost	44,201
	Hired labor cost	17,411
	Total interest on cash cost (d)	**61,611**
3	**Total variable cost (a+b+c+d)**	**1,902,618**
4	**Total cash cost (a+c+d)**	**1,601,897**
5	**Return above variable cost (RAVC)**	**2,841,702**
6	**Return above cash cost (RACC)**	**3,142,423**
7	**Benefit cost ratio (BCR)**	**2.5**

Appendix 7 Enterprise budget of cucumber production in Mawlamyine Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**7,165,900**
	Productivity (kg/ha)	27,775
	Price (ks/ha)	258
2	**Variable costs**	
	Seed cost	128,492
	FYM	266,868
	Base fertilizer	103,782
	Compound	242,158
	Urea	107,983
	Pesticide	42,007
	Plant hormone	49,420
	Bamboo	156,909
	Fuels	32,617
	Nee	266,868
	Total material cost (a)	**1,397,103**
	(b) Family labor cost	
	Watering	48,926
	Total family labor cost (b)	**48,926**
	(c) Hired labor cost	
	Permanent labor	444,780
	Ploughing and harrowing	159,132
	Watering	25,204
	Harvesting	52,385
	Total hired labor cost (c)	**681,502**
	(d) Interest on cash cost	
	Material cost	55,884
	Hired labor cost	27,260
	Total interest on cash cost (d)	**83,144**
3	**Total variable cost (a+b+c+d)**	**2,210,675**
4	**Total cash cost (a+c+d)**	**2,161,749**
5	**Return above variable cost (RAVC)**	**4,955,225**
6	**Return above cash cost (RACC)**	**5,004,151**
7	**Benefit cost ratio (BCR)**	**3.2**

Appendix 8 Enterprise budget of cucumber production in Paung Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**5,411,490**
	Productivity (kg/ha)	26,017
	Price (ks/kg)	208
2	**Variable costs**	
	Seed cost	118,855
	Base fertilizer	100,076
	Compound	129,728
	Urea	69,126
	Pesticide	37,065
	Fungicide	27,675
	Herbicide	13,899
	Plant hormone	51,273
	Bamboo	159,688
	Fuels	25,637
	Nee	266,868
	Total material cost (a)	**999,890**
	(b) Family labor cost	
	Furnishing planting bed	69,435
	Seeding	24,710
	Watering	25,698
	Weeding	12,046
	Fertilizer application	39,783
	Pesticide application	60,540
	Hormone application	25,946
	Harvesting	156,661
	Total family labor cost (b)	**414,819**
	(c) Hired labor cost	
	Ploughing and harrowing	161,542
	Furnishing planting bed	355,824
	Watering	68,200
	Total hired labor cost (c)	**585,565**
	(d) Interest on cash cost	
	Material cost	39,996
	Hired labor cost	23,423
	Total interest on cash cost (d)	**63,418**
3	**Total variable cost (a+b+c+d)**	**2,063,693**
4	**Total cash cost (a+c+d)**	**1,648,874**
5	**Return above variable cost (RAVC)**	**3,347,797**
6	**Return above cash cost (RACC)**	**3,762,616**
7	**Benefit cost ratio (BCR)**	**2.6**

Appendix 9 Enterprise budget of cucumber production in Thaton Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**6,053,950**
	Productivity (kg/ha)	28,158
	Price (ks/kg)	215
2	**Variable costs**	
	Seed cost	225,602
	FYM	370,650
	Compound	181,824
	Urea	59,942
	Pesticide	210,035
	Plant hormone	50,656
	Bamboo	164,341
	Fuels	28,209
	Nee	266,868
	Total material cost (a)	**1,558,126**
	(b) Family labor cost	
	Seeding	19,768
	Watering	47,196
	Weeding	27,675
	Fertilizer application	32,123
	Pesticide application	51,891
	Hormone application	22,239
	Harvesting	96,369
	Total family labor cost (b)	**297,261**
	(c) Hired labor cost	
	Ploughing and harrowing	155,260
	Watering	31,629
	Weeding	68,694
	Total hired labor cost (c)	**255,583**
	(d) Interest on cash cost	
	Material cost	62,325
	Hired labor cost	10,223
	Total interest on cash cost (d)	**72,548**
3	**Total variable cost (a+b+c+d)**	**2,183,519**
4	**Total cash cost (a+c+d)**	**1,886,257**
5	**Return above variable cost (RAVC)**	**3,870,431**
6	**Return above cash cost (RACC)**	**4,167,693**
7	**Benefit cost ratio (BCR)**	**2.8**

Appendix 10 Enterprise budget of eggplant production in Belin Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**5,337,360**
	Productivity (kg/ha)	22,426
2	Price (ks/kg)	238
	(a) Material cost	
	Seed cost	113,975
	FYM	432,425
	Base fertilizer	-
	Compound	670,259
	Urea	704,235
	Rice dust	-
	Pesticide	444,780
	Fungicide	-
	Herbicide	59,304
	Plant hormone	-
	Fuels	123,550
	Total material cost (a)	**2,548,528**
	(b) Family labor cost	
	Seeding	14,826
	Watering	61,775
	Weeding	16,679
	Fertilizer application	29,652
	Pesticide application	95,442
	Hormone application	-
	Harvesting	177,912
	Total family labor cost (b)	**396,287**
	(c) Hired labor cost	
	Permanent labor	-
	Ploughing and harrowing	152,584
	Furnishing planting bed	209,417
	Seeding	9,266
	Watering	-
	Weeding	29,652
	Fertilizer application	-
	Pesticide application	-
	Hormone application	-
	Harvesting	-
	Total hired labor cost (c)	**400,920**
	(d) Interest on cash cost	
	Material cost	101,941
	Hired labor cost	16,037
	Total interest on cash cost (d)	**117,978**
3	**Total variable cost (a+b+c+d)**	**3,463,712**
4	**Total cash cost (a+c+d)**	**3,067,425**
5	**Return above variable cost (RAVC)**	**1,873,648**
6	**Return above cash cost (RACC)**	**2,269,935**
7	**Benefit cost ratio (BCR)**	**1.5**

Appendix 11 Enterprise budget of eggplant production in Mawlamyine Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**11,514,860**
	Productivity (kg/ha)	38,255
	Price (ks/kg)	301
2	**Variable costs**	
	Seed cost	50,831
	FYM	494,200
	Base fertilizer	120,019
	Compound	679,525
	Urea	338,873
	Rice dust	-
	Pesticide	810,834
	Fungicide	-
	Herbicide	-
	Plant hormone	-
	Fuels	85,072
	Total material cost (a)	**2,579,353**
	(b) Family labor cost	
	Seeding	13,766
	Watering	92,663
	Weeding	-
	Fertilizer application	49,771
	Pesticide application	156,731
	Hormone application	-
	Harvesting	360,049
	Total family labor cost (b)	**672,979**
	(c) Hired labor cost	
	Permanent labor	63,539
	Ploughing and harrowing	177,912
	Furnishing planting bed	-
	Seeding	-
	Watering	13,237
	Weeding	157,791
	Fertilizer application	-
	Pesticide application	-
	Hormone application	-
	Harvesting	-
	Total hired labor cost (c)	**412,479**
	(d) Interest on cash cost	
	Material cost	103,174
	Hired labor cost	16,499
	Total interest on cash cost (d)	**119,673**
3	**Total variable cost (a+b+c+d)**	**3,784,485**
4	**Total cash cost (a+c+d)**	**3,111,506**
5	**Return above variable cost (RAVC)**	**7,730,375**
6	**Return above cash cost (RACC)**	**8,403,354**
7	**Benefit cost ratio (BCR)**	**3.0**

Appendix 12 Enterprise budget of eggplant production in Paung Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**7,536,550**
	Productivity (kg/ha)	32,207
	Price (ks/kg)	234
2	**Variable costs**	
	Seed cost	72,895
	FYM	444,780
	Base fertilizer	123,550
	Compound	518,910
	Urea	312,977
	Rice dust	-
	Pesticide	713,897
	Fungicide	-
	Herbicide	25,204
	Plant hormone	-
	Fuels	59,714
	Total material cost (a)	**2,271,926**
	(b) Family labor cost	
	Seeding	26,768
	Watering	34,594
	Weeding	18,943
	Fertilizer application	59,304
	Pesticide application	135,905
	Hormone application	-
	Harvesting	557,606
	Total family labor cost (b)	**833,120**
	(c) Hired labor cost	
	Permanent labor	-
	Ploughing and harrowing	165,557
	Furnishing planting bed	261,506
	Seeding	-
	Watering	32,123
	Weeding	-
	Fertilizer application	-
	Pesticide application	-
	Hormone application	-
	Harvesting	189,442
	Total hired labor cost (c)	**648,628**
	(d) Interest on cash cost	
	Material cost	90,877
	Hired labor cost	25,945
	Total interest on cash cost (d)	**116,822**
3	**Total variable cost (a+b+c+d)**	**3,870,496**
4	**Total cash cost (a+c+d)**	**3,037,376**
5	**Return above variable cost (RAVC)**	**3,666,054**
6	**Return above cash cost (RACC)**	**4,499,174**
7	**Benefit cost ratio (BCR)**	**1.9**

Appendix 13 Enterprise budget of eggplant production in Thaton Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**10,477,040**
	Productivity (kg/ha)	44,207
	Price (ks/kg)	237
2	**Variable costs**	
	Seed cost	39,749
	FYM	452,944
	Base fertilizer	-
	Compound	591,730
	Urea	-
	Rice dust	777,006
	Pesticide	962,603
	Fungicide	-
	Herbicide	-
	Plant hormone	-
	Fuels	36,850
	Total material cost (a)	**2,860,882**
	(b) Family labor cost	
	Seeding	16,758
	Watering	39,321
	Weeding	-
	Fertilizer application	28,038
	Pesticide application	88,956
	Hormone application	-
	Harvesting	83,325
	Total family labor cost (b)	**256,398**
	(c) Hired labor cost	
	Permanent labor	-
	Ploughing and harrowing	159,001
	Furnishing planting bed	-
	Seeding	-
	Watering	39,482
	Weeding	107,649
	Fertilizer application	-
	Pesticide application	-
	Hormone application	-
	Harvesting	-
	Total hired labor cost (c)	**306,132**
	(d) Interest on cash cost	
	Material cost	114,435
	Hired labor cost	12,245
	Total interest on cash cost (d)	**126,681**
3	**Total variable cost (a+b+c+d)**	**3,550,093**
4	**Total cash cost (a+c+d)**	**3,293,695**
5	**Return above variable cost (RAVC)**	**6,926,947**
6	**Return above cash cost (RACC)**	**7,183,345**
7	**Benefit cost ratio (BCR)**	**3.0**

Appendix 14 Enterprise budget of tomato production in Belin Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**3,014,620**
	Productivity (kg/ha)	15,620
	Price (ks/kg)	193
2	**Variable costs**	
	(a) Material cost	
	Seed cost	123,550
	FYM	111,195
	Base fertilizer	98,840
	Compound	-
	Urea	49,420
	Pesticide	148,260
	Fungicide	-
	Herbicide	24,710
	Plant hormone	49,420
	Color promoter	-
	Fuels	57,327
	Total material cost (a)	**662,722**
	(b) Family labor cost	
	Seeding	14,826
	Watering	57,327
	Weeding	24,710
	Fertilizer application	39,536
	Pesticide application	185,325
	Hormone application	14,826
	Harvesting	-
	Total family labor cost (b)	**336,550**
	(c) Hired labor cost	
	Permanent labor	-
	Ploughing and harrowing	159,380
	Furnishing planting bed	333,585
	Seeding	-
	Watering	-
	Weeding	-
	Fertilizer application	-
	Pesticide application	-
	Hormone application	-
	Harvesting	298,991
	Total hired labor cost (c)	**791,956**
	(d) Interest on cash cost	
	Material cost	26,509
	Hired labor cost	31,678
	Total interest on cash cost (d)	**58,187**
3	**Total variable cost (a+b+c+d)**	**1,849,415**
4	**Total cash cost (a+c+d)**	**1,512,865**
5	**Return above variable cost (RAVC)**	**1,165,205**
6	**Return above cash cost (RACC)**	**1,501,755**
7	**Benefit cost ratio (BCR)**	**1.6**

Appendix 15 Enterprise budget of tomato production in Paung Township

No.	Items	Total value (ks/ha)
1	**Total gross benefit**	**4,596,060**
	Productivity (kg/ha)	17,814
	Price (ks/kg)	258
2	**Variable costs**	
	(a) Material cost	
	Seed cost	148,260
	FYM	-
	Base fertilizer	197,680
	Compound	-
	Urea	61,775
	Pesticide	121,079
	Fungicide	27,675
	Herbicide	-
	Plant hormone	17,297
	Color promoter	158,144
	Fuels	32,370
	Total material cost (a)	**764,280**
	(b) Family labor cost	
	Seeding	-
	Watering	32,370
	Weeding	-
	Fertilizer application	-
	Pesticide application	148,260
	Hormone application	22,239
	Harvesting	400,302
	Total family labor cost (b)	**603,171**
	(c) Hired labor cost	
	Permanent labor	-
	Ploughing and harrowing	159,874
	Furnishing planting bed	555,975
	Seeding	24,710
	Watering	73,636
	Weeding	200,892
	Fertilizer application	59,304
	Pesticide application	-
	Hormone application	-
	Harvesting	-
	Total hired labor cost (c)	**1,074,391**
	(d) Interest on cash cost	
	Material cost	30,571
	Hired labor cost	42,976
	Total interest on cash cost (d)	**73,547**
3	**Total variable cost (a+b+c+d)**	**2,515,389**
4	**Total cash cost (a+c+d)**	**1,912,218**
5	**Return above variable cost (RAVC)**	**2,080,671**
6	**Return above cash cost (RACC)**	**2,683,842**
7	**Benefit cost ratio (BCR)**	**1.8**

Appendix 16 Profit sharing of actors in yard-long bean supply chain in Belin Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	207.64	267.25	452.49
Production cost	(b)	48.29	-	-	-
Marketing cost	(c)	3.95	13.98	10.19	23.88
Labor		3.7	2.65	1.14	5.21
Packing material		0.2	2.45	4.52	3.67
Transport		0.05	5.31	2.29	4.90
Loss		0	3.06	1.49	9.49
Overhead cost		0	0.51	0.51	0.46
Tax		0	0.00	0.24	0.15
Total cost(d=a+c)	(d)	52.24*	221.62	277.44	518.62
Sale Prices	(e)	216	267.25	450.96	560.87
Market margin (f=e-a)	(f)	167.71**	59.61	183.71	108.38
% share of margin	(g)	32	11	35	21
Profit margin (h=e-d)	(h)	163.76	45.63	173.52	42.25
% share of profit	(i)	39	10	41	10

Note: * (d=b+c), ** (f=e-b)

Appendix 17 Profit sharing of actors in yard-long bean supply chain in Mawlamyine Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	-	323.04	388.36
Production cost	(b)	56	-	-	-
Marketing cost	(c)	4.72	-	14.75	23.64
Labor		2.8	-	2.14	4.90
Packing material		0.25	-	6.16	4.08
Transport		1.67	-	2.88	4.29
Loss		0	-	2.63	9.79
Overhead cost		0	-	0.61	0.31
Tax		0	-	0.33	0.28
Total cost(d=a+c)	(d)	60.72*	-	337.79	412.00
Sale Prices	(e)	315	-	388.36	488.98
Market margin (f=e-a)	(f)	259**	-	65.32	100.62
% share of margin	(g)	61	-	15	24
Profit margin (h=f-d)	(h)	254.28	-	50.57	76.98
% share of profit	(i)	67	-	13	20

Note: * (d=b+c), ** (f=e-b)

Appendix 18 Profit sharing of actors in yard-long bean supply chain in Paung Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	222.66	282.06	343.09
Production cost	(b)	27.7	-	-	-
Marketing cost	(c)	3.6	15.64	9.97	21.61
Labor		1.4	4.90	1.08	3.67
Packing material		0.1	2.20	4.21	4.29
Transport		2.1	4.78	2.31	4.59
Loss		0	3.25	1.65	8.57
Overhead cost		0	0.51	0.51	0.31
Tax		0	0.00	0.20	0.18
Total cost(d=a+c)	(d)	31.3*	238.30	292.03	364.70
Sale Prices	(e)	214	282.06	345.34	417.49
Market margin (f=e-a)	(f)	186.3**	59.40	63.28	74.40
% share of margin	(g)	49	15	17	19
Profit margin (h=f-d)	(h)	182.7	43.76	53.31	52.79
% share of profit	(i)	55	13	16	16

Note: * (d=b+c), ** (f=e-b)

Appendix 19 Profit sharing of actors in yard-long bean supply chain in Thaton Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	237.25	298.48	422.39
Production cost	(b)	22	-	-	-
Marketing cost	(c)	2.2	15.02	13.00	21.82
Labor		1.9	5.82	2.08	4.49
Packing material		0.1	1.90	5.14	3.67
Transport		0.2	3.43	2.69	4.29
Loss		0	3.34	2.31	8.78
Overhead cost		0	0.54	0.51	0.41
Tax		0	0.00	0.27	0.18
Total cost(d=a+c)	(d)	24.2*	252.27	311.48	444.21
Sale Prices	(e)	234	298.48	422.38	498.12
Market margin (f=e-a)	(f)	212**	61.23	123.90	75.73
% share of margin	(g)	45	13	26	16
Profit margin (h=f-d)	(h)	209.80	46.21	110.90	53.91
% share of profit	(i)	50	11	26	13

Note: * (d=b+c), ** (f=e-b)

Appendix 20 Profit sharing of actors in cucumber supply chain in Belin Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	214.49	303.37	423.80
Production cost	(b)	25	-	-	-
Marketing cost	(c)	0.35	11.86	12.41	22.80
Labor		0.19	3.06	2.57	4.59
Packing material		0.14	1.65	4.47	4.29
Transport		0.02	5.21	2.35	5.21
Loss		0	1.43	2.33	8.26
Overhead cost		0	0.51	0.51	0.31
Tax		0	0.00	0.18	0.15
Total cost(d=a+c)	(d)	25.35*	226.35	315.78	446.60
Sale Prices	(e)	184	303.37	423.19	548.41
Market margin (f=e-a)	(f)	159**	88.88	119.82	124.61
% share of margin	(g)	32	18	24	25
Profit margin (h=f-d)	(h)	158.65	77.02	107.41	101.81
% share of profit	(i)	36	17	24	23

Note: * (d=b+c), ** (f=e-b)

Appendix 21 Profit sharing of actors in cucumber supply chain in Mawlamyine Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	-	187.68	288.72
Production cost	(b)	27	-	-	-
Marketing cost	(c)	0.66	0	15.74	21.37
Labor		0.17	-	3.49	4.29
Packing material		0.23	-	6.08	4.08
Transport		0.26	-	2.82	3.67
Loss		0	-	2.57	8.78
Overhead cost		0	-	0.51	0.31
Tax		0	-	0.27	0.24
Total cost(d=a+c)	(d)	27.66*	-	203.42	310.09
Sale Prices	(e)	258	-	288.72	444.47
Market margin (f=e-a)	(f)	231**	-	101.04	155.75
% share of margin	(g)	47	-	21	32
Profit margin (h=f-d)	(h)	230.34	-	85.30	134.38
% share of profit	(i)	51	-	19	30

Note: * (d=b+c), ** (f=e-b)

Appendix 22 Profit sharing of actors in cucumber supply chain in Paung Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	208.46	268.68	394.31
Production cost	(b)	36	-	-	-
Marketing cost	(c)	1.59	12.76	11.70	21.58
Labor		0.25	3.82	2.35	3.37
Packing material		0.06	2.41	4.07	4.29
Transport		1.28	4.57	2.29	3.98
Loss		0	1.45	2.29	9.49
Overhead cost		0	0.51	0.51	0.31
Tax		0	0.00	0.20	0.15
Total cost(d=a+c)	(d)	37.59*	221.22	280.38	415.89
Sale Prices	(e)	209	268.67	392.78	526.27
Market margin (f=e-a)	(f)	173**	60.21	124.10	131.96
% share of margin	(g)	35	12	25	27
Profit margin (h=f-d)	(h)	171.41	47.45	112.40	110.38
% share of profit	(i)	39	11	25	25

Note: * (d=b+c), ** (f=e-b)

Appendix 23 Profit sharing of actors in cucumber supply chain in Thaton Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	216.54	276.66	401.78
Production cost	(b)	25	-	-	-
Marketing cost	(c)	0.31	27.14	15.19	20.72
Labor		0.16	5.80	3.59	4.29
Packing material		0.07	1.75	5.15	3.67
Transport		0.08	3.43	2.82	3.06
Loss		0	15.63	2.84	9.19
Overhead cost		0	0.54	0.51	0.31
Tax		0	0.00	0.29	0.20
Total cost(d=a+c)	(d)	25.31*	243.68	291.85	422.50
Sale Prices	(e)	216	276.55	401.78	585.50
Market margin (f=e-a)	(f)	191**	60.01	125.12	183.72
% share of margin	(g)	34	11	22	33
Profit margin (h=f-d)	(h)	190.69	32.87	109.93	163.00
% share of profit	(i)	38	7	22	33

Note: * (d=b+c), ** (f=e-b)

Appendix 24 Profit sharing of actors in eggplant supply chain in Belin Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	243.52	303.74	367.53
Production cost	(b)	21.4	-	-	-
Marketing cost	(c)	0.31	16.27	12.41	16.68
Labor		0.18	2.31	2.41	5.21
Packing material		0.12	2.18	4.51	3.98
Transport		0.01	5.76	2.31	4.29
Loss		0	5.51	2.37	2.75
Overhead cost		0	0.51	0.61	0.31
Tax		0	0.00	0.20	0.15
Total cost(d=a+c)	(d)	21.71*	259.79	316.15	384.21
Sale Prices	(e)	239	303.74	369.06	552.45
Market margin (f=e-a)	(f)	217.6**	60.22	65.32	184.92
% share of margin	(g)	41	11	12	35
Profit margin (h=f-d)	(h)	217.29	43.95	52.91	168.24
% share of profit	(i)	45	9	11	35

Note: * (d=b+c), ** (f=e-b)

Appendix 25 Profit sharing of actors in eggplant supply chain in Mawlamyine Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	-	442.84	503.06
Production cost	(b)	50.89	-	-	-
Marketing cost	(c)	1.34	-	16.43	16.45
Labor		0.32	-	3.49	4.08
Packing material		0.23	-	6.14	4.29
Transport		0.79	-	2.90	3.67
Loss		0	-	3.02	3.67
Overhead cost		0	-	0.51	0.51
Tax		0	-	0.37	0.22
Total cost(d=a+c)	(d)	52.23*	-	459.27	519.51
Sale Prices	(e)	302	-	503.06	669.01
Market margin (f=e-a)	(f)	251.11**	-	60.22	165.95
% share of margin	(g)	53	-	13	35
Profit margin (h=f-d)	(h)	249.77	-	43.79	149.50
% share of profit	(i)	56	-	10	34

Note: * (d=b+c), ** (f=e-b)

Appendix 26 Profit sharing of actors in eggplant supply chain in Paung Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	225.57	319.46	446.02
Production cost	(b)	43	-	-	-
Marketing cost	(c)	1.72	12.35	12.30	14.55
Labor		0.33	3.41	2.45	3.37
Packing material		0.09	2.27	4.24	3.37
Transport		1.3	4.65	2.41	3.98
Loss		0	1.51	2.49	3.37
Overhead cost		0	0.51	0.51	0.31
Tax		0	0.00	0.20	0.15
Total cost(d=a+c)	(d)	44.72*	237.92	331.76	460.57
Sale Prices	(e)	235	319.46	443.98	604.01
Market margin (f=e-a)	(f)	192**	93.89	124.52	157.99
% share of margin	(g)	34	17	22	28
Profit margin (h=f-d)	(h)	190.28	81.54	112.22	143.44
% share of profit	(i)	36	15	22	27

Note: * (d=b+c), ** (f=e-b)

Appendix 27 Profit sharing of actors in eggplant supply chain in Thaton Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	217.54	278.53	399.98
Production cost	(b)	56	-	-	-
Marketing cost	(c)	0.68	19.69	15.34	16.24
Labor		0.38	7.70	3.37	4.69
Packing material		0.13	2.20	5.26	4.29
Transport		0.17	3.43	3.04	3.47
Loss		0	5.82	2.98	3.26
Overhead cost		0	0.54	0.51	0.31
Tax		0	0.00	0.18	0.22
Total cost(d=a+c)	(d)	56.68*	237.23	293.87	416.22
Sale Prices	(e)	238	278.78	399.98	550.20
Market margin (f=e-a)	(f)	182**	61.24	121.45	150.22
% share of margin	(g)	35	12	24	29
Profit margin (h=f-d)	(h)	181.32	41.55	106.11	133.98
% share of profit	(i)	39	9	23	29

Note: * (d=b+c), ** (f=e-b)

Appendix 28 Profit sharing of actors in tomato supply chain in Belin Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	203.01	330.59	449.49
Production cost	(b)	24.09	-	-	-
Marketing cost	(c)	0.71	20.19	13.69	29.23
Labor		0.57	4.51	3.49	5.21
Packing material		0.14	8.21	4.48	3.98
Transport		0	6.96	2.45	4.29
Loss		0	0.00	2.53	15.30
Overhead cost		0	0.51	0.51	0.31
Tax		0	0.00	0.22	0.15
Total cost(d=a+c)	(d)	24.8*	223.20	344.28	478.72
Sale Prices	(e)	194	330.59	447.96	573.49
Market margin (f=e-a)	(f)	169.91**	127.58	117.37	124.00
% share of margin	(g)	32	24	22	23
Profit margin (h=f-d)	(h)	169.2	107.39	103.68	94.77
% share of profit	(i)	36	22	22	20

Note: * (d=b+c), ** (f=e-b)

Appendix 29 Profit sharing of actors in tomato supply chain in Paung Township (ks/kg)

Items		Producers	Collectors	Wholesalers	Retailers
Purchase Prices	(a)	-	265.45	369.35	452.02
Production cost	(b)	128	-	-	-
Marketing cost	(c)	13.32	22.11	13.11	27.96
Labor		1.8	5.21	2.84	3.37
Packing material		0.22	8.27	4.09	3.98
Transport		11.3	8.12	2.67	4.59
Loss		0	0.00	2.76	15.62
Overhead cost		0	0.51	0.51	0.31
Tax		0	0.00	0.24	0.09
Total cost(d=a+c)	(d)	141.32*	287.56	382.46	479.98
Sale Prices	(e)	258	369.35	449.98	630.04
Market margin (f=e-a)	(f)	130**	103.90	80.63	178.02
% share of margin	(g)	26	21	16	36
Profit margin (h=f-d)	(h)	116.68	81.79	67.52	150.06
% share of profit	(i)	28	20	16	36

Note: * (d=b+c), ** (f=e-b)