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Value Chain Analysis of Mandarin in Selected Areas of Myanmar

Hsu Myat Oo

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List of Abbreviations

BCR	:	Benefit-Cost Ratio
DOA	:	Department of Agriculture
FAO	:	Food and Agriculture Organization
FAOSTAT	:	Statistics of Food and Agriculture Organization
GDP	:	Gross Domestic Product
ha	:	Hectare
Kg	:	Kilogram
Ks	:	Kyat
MADB	:	Myanmar Agricultural Development Bank
MOAI	:	Ministry of Agriculture and Irrigation
NGOs	:	Non Government Organization
R&D	:	Research and Development

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Abstract

The Mandarin orange (*Citrus reticulata* Blanco) is one commercially important species of citrus and a potential important agriculture commodity that may drive rural economic growth in Myanmar. The objectives of the study are (1) to develop a mandarin value chain map, (2) to identify the major stakeholders in the mandarin value chain and (3) to determine the problems, constraints, strengths and weakness faced by marketing participants at each level of the value chain for mandarin oranges. The research questions are (1) What is the value chain of mandarin in Myanmar? (2) Who are the major stakeholders in the mandarin value chain? and (3) what are the problems/constraints faced by various stakeholders within the value chain of mandarin? The qualitative method was applied by using in-depth interviews and semi-structure interviews to collect the primary data, while the quantitative method was used to estimate the cost and margin, and profits of actors at each level of the value chain. Marketing margin analysis and SWOT analysis were used in this study. It was found that there were many actors in the mandarin value chain such as input providers, growers and wholesalers. The major constraints for mandarin growers are diseases, insects, lack of technical knowledge, and high price of inputs, lack of market information, unorganized marketing and high transportation costs. The major constraint for wholesalers was low access to financial possibilities. Therefore, financial constraints need to be simultaneously solved at all levels of the value chain. The study showed that mandarin farming is a profitable and potential business in the study area. It can conclude that there is an immense need for facilitators (NGOs and other agencies) to increase productivity, improve the quality of the production system and marketing through the cooperative society for efficient marketing.

1. Introduction

1.1 Overview

Mandarin (*Citrus reticulate* Blanco) is a subtropical fruit which belongs to the family Rutaceae and subfamily Aurantioideae (Samson, 1986). It is one of the commercially important species of citrus and originated in the Malay Archipelago of the South East Asian Region. Citrus fruits are among the most important fruits grown worldwide, especially in warm temperate and humid subtropical and tropical regions. The world production of mandarin was 37,500,000 (37.5 million) tons (FAO STAT, 2011). In Myanmar, the cultivated area of oranges is about 14,289 ha with a harvested area of 11,612 ha with an average yield of 28.64 tons ha^{-1}(DAP, 2011). It is widely grown in Southern Shan State, Kachin State and Mandalay Region.

Myanmar is one of the developing countries which mainly depend on an agriculture based economy. Agriculture plays a primary role not only for domestic self-sufficiency but also for export of the surplus. Since Myanmar is richly endowed with natural resources, many varieties of crops can be grown throughout the country in diverse agro-ecosystems. In order to increase the foreign exchange earnings and the national economy, the government placed concerted efforts to increase production of four major crops, namely-paddy, pulses, cotton and sugarcane. Efforts are also being made to promote the export earnings from rubber, coffee, tea and sericulture. The promotion of fruits production is rather weak compared to the above crops and the aim is only for domestic consumption.

However, fruit production is very important for country's food security. In addition, it can be added to the country's income as well as high nutritive value for consumption. The production of some fruits increased quite dramatically after the mid-1990s in response to the expansion of the domestic market as part of the process of economic development. In recent years, some fruits such as mango production have begun to be stimulated by overseas demand. In general, the profitability from the systematic production of fruit is high and an expansion of these crops has contributed substantially to the stimulation of the rural economy. Though it may sound rather obvious, a key factor which has allowed the marketing

of fruit crops over a wide area is the improvement of the infrastructure, including the development of communication facilities.

1.2 Research Rationale

Mandarin (*Citrus reticulate* Blanco) is a subtropical fruit which belongs to the family Rutaceae and subfamily Aurantioideae (Samson, 1986). It is one of the commercially important species of Myanmar has long been known as an agro-based nation with a total land area of 676,577 sq. km in the South East Asian Region. Owing to the different agro-climatic conditions (tropics, sub-tropics and sub-temperate), and three prevailing seasons (hot, rainy and cool-dry seasons) the country is blessed with extensive crop growing. In addition, land, water and man power strengthen the potential of the agricultural sector as the pillar of Myanmar's economy. The agricultural sector contributes 34% of GDP, equivalent to 15.4% of total export earnings in 2008-2009 (MOAI, 2010).

Apart from rice, the staple food of the nation, horticultural crops in general plays an important role in economic development and nutritional status of its inhabitants. The horticultural crop growing area is as much as 17%, in which culinary crops account for 1% and fruit, vegetables and other horticultural crops account for 16% of the total sown area, respectively (MOAI, 2010). Production of horticultural crops is mostly consumed domestically with some proportion exported to neighboring countries. Marketing of horticultural crops in general and fruits and vegetables in particular, is more complex and risky unlike cereal because of the special characteristic of its highly perishable nature, seasonality, bulkiness and special care needed including its immediate disposal (Gandhi and Namboodiri, 2002).

It is very much evidenced that the core challenge for the development of agriculture commercialization is the absence of a network of functional value chains. In order to make this value chain effective and functional, key deficient and constraining factors have to be identified and addressed as a priority. The study, therefore, aims to obtain a more detailed understanding of the stakeholders, activities, costs and opportunities related to the flow of mandarin together with increased commercialization in agriculture.

1.3 Objectives of the Research

Based on the questions below, the main objectives of this research are;

- To develop a mandarin value chain map
- To identify the major stakeholders in the mandarin value chain
- To determine the problems, constraints, strength and weakness faced by marketing participants at each level of the value chain for mandarin oranges

1.4 Research Questions

- What is the value chain of mandarin in Myanmar?
- Who are the major stakeholders in the mandarin value chain?
- What are the problems/constraints faced by various stakeholders within the value chain of mandarin?

1.5 Scope of the Study

The overall scope of this study will analyze the value chain of mandarin in selected areas of Myanmar. This study aims at improving the mandarin production along the value chain in selected areas of Myanmar. Due to time and financial resource constraints, the study is limited in its depth and coverage in fully addressing the aforementioned objectives. It will emphasize mainly the mandarin production value chain. The results of the study may have some limitations such as its sample size and therefore may not be generalized and applied to the whole of Myanmar. However, it may be useful for areas with similar contexts with the study area.

2. Review of Literature

This study intended to identify the problems and opportunities of mandarin orange produced in Hsipaw and Larshio districts. Therefore, this chapter deals with a review of the past work done in different aspects of production and marketing of fruits inside and outside of country that are relevant to the study.

2.1 Mandarin Orange

The "Mandarin orange" or mandarin is a small citrus tree (*Citrus reticulate* Blanco) with the fruit resembling the sweet orange (*Citrus sinensis*). However, the fruit is oblate, rather than spherical, and roughly resembles a pumpkin in shape. Mandarin oranges are sometimes grouped as "loose-skinned oranges" because their skins easily slip off the fruit (Herbst, 2001). Their segments are also loose and easily separated.

Mandarin orange (*Citrus reticulate* Blanco) cultivation is one of the major economic activities in the mid-hills (550-1300 m) of the western development region (Lohar, 1995). Mandarin orange cultivation provides nutrition, employment to the people, acts as a source of income and maintains environmental harmony (Gurung, 1993; Tomiyashu*et al*., 1998; Shrestha and Verma, 1999).

2.2 Marketing

Marketing is the performance of all business activities involved in the flow of products and services from the point of initial production until they are in the hands of consumers (Kohls and Uhl, 1985). Marketing is a major function after production. Acharya and Agrawal (1999) stated that production is the door to economic development but it is marketing that opens the lock. Thus, marketing plays an important role in agricultural production. Moreover marketing is the creation of time, place and possession utilities through which human wants are satisfied by the exchange of goods and services.

Horticulture marketing is one of the important branches of agricultural marketing and deals with the marketing of horticultural commodities (fruits, vegetables and flowers). The conventional definition of agricultural marketing states that agricultural marketing starts when the crop is harvested. But, the concept has been changed. Marketing of vegetable products begins at the farm when the farmers plan his production to meet specific demands and market prospects (Awasthi, 2007). Efficient marketing system plays a crucial role in getting the remunerative prices to the producers.

The links in the market chain (production, post-harvest management, marketing, and business development services) are often disjointed in agricultural markets, generating an inefficient

flow of information along the market chain. This lack of marketing information and coordination along the market chain allows some actors to exploit other market chain actors unfairly (Lundy *et al*., 2008). An efficient marketing information system can manage, for timely delivery of product, reduce marketing costs and increase production and productivity and make the market yard healthy and hygienic (Awasti, 2007).

2.3 Gross Margin

The gross margin of any particular crop enterprise is defined as the difference between enterprise gross income and the variable expenses attributable to that enterprise (Dillon and Hardakar, 1993). The estimation of gross margin is essential to obtain economic optimum through maximizing the gross margin (Upton, 1996). The variable expenses used in the calculation of the gross margin may be defined as expenses that vary more or less in direct proportion to the level of the enterprises. The gross margin is usually expressed on a per unit basis, that is, per unit area and/or per unit of production. Gross margin gives an idea about farm planning as it helps decide whether or not to continue existing farm practices or substitute by others.

The scale of production is the most important as all agricultural activities depend on farm size. Farm size tends to effect per unit net return from the enterprise. In comparison to small scale farming large scale farming has advantages like efficient labour division, low overhead cost, economies in buying, selling, better bargaining power and flexible profit making opportunities (Lekhi and Singh, 1996). So a difference in the scale is an important factor to be considered in the study of enterprises.

2.4 Value Chain Analysis

Value chain analysis is a tool that we use to define development opportunities, looking at each distinct step in the life of a product, the actors at each step, how value is added, and how much they earn for that value created (Piper, 2007). It provides a suitable framework to study the impacts of economical, technological and institutional changes through global marketing chains and the distribution of the incidence of those impacts and any gains arising from them between members at different production and marketing stages. A “value chain” denotes all the actions involved in making a product and delivering it to retail and the consumer. It is a

supply chain consisting of the input suppliers, producers, processors and buyers that bring a product from its conception to its end use. It seeks to address the major constraints at each level of the supply chain, rather than focusing on just one group or on one geographical location (Dempsey and Campbell, 2007).

Value chain analysis is based on a comprehensive description of input-output relationships from grower to retailer, and the coordinating mechanisms that guide activities at each stage. It can include deliberation of technical transformations of product, costs, pricing and margins, number and size of firms at each stage, barriers to entry, market power and the sharing of benefits from innovation, product differentiation and diversification (Cruz, 2003).

The value chain explains the full range of activities which are necessary to bring product/service from conception, through the different stages of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use. As can be seen from this, production is only one of a number of value added links. Moreover, there is range of activities within each link of the chain. Although this often is represented as a vertical chain, intra-chain linkages are most often of a two-way nature, for example, specialized design agencies not only influence the nature of the production process and marketing, but are in turn are influenced by the constraints in these downstream links in the chain (Kaplinsky & Morris).

A value chain is a series of related business activities from the provision of specific inputs for a specific product to primary production, transformation, marketing, and up to the final sale of the particular product to consumers (the functional view on a value chain). The set of enterprises (operators) performing these functions, i.e. producers, processors, traders and distributors of a particular product. Enterprises are linked by a series of business transactions in which the product is passed on from primary producers to end consumers. According to the sequence of functions and operators, value chains consist of a series of chain links (or stages). The value chain comprises an economic system organized around a particular commercial product. The coordination of enterprise activities in a value chain is necessary to provide final customers with the right quantity and quality of the product. Enterprises have to collaborate to be successful. The value chain therefore: connects the different yet related business activities (production, transformation, marketing, etc.) necessary for serving customers, and

joins and coordinates the enterprises (primary producers, processing industry, traders, etc.) performing these business activities (GTZ, 2007).

Value chain analysis is the process of chain improvement and value chain promotion. Value chain mapping is drawing a visual representation of the value chain system. Maps identify enterprise functions, chain operators and their linkages, as well as the chain supporters within the value chain. In any value chain, chain maps are the core for analysis and therefore indispensable. Quantifying and explaining value chains in detail includes attaching numbers to the basic chain map, e.g. numbers of actors, the volume of produce or the market shares of particular segments in the chain. Depending on the specific interest, specific chain analyses "zoom in" on any relevant aspect, e.g. characteristics of particular actors, services, or the political, institutional and legal framework conditions enabling or hindering chain development (GTZ, 2007).

Economic analysis of value chains is the evaluation of chain performance in terms of economic efficiency. This contains determining the value added along the stages of the value chain, the cost of production and, to the extent possible, the income of operators. Another aspect is the transaction costs, which are the cost of doing business, collecting information and enforcing contracts. The economic performance of a value chain can be "benchmarked", i.e. the value of important parameters can be compared with those of competing chains in other countries or similar industries (GTZ, 2007).

2.5 Conceptual and Empirical Studies

Joshi, S. R. and Gurung, B.R. analyzed citrus value chain in Bhutan. This study used SWOT analysis. Pokhrel, C. N. (2011) also analyzed market chain of mandarin in Nepal: A case of Lamjung district. This study also used SWOT analysis.

3. Research Methodology

3.1 Study Area

3.1.1 Selection of Study Area

The research was conducted in northern Shan State of Myanmar, which is the highest potential region for mandarin production in terms of area and production of the country. Hsipaw and Larshio were purposively selected for the study. These districts can produce mandarin orange year round. This study focused on the current situation of value chain for mandarin orange. It aims at finding out reasonable solutions for value chain of mandarin from production to market distribution. Data collection was conducted from the production site of mandarin in villages at Hsipaw and Larshio to the city wholesale markets at Mandalay and Yangon.

3.1.2 Hsipaw and Larshio

Hsipaw and Larshio are situated in northern Shan State, Myanmar on the riverbank of the Duthawady River. Hsipaw and Larshio are located at 22^{o} N and 97^{o} E coordinates with an elevation of 836 meters above sea level. It is an important production area for mandarin and pineapple. The main market destination for Hsipaw and Larshio mandarin is Yangon and Mandalay.

3.1.3 Mandalay Wholesale Market

Mandalay is located in the central dry zone of Myanmar by the Ayeyarwady river at 21.98^{o} N, 96.08^{o} E and 64 meters above sea level. Mandalay is the major trading and communication center for northern and central Myanmar. Mandalay market is the focal point of upper Myanmar. It is an important terminal market and also a major transit market. Agricultural produce enters Mandalay City from surrounding States and Regions by road, railway and waterway. Mandalay Thiri Malar market is a wholesale market of fresh produce for upper Myanmar. Mandarinare distributed to Mandalay retail markets and other distant markets such as Kyaukse, Myitha and Myitkyina.

3.1.4 Yangon Wholesale Market

Yangon is located in lower Myanmar at the convergence of the Yangon and Bago Rivers about 30 km away from the Gulf of Martaban at 16^{o} N and 96^{o} E. Yangon is the focal point of internal and external trade and agricultural produce enters Yangon City from surplus producing areas by road, rail and waterway. In Yangon City, there are two main markets: Bayint Naung is the wholesale market for dry goods and Thiri Mingalar market is the wholesale market for fresh produce. Yangon Thiri Mingalar market also has a terminal and transit functions. Mandarin oranges are distributed to Yangon retail markets and other distant markets such as Mawlamyine, Patain and Myawaddy.

3.2 Data Collection

To access the current performance of mandarin wholesale market in Yangon and Mandalay, field survey for primary data collection was undertaken in June 2013. The data collected included the investigation of marketing cost, marketing margin of various stakeholders, marketing channels and constraints, challenges and the possible solutions for mandarin production. Both primary and secondary data were considered in this study. In each market, the number of respondents from the different stakeholders is shown in Table 3.1. For each stratum, personal interviews were implemented with different structured questionnaires.

For this study, 10 mandarin growers and 18 wholesalers were interviewed with different sets of structured questionnaires to obtain a clearer understanding of the current marketing channels of the mandarin sector.

A farmers related questionnaire was used to collect farmer's socio-economic data such as age, education, family size, farm ownership, farm size, mandarin sown area, harvested area, yield, crop production, output prices, labor costs, transportation costs, marketing costs, loans from money lenders, amount of surplus, production cost of mandarin and constraints.

The market related questionnaire was used to collect farm level detailed measures of prices and quantity, purchased and sold system, marketing costs of various stakeholders, storage facilities, transport facilities and access to market information.

Secondary data were taken from published and official records of the Ministry of Agriculture and Irrigation (MOAI), various government organizations, the Food and Agriculture Organization (FAO) and the other related publications.

Table 3.1 Number of respondents in the study area

Market Participants	Number of sample respondents
Growers	10
Wholesalers	18
Total	28

3.3 Data Analysis Methods

Data was collected from the growers, traders and other sources were analyzed using descriptive and econometric models with the help of statistical software packages such as SPSS Version 16.0. The descriptive statistics analysis that were employed used diagrams, charts, percentages, means, variances and standard deviations in examining the mandarin marketing system as well as growers' demographic and socio-economic characteristics as well as the role of traders characteristics.

3.3.1 Cost and Return Analysis

Enterprise budgeting is used in the economic analysis. 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 a 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 area. Both cash and non-cash items were included in the estimation of material and labor cost. Non-cash items for material costs were owned farm assets, owned FYM and so on. Cash payment for labor included hired labor and payment for land preparation.

The first measurement was the difference between the total gross benefits or total returns and total variable cash costs, excluding opportunity costs. This value was referred to as "return

above variable cash cost". The second measurement was the deduction of the opportunity cost and total variable cash costs from gross benefit. This return was referred to as "return above variable costs" or "gross margin".

The return per unit of capital invested could be calculated by gross benefits per total variable costs. The return per unit of cash cost could be calculated by gross benefits per total cash costs.

These measurements could be expressed with questions as:

Measurement (1)
Return above variable cash cost = Total gross benefit – total variable cash cost

Measurement (2)
Return above variable cost = Total gross benefit – total variable cost

Measurement (3)
Return per unit of capital invested = Total gross benefit/Total variable cost

Measurement (4)
Return per unit cash cost = Total gross benefit/Total cash cost

3.3.2 Method of Marketing Cost and Marketing Margin Analysis

3.3.2.1 Methods of marketing margin analysis

When marketing margins at different levels of the marketing chain are compared, it is common to use the consumer price as the common denominator for all margins. The following are some commonly used indicators in the analysis.

(a) Total Gross Marketing Margin (TGMM)

TGMM = (Consumer Price –Grower's Price)/Consumer Price ×100

Margin of wholesaler = (Consumer Price –Wholesaler's Price)/Consumer Price×100

(b) Farmer's Portion of Producer's Gross Marketing Margin (PGMM)
PGMM = (Consumer Price – Marketing Gross Margin)/Consumer Price×100

(c) Gross Marketing Margin= Average Selling price – Average Buying price

(d) Profit= Gross Marketing margin-Total Marketing cost

3.3.2.2 Marketing Margin

Agriculture researchers and economists use the term "marketing margin" to summarize the aggregated costs of moving agricultural goods forward along the successive levels of the farm to the retail marketing margin chain. The marketing margin or the farm to retail -price spread is the difference between farm value and the retail price. It represents payment for all assembling, processing, transporting and retailing charges added to the farm product (Elitzak, 1996).

A marketing margin is the percentage of the final weighted average selling price taken by each of the marketing chain. The total marketing margin is the difference between what the consumer pays and what the producer/farmer receives for his product. In other words, it is the difference between the retail price and the farm price (Cramers and Jensen, 1982).

The total marketing margin may be subdivided into different components; all the cost of marketing service and profit margin or net return. The marketing margin in an imperfect market is likely to be higher than that in a competitive market because of the expected abnormal profit. But the marketing margin can also be high, even in a competitive market due to high real market costs (Worlday, 1994).

An empirical analysis of marketing margins should be first and foremost an economic analysis of the determinants of the farm and retail price for a given commodity. The volume of marketing reflects the efficiency of the marketing system. The higher marketing margin reflects fewer shares of the producer and more benefits to marketing middlemen and vice-versa. The number of middlemen involved in various channels of the marketing has a strong effect on the marketing margin.

3.3.2.3 Marketing Channel

Marketing channels can be defined as the set of external organizations that a firm uses to achieve its distribution objectives. Essentially, a channel is the route, path, or conduit through which products or things of value flow, as they move from the manufacturer to the ultimate user of the product (Stern *et al*., 1996). The marketing channel shows the flow of crops from the production site (producers) to intermediaries and on to the exporters. To understand how the commodities move through the various channels, it is necessary to identify the role of various market places and marketing agents involved.

For most manufacturers, success or failure is determined by how effectively and efficiently their products are sold through their marketing channel members (e.g., agents, wholesalers, distributors, and retailers). Given this situation, considerable marketing channel research has focused on organizational responsibility for managing channels and how interrelationships among a firm and its channel members can be managed better (Achrol and Stern, 1988; Anderson *et al.*, 1997).

4. Results and Discussion

4.1 Mapping the Value Chain

4.1.1 Core Process

The core process of the mandarin value chain was shown in Figure 4.1. The mandarin flow was input providers-farmers-wholesalers-retailers.

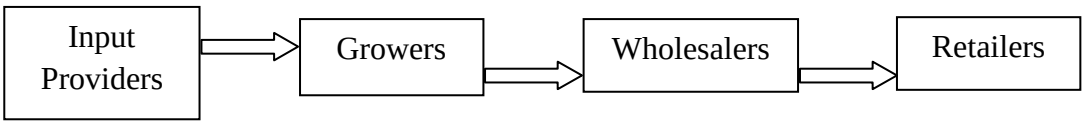

Figure 4.1 Core Process for Mandarin Value Chain in the Study area

4.1.2 Input Providers, Actors and Supporters

4.1.2.1 Input Providers

Growers produce their products using various inputs. Mandarin growers in the study area used the inputs to produce mandarin fruit. Table 4.1 showed the inputs used by mandarin

growers and the input providers. The distance from selected villages to market in Larshio is around 10 miles each. Most of the growers buy inputs from the Seven Tiger Company in Hsipaw and from markets in Larshio by truck and bus. About 100% of the sample growers bought mandarin seedlings from the Seven Tiger Company in Hsipaw. About 100% of the sample growers bought urea from markets in Larshio. About 70% of the sample growers bought compound fertilizers, pesticides and foliar fertilizers from the Seven Tiger Company in Hsipaw followed by markets in Larshio (30%). Growers said that the Seven Tiger Company sold the inputs at a high price for suitable quality of fertilizers and pesticides.

4.1.2.2 Growers and Their Specific Activities

Socioeconomic characteristics of sample growers in the study area were shown in Table 4.2. In the study area, the average age of the sample growers was 45.4 years. The eldest of sample growers was 60 years and the youngest 29 years. Average schooling years of sample growers were 9.9 years. The maximum schooling years of sample growers were 14 years and the minimum schooling year was 1 year.

In the study area, education level of the sample farmers was categorized into five groups. "Monastery education level" referred to informal schooling although they could read and write. "Primary school level" referred to formal schooling up to 5 years; "Secondary school level" was intended as formal schooling up to 9 years and "High school level" referred to the formal schooling up to 11 years. The last "Higher education level" referred to those who are graduates from a college or university. The education level of farmers might be crucial for decision making in their farming system.

From the results of the survey, monastery education and secondary education level were not found. The primary education level was found in 30% of sample growers. High school education level contributed to 40% and was the highest percentage among all education levels. The higher education level was 30%. The education level of the sampled farmers is shown in figure 4.2.

The average farming experience of the sampled farm household heads was 16.5 years. The maximum experience was 35 years and the minimum experience was 3 years.

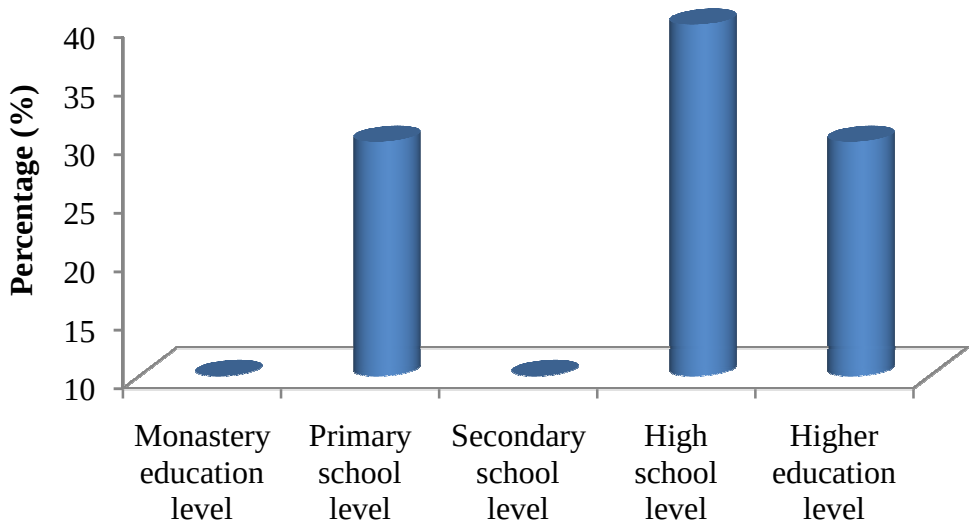

Figure: 4.2 Education Levels of Sample Growers in the Study Area

Source: Field survey (2013)

Table 4.1 Inputs and input providers for mandarin production in the study area

Kinds of Inputs	Buying place	Input providers	Percentage (%)
Seedling (N=10)	Hsipaw	Seven Tiger Company	100
Urea (N=10)	Larshio	Markets	100
Compound fertilizers, pesticides and foliar (N=10)	Hsipaw	Seven Tiger Company	70
	Larshio	Markets	30

Source: Field Survey (2013)

Table 4.2 Socio-economic characteristics of Sample Growers in the Study Area

Items	Measurement	Average	Maximum	Minimum
Household head's Age	Years	45.40	60	29
Schooling years	Years	9.90	14	4
Education Level				
Monastery education	Number		0 (0)	
Primary school level	Number		3 (30)	

Items	Measurement	Average	Maximum	Minimum
Secondary school level	Number		0 (0)	
High school level	Number		4 (40)	
Higher education level	Number		3 (30)	
Farming experience	Years	16.5	35	3

Source: Field survey (2013)
Note: Figure in the parentheses represents percentage.

4.1.2.3 Cost and Return Analysis for Mandarin Production

The enterprise budget for mandarin production of the sample growers was presented in Table 4.3 and the cost and benefit for mandarin production can be found in Table 4.4. It was found that the sample growers expended a total variable cost 53,388,484 kyat/ha. Average yield obtained by the sampled farmers was 44,676 kilogram per hectare. The average price of mandarin was 1,200 kyats per kilogram. Therefore, the total gross benefit for sample growers was 53,611,200 kyats per hectare.

Total material cost was 44,405,008 kyats per hectare. Total family labor cost was 35,888 kyats per hectare. Expenses for hired labor cost were 55,489 kyats per hectare for the sampled farm households. The total interest cost on cash cost by the sampled farm households amounted to 8,892,099kyats per hectare. Return above variable cash cost (RAVCC) was 290,865 kyats per hectare and the return above variable cost (RAVC) for sampled farm households was about 254,977 kyats per hectare. Hence, the benefit-cost ratio for mandarin production was 1. Therefore it can be concluded that the sample growers received a profit of 10 kyats if they invested 100 kyats in mandarin production.

The break even yield can be calculated by dividing the total variable cost by average price per kilogram. The breakeven yield of mandarin production was 44,490kg/ha. It can be said that if the sampled growers produced 44,490 kilogram per hectare they covered their total variable cost. The breakeven price can also be calculated by dividing the total variable cost by the average yield per hectare. The breakeven price of mandarin production was 1,200 kyats per kilogram. It can be concluded that the total variable costs for mandarin production were covered if the sampled farmers received 1,200 kyats per kilogram from selling mandarin.

4.1.2.4 Selling Method and Mode of Transportation of the Sample Growers

There are a few market participants in the mandarin marketing channel in the study area. First, 100 percent of the mandarin directly flows from farmers to wholesalers. In the study area, as shown in Table 4.5, all of sampled growers sell directly to wholesalers because of the convenient road infrastructure. The mandarin marketing channel starts from farmers to wholesalers.

The mode of transport used by the sampled farmers was shown as a percentage in Table 4.6. The most convenient system for transportation was by truck. About 70% of sampled farmers transported their mandarin by truck and 30% of sampled growers transported their fruits by highway bus.

Table 4.3 Enterprise budget of mandarin production (per ha basis) (n=10)

Item	Unit	Level	Effective Price (kyats/unit)	Total Value
1.Gross Benefit				
Yield of mandarin	Kg/ha	44676	1,200	53,611,200
Total gross benefit	Kyat/ha			**53,611,200**
2. Variable Cost				
(a) Material Cost				
Seedling	Plt/ha	524	250	131,000
FYM	Ton/ha	8	25,900	207,200
Compound	Kg/ha	1285	631	810,835
Fuel	Ton/ha	47	918,750	43,181,250
Pesticide	Liter/ha	8.4	3,600	30,245
Foliar fertilizer	Liter/ha	7.41	6,000	44,478
Total Material Cost(a)	Kyat/ha			**44,405,008**
(b)Family Labor Cost				
Trimming trees	Md/ha	3	2,400	7,200
Fertilizing	Md/ha	2.471	2,750	6,795
Spraying	Md/ha	2.471	2,200	5,436
Watering	Md/ha	2.471	2,250	5,560
Harvesting	Md/ha	5.1891	2,100	10,897

Item	Unit	Level	Effective Price (kyats/unit)	Total Value
Total family labor cost(b)	Kyat/ha			**35,888**
(c) Hired Labor Cost				
Clearing weeds	Md/ha	3	1,820	5,397
Trimming trees	Md/ha	4	2,150	9,568
Fertilizing	Md/ha	5	2,300	11,367
Spraying	Md/ha	2	2,400	5,930
Harvesting	Md/ha	12	2,000	23,227
Total Hired Labor Cost	Kyat/ha			**55,489**
(d) Interest on cash cost				
Material cost	Kyat/ha	44405008.00	0.2	8,881,002
Hired labor cost	Kyat/ha	55489	0.2	11,098
Interest on cash cost	Kyat/ha			**8,892,099.40**

Source: Field survey (2013)

Table 4.4 Cost and benefit of mandarin production for sampled growers

Items	Units	Value
Average yield	Kg/ha	44,676
Average product price	Ks/kg	1,200
Total Gross Benefits (GB)	**Ks/ha**	**53491,200**
Total Material Cost	Ks/ha	44405008
Total Family labor Cost	Ks/ha	35888
Total Hired labor Cost	Ks/ha	55489
Total Interest Cost	Ks/ha	8892099.40
Total Variable Cost (TVC)	**Ks/ha**	**53388484**
Total Variable Cash Cost (TVCC)	**Ks/ha**	**53352596**
Return above cash cost (GB-TVCC)	Ks/ha	290865.16
Return above variable cost (GB-TVC)	Ks/ha	254976.85
Return per unit of cash expensed (GB/TVCC)	Ks/ha	1.01
Return per unit of capital invested (GB/TVC)	Ks/ha	1.0
Breakeven yield (TVC/price per unit)	kg/ha	44490.40
Breakeven price (TVC/yield per unit)	Ks/kg	1200

Source: Field survey (2013)

Table 4.5 Selling method of sampled farmers

Main buyers of mandarin	Mandalay	Yangon
Town wholesalers	**60%**	**40%**

Source: Field survey (2013)

Table 4.6 Mode of transportation of sampled farmers Yangon

Mode of transport	Mandalay	Yangon
By Truck	**100%**	**70%**
By Highway Bus		**30%**

Source: Field survey (2013)

4.1.2.5 General Characteristics and Marketing Activities of Wholesalers

Age, experience and education levels of wholesalers were shown in Table 4.7 and marketing activities were presented in Table 4.8. In the oilseed crop marketing channel, the wholesaler plays a key role–in the distribution of crops from growers to retailers and consumers. In Mandalay and Yangon, the town wholesalers are the main intermediaries from whom the growers can inquire on the price information. They also have the connection with other town wholesalers and retailers who inform them about the buying and selling prices.

In general, the average age of wholesalers in Mandalay was 46.5 years, ranging from 40 years to 51 years, their experience ranged from 20-30 years. In Yangon, the average age of wholesalers was 46.64 years, ranging from 37 to 52 years with experience ranging from 15-30 years. The education level of wholesalers in Mandalay and Yangon were high as half of them completed some high school levels. In Mandalay, 25% of wholesalers were at the primary level with other 25% at the graduate level. For the Yangon wholesalers, 7% were in the primary level, 7% in Secondary level and 36% in the graduate levels, respectively. All (100%) of the wholesalers employed a cash down system. Most of wholesalers used the cash down system in purchasing of mandarin. (Selling type of wholesalers was found as cash down system). A hundred percent of the wholesalers sold their mandarin receiving half of the cash down and credit system. All of the wholesalers used trucks in the transportation of their crops as shown in Table 4.8.

Table 4.7 Age, experience and education level of wholesalers

Characters	Mandalay wholesalers (n=4)	Yangon wholesalers (n=14)
Age (years)		
Mean	46.5	46.64
Standard Deviation	4.65	4.50
Range	40-51	37-52
Experience (years)		
Mean	25.7	21.93
Standard Deviation	6.75	4.68
Range	20-30	15-30
Education Level (%)		
Monastery	0%	0%
Primary level	25%	7%
Secondary level	0%	7%
High School level	50%	50%
Graduate level	25%	36%

Source: Field survey (2013)

Table 4.8 Marketing activities of wholesalers

Activities	Mandalay Wholesalers (n=4)	Yangon wholesalers (n=14)
Type of purchasing		
Use cash down system	4 (100)%	14 (100)%
Type of selling		
Received half of the cash down and credit	4 (100)%	14 (100)%
Mode of transport		
By truck	4 (100%)	14 (100)%

Source: Field survey (2013)

4.1.2.6 Credit Providers (Supporters)

Availability of credit for sampled growers was shown in Table 4.9. There were two credit sources available for growers in the study area. The credit received from all sources was for producing all rain-fed crops and for household expenses. The sampled growers borrowed money from the MADB with an average amount of 100,000 kyats per year (9.29% of the total credit amount), with an average interest rate of 1.5%. The average amount of 860,000 kyats (90% of the total credit amount) was borrowed from private money lenders such as shopkeepers in the villages, broker-men and crop traders with an average interest rate of 3.8%. Farmers usually borrow cash to purchase inputs for mandarin production such as chemical fertilizer, pesticides and fuel in their village.

Table 4.9 Situation for credit availability of sampled farmers in the study area

Sources of credit	Amount of credit (Kyat)	Percentage	Interest rate (Kyat per month)
MADB	100,000	10	1.5
Private money lender	860,000	90	3.8
Total	960,000	100	

Source: Field survey (2013)

4.1.3 Knowledge and Information Flow

The Seven Tigers Company is responsible for disseminating information on technical progress to growers, providing training on crop management and conducting agricultural development programs for hybrid varieties and others. Growers were asked whether they have received extension services on mandarin production in the study area. All of the sampled growers answered that access to government extension service is absent. However, agricultural information was received through private agro-chemical (fertilizers, pesticides, foliar, plant growth hormone, etc.) dealers and marketing agents. The pesticide and fertilizer company staff used to come to the villages once or twice within a crop season to hold pesticide and fertilizer market promotion meetings in the villages.

4.1.4 Relationship and Linkages

A relationship is defined as a social connection between two parties. Linkages are defined as a business relationship between two parties of a value chain/network. Trust is the social capital formed between two parties enabling a more efficient linkage through the reduction of transaction costs. Mandarin growers in the study area communicate with the wholesalers who live in Mandalay and Yangon Town. Trust is important between growers and wholesalers. Wholesalers in Mandalay have linkages with Mgaway, Nay Pyi Taw, Sagaing, Rakhine and Kachin wholesalers. Also, wholesalers in Yangon have linkages with Ayeyarwaddy, Mon, Kayin, Tanintaryi and Bago wholesalers. Wholesalers in Mandalay and Yangon build agreements with growers at a particular price and at a particular period of time. Therefore trust is the important role among the actors along the value chain.

Mandarin Marketing Channel in Upper Myanmar

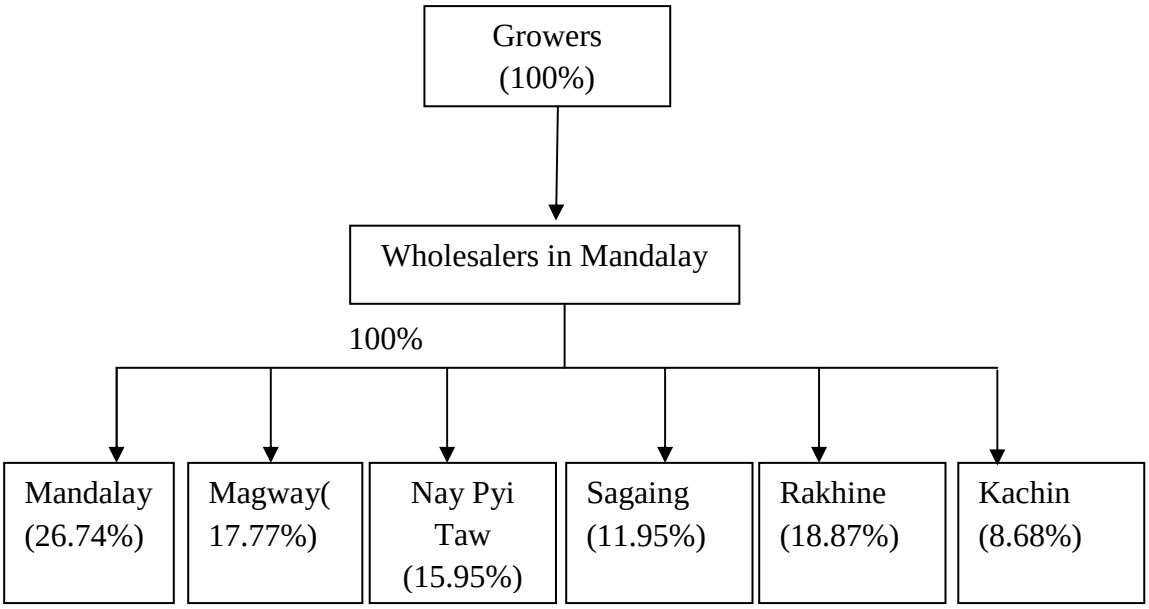

Figure: 4.3 Mandarin Marketing Channel in Upper Myanmar

Mandarin Marketing Channel in Lower Myanmar

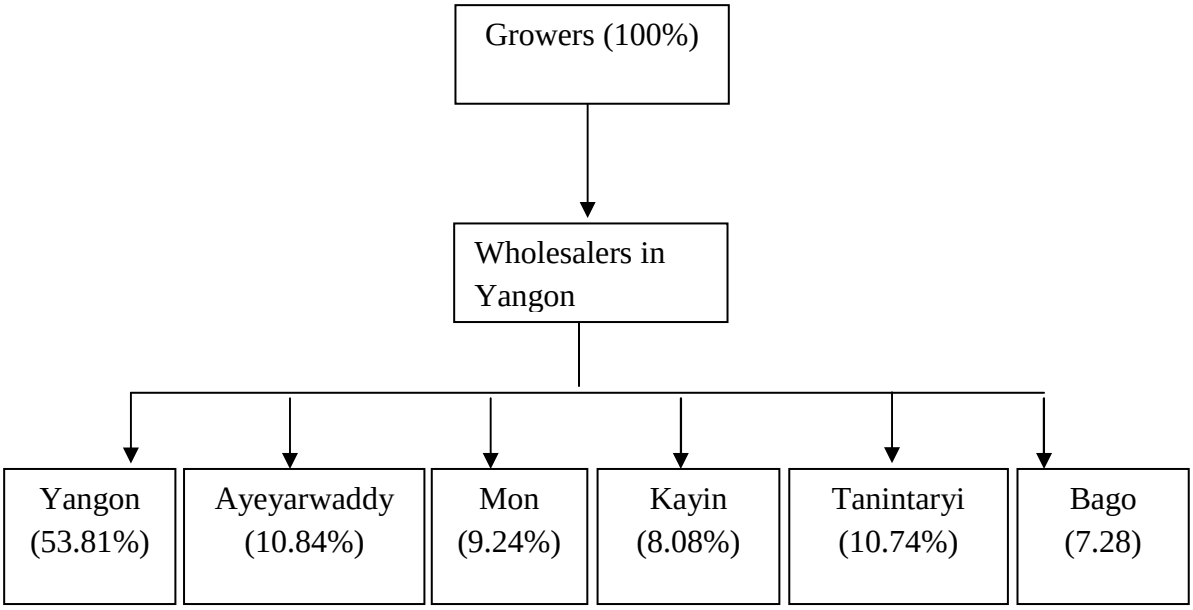

Figure: 4.4 Mandarin Marketing Channel in Lower Myanmar

4.2 Analysis of the Value Chain

4.2.1 Grading

Most of the growers in the research area sold their mandarin to the wholesalers and village retailers after harvesting. Growers practice the grading system; they graded the mandarin by category, i.e. big, medium and small. Wholesalers also graded the mandarin into four groups i.e. extra big, big, medium and small.

4.2.2 Packaging

Packaging is most important for maintaining the quality of mandarin. All growers and wholesalers were using plastic crates, wooden boxes and paper boxes for packaging of mandarin in the study area. Plastic crates and paper boxes were expensive but reduced the losses during handling (loading, unloading and transportation).

4.2.3 Transportation

There were no specialized refrigerated vehicles for the transportation of fruits and vegetables in Myanmar. Most fruits and vegetables were transported from the production area to markets mainly on trucks and bus. In the research area most of the growers were selling their mandarin directly to the wholesalers. Wholesalers were also found using trucks and sometimes highway bus for the transportation of mandarins from the study area.

4.2.4 Marketing Problem

Marketing plays an important role for the easy disposal of the product from producer and ultimately to the consumer. Due to a low storage life under ordinary conditions, an easy and safe disposal of the commodity after harvesting is important. According to the farmer's perception on the specific marketing problems, a problem ranking was done. Lack of market information, unorganized marketing, high transportation cost and lack of storage facilities were the top four marketing problems in Myanmar. Kandel (2007) has also identified a lack of market information, unorganized marketing, high transportation cost, and lack of storage facilities as constraints in marketing of guava in Tanahun. Likewise, Kafle and Rana (2003) also found that a lack of market information, lack of farmers' networks and lack of collection centers and market places as marketing problems of citrus in Gorkha district. Shrestha (2009) states that collective marketing is the best way of marketing which has strong bargaining power on price determination and increase profits from the enterprise to the small holder farmer.

4.2.5 Respondents' Suggestion to Improve the Production and Market Chain

To address the problems faced in production and marketing respondents were asked to provide suggestions to solving these issues.. Almost all farmers (100%) suggested providing good cultivation knowledge, pest and disease management. About 60% of the farmers suggested facilitation in forming producer organization/cooperatives and 30 % suggested easy access to credit with low interest rates because some growers were taking loans from neighbors at high interest rates (as high as 20 %) and 10 % suggested timely availability of inputs. Likewise, all (100 %) farmers suggested the need for technical assistance in the mandarin growing areas to minimize production problems. Furthermore, respondents were

also asked to provide suggestions in solving marketing problems. Here 90 % of farmers suggested providing marketing information to mandarin farmers through local FM radios and establishing a notice board providing daily marketing information at the time of mandarin harvesting in the centre of the district as well as provision of storage facilities during peak harvesting season for 2-3 months. About 50% of farmers suggested facilitation of marketing as a group would be a better option, 50 % farmers suggested the need for providing processing knowledge through any concerned governmental or non-governmental organization.

4.3 SWOT Analysis

Mandarin production and marketing sector in Myanmar has the following strength, weakness, opportunity and threats.

Internal factor	**External factor**
Strength	**Opportunity**
▪ Availability of highly suitable climatic condition for mandarin production. ▪ Good image (reputation) of mandarin in the market of that location due to good taste. ▪ Government's different plan and policies has prioritized mandarin as a high value crop in the hill farming system. Its aim is to increase the production and productivity of mandarin. ▪ Income generating business for poor marginalized people. ▪ Produced mandarin is sold in most urban areas of the country.	▪ High demand of that region's mandarin in Myanmar. ▪ Better export potential to other countries. ▪ Diversified climate. ▪ Utilization and conservation of sloppy land. ▪ Employment opportunity. ▪ Government of Myanmar is emphasizing commercial cultivation of mandarin orange.

Weakness	Threat
▪ Use of low quality input. ▪ Poor transportation facility. ▪ Lack of storage and processing facility. ▪ Lack of technical know-how. ▪ Very limited research on mandarin sectors. ▪ High postharvest losses. ▪ Lack of collection centre	▪ Incidence of citrus decline ▪ Attack of many insects. ▪ Political instability. ▪ Lack of coordination between production and marketing. ▪ High consumption markets are far away, farmers not satisfied with the price they receive. ▪ Farmers have inadequate information on marketing of oranges. ▪ The orchard selling on a contractual system not good due to a low price offered by contractor and sometimes uncertainty of payment.

5. Conclusions and Recommendation

5.1 Conclusions

Hsipaw and Larshio districts are the potential production areas of mandarin orange due to soil and climatic conditions and to some extent road links. About 100 % of the production was found to reach consumers through wholesalers and retailers. More commonly used materials for packaging mandarin were plastic crates, wooden boxes and paper boxes. Means of transportation was by truck and bus.

From the study it was found that growers and wholesalers were the main actors of the marketing system. Growers were involved in harvesting, collecting, packaging, transporting and selling of the mandarin. Gross margin analysis showed that mandarin orange cultivation was profitable and the best option for small holder farmers. Information sharing among the traders was per kg price, quantity and time of delivery. Means of marketing information was

mostly from neighbors for grower and telephone call for other traders. In conclusion, there was no fair information sharing among the chain actors.

Growers were found to be faced with several productions and marketing problems. The major production problems were a lack of irrigation facilities, disease, insects, lack of technical knowledge, and high price of inputs. Major marketing problems were market information, unorganized marketing and high transportation costs.

From the research, it was found that mandarin orange cultivation was found to be a significant source of household income? To achieve more income through mandarin business, mandarin growers should unite as a producer organization and should start a group approach of mandarin marketing directly with wholesalers by omitting pre-harvest contractors in the chain. The group approach of marketing can provide more benefits to the growers by reducing the profit taken by pre-harvest contractors as well as reducing the price to consumers.

5.2 Recommendations

Based on the findings of this study, the following actions are proposed for consideration by the Government of Myanmar:

1. Myanmar oranges are available for 3 months of the year (i.e., 15th of November to 15th of February) in the market. During peak harvesting season the price of mandarin gets low; whereas after February the mandarin market is covered by Chinese mandarin which cost more but of poorer taste compared to Myanmar mandarins. Therefore to fetch a good price of mandarin there should be a facility for storage where oranges can be stored in cellar stores for at least 3 months. So that, for the storage of mandarin, a low cost cellar facility should be constructed at farmer fields as a demonstration. Growers can then adopt this technology by making similar cellar store themselves.
2. Growers in this area lack market information, which could improve their knowledge in bargaining with traders on prices of their commodities. There is a need to strengthen the market information services by broadcasting daily rates of mandarin in

different markets through Local FM radio and establishing a price notice board in a central location.

3. Production and plant protection training to grower is as essential technology transfer for meeting their practical needs of increasing productivity and quality of mandarin.
4. A producer's organization/ cooperative should be formed for marketing of mandarin fruits. The advantage of cooperative marketing includes: economies of scale, through joint purchasing of inputs and joint marketing of products, collective bargaining power, lower transaction cost (for growers and traders) and improved access to finance where credit organizations favors group loans. The main objectives of the cooperative marketing are to ensure remunerative prices to the producers and reduce the cost of marketing and monopoly of the traders.
5. Due to a lack of knowledge about the variety of seeds (high yielding, early and late variety), most of the growers were growing local variety. Therefore information about high-yielding and locally adaptable varieties should also be provided.

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