

Analysis of market chain of mandarin in Nepal: A case of Lamjung district



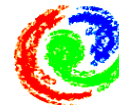
**A Research Project Submitted to
Van Hall Larenstein University of Applied Sciences
in Partial Fulfilment of the Requirements for
the Degree of Master in Agriculture Production Chain Management
Specialization “Horticulture Chain”,**

**By
Chet Nath Pokhrel**

September, 2011

**Wageningen
The Netherlands**

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Analysis of market chain of mandarin in Nepal: A case of Lamjung district

Supervisor

Koen Janssen

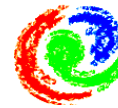
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**Master's Degree in Agriculture Production Chain Management
Specialization "Horticulture Chain"**

**Van Hall Larenstein University of Applied Sciences
Wageningen, The Netherlands**

September, 2011



LIST OF ABBREVIATION

| | |
|--------|---|
| AD | Anno Domini |
| ADB | Agriculture Development Bank |
| APP | Agriculture Perspective Plan |
| APROSC | Agriculture Project Service Services Centre |
| BS | Bikram Sanbat |
| DADO | District Agriculture Development Office |
| DCRDC | Dhaulagiri Community Resources Development Center |
| GDP | Gross Domestic Product |
| GM | Gross Margin |
| GR | Gross Revenue |
| HHs | Households |
| MDD | Market Development Division |
| MM | Marketing margin |
| MF | Micro-finance |
| Mt | Metric ton |
| MOAC | Ministry of Agriculture and Cooperatives |
| NRs | Nepalese Rupees |
| SMS | Subject Matter Specialist |
| VDCs | Village Development Committees |

EQUIVALENTS

CURRENCY

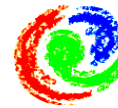
1 Euro (€) ≈ 100 Nepalese Rupees

AREA

| | |
|-----------|------------------------|
| 1 hectare | = 30 kattha |
| | = 19.66 Ropani |
| 1 ropani | = 508.5 m ² |

WEIGHT

| | |
|--------------|------------------------|
| 1 Metric ton | = 10 quintal = 1000 Kg |
|--------------|------------------------|



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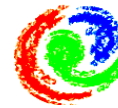
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ACKNOWLEDGEMENT

I am very much grateful to the Royal Government of the Netherlands through the Netherland Scholarship program (NUFFIC) for making this Professional Master possible.

First of all, I would like to express my deep sense of gratitude to my supervisor Mr. Koen Janssen for his valuable suggestion and critical comments during the preparation of this report and Tracey Campbell, Horticulture Chain Course Coordinator, Who had been very supportive and accommodating during the entire period of master course. I wish to express my sincere thank to Mr. Marco Verschuur for providing valuable knowledge on value chain analysis which support me in preparation of my thesis. Likewise my sincere thank goes to all the Larenstein teachers, staffs and class fellow who assisted to make my stay pleasure here in Wageningen.

I am foremost grateful to mandarin orange producer of Chitti and Udipur VDC and traders of Bensishawar, Narayangard and Kathmandu markets for providing reliable information as friendly environment. I am equally grateful with DADO staffs Lamjung, DCRDC Baglung for their cooperation and support.

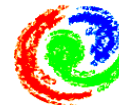
My special thanks goes to Dr. Gopi Krishna Sedhain, Dr. Krishna Prasad Devkota, Mr Gautam Shrestha, Mr Nagendra Bastakoti, Mr Sagar Dhakal, Mr Gokul Paudel and brother Mr Madhav Pokhrel for their good will and co-operation.

I would like to express my special heartfelt gratitude to my respected parents Mr. Hari Prasad Pokhrel and Mrs. Subhadra Pokhrel for their never-ending support and love.

Last but not the least; my sincere love is to my beloved wife Maya and sons Abiral and Amit for encouragement, support, patience, love and inspiration during my whole study.

September, 2011

Wageningen, The Netherland



GLOSSARY

| | |
|------------|--|
| Bari land: | Unirrigated upland |
| Brahmin: | Sacred caste in Hindu religion, Aryan by origin |
| Chhetri : | Middle cast group, Aryan origin |
| Dallit: | Socially deprived caste groups in Nepal mainly as, Kami (B.K.), Damai and Sarki (Nepali), Aryan origin |
| Dashain: | National festival celebrated by Hindu in honor of goddess Durga the deity of Power falls in the month of mid Sept. to mid Oct. |
| Doko: | Locally woven bamboo baskets, cone shaped designed to carry on the back, Popular in hilly region. |
| Khet: | Irrigated land |

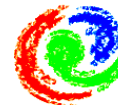
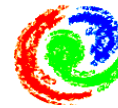
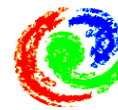


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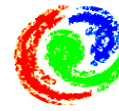
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ABSTRACT

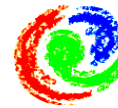
Mandarin orange (*Citrus reticulata*) is one of the most important fruit in mid hill of Nepal. It occupies 1st rank among the citrus fruits in term of area and production. The study was carried out to analyze the market chain of mandarin orange in Lamjung district of Nepal in 2011. Mainly, this study was proposed to identify the production area and productivity of mandarin, cost of cultivation, marketing channels, gross margins, value share and situation of information flow among the chain actors and also to find out the production and marketing constraints of mandarin orange by analyzing the mandarin market chain. For this purpose purposive selection of two village development committee of Lamjung namely Udipur and Chitti were done based on the production situation. From these two VDCs 20 samples from each were taken by using simple random sampling techniques. Similarly, two pre-harvest contractors, four wholesalers (two from Narayangard and two wholesaler from Kalimati fruit and vegetables wholesale market), six retailers (two from Bensishahar, two from Narayangard and two from Kathmandu) were purposively selected. Primary data were collected through questionnaire survey and checklist and other relevant information was taken from the secondary sources.

The average land under mandarin orange cultivation was 0.26 hectare in Chitti and 0.24 hectare in Udipur VDC, respectively. The productivity of mandarin was higher in Chitti (15 Mt/ha.) than Udipur (9.5 Mt/ha.) due to more use of manure as well as suitable climate and fertile soil.

The average cost of production per hectare in Chitti was found more than Udipur and the average return per hectare and benefit cost ratio was also higher in Chitti. The overall gross margin per hectare was Rs 196,812 in Chitti and Rs 166,580 in Udipur. Income from mandarin was found significant source in household economy. We found that female farmers were getting more income than male from mandarin farming. The marketing system study showed that the pre-harvest contract was the most common marketing pattern. Four marketing channels were identified. Producers- pre-harvest contractors- wholesalers- retailers- consumers, second is producers-wholesalers- retailers- consumers, third is producers- retailers- consumers and the fourth is producers- consumers. Among these four channels, first one was the most common where ninety percent mandarin passes through this channel. The marketing margin was found Rs 32.9 per kg. The farm gate price of the mandarin was 22.30 per kg and the consumer price was 55.20 per kg which is more than twice of farm gate price. The producers share in the study area was 40 percent which was high among chain actors.

Information sharing among the actors was found very limited and the means of market information was neighbours for most respondent farmers and telephone call for traders. From the study we found that farmers were facing several constraints of productions and marketing. The major production constraints were lack of irrigation facility, diseases, insect, and lack of technical knowledge, high price of input, lack of credit facility. Likewise, in marketing constraints faced by farmers were lack of market information, unorganized marketing, high transportation cost, low price offered by traders and lack of storage facilities.

The study showed that mandarin farming is a profitable and potential business in the study area. We can conclude that, there is an immense need of facilitators (NGOs and other agencies) to increase productivity, improve the quality production system and marketing through cooperative society for efficient marketing.



CHAPTER 1: INTRODUCTION

1.1 Background

The research was conducted in one of the most important mandarin producing area of Nepal, i.e. Lamjung district where two Village Development Committees (VDCs i.e. Chitti and Udipur) were selected as a research area. More detail of the study area and the reason of selecting these two VDCs have been describe in chapter three. This section deals with Nepal and its agro-ecological region of Nepalese agriculture, importance of fruits in Nepalese economy and brief overview of mandarin/citrus in the Nepalese economy.

1.1.1 A short glimpse about Nepal

Nepal is a small landlocked country situated in between two big countries china in the north and India in the south, west and east. The total area of the country is 147,181 square kilometre and lies between 26° 22' and 30° 27' north latitude and 80° 4' and 88° 22' east longitude. Despite its size, it has large geo-climate variation ranging from the tropical to alpine climate. The country is administratively classified into five development regions, fourteen zones and seventy five districts. VDCs, Municipalities, sub-metro-politan and metro-politans are the lower administrative units in the districts. Currently, there are thirty nine hundred and fifteen VDCs, fifty three Municipalities, four sub-metropolitans and one metropolitan in the country. The country is divided into three parallel ecological zones running from east to west, the Terai, the Hills and the Mountains. These zones differ greatly from one another in topography, climate and population density. The Terai belt consists of about 23 % of the total land, hill consists of 42 % and mountain areas consist of 35 % of the total area respectively (CBS, 2009).

1.1.2 Agriculture sector in Nepal

Agriculture is the most prioritized sectors of the national economy of Nepal. It contributes about 38 % of Gross Domestic Product (GDP) and about 66 % of the economically active population involved in this sector. Among the total land, 3.1 million ha of land is cultivated and 1.2 million ha of land has access to the irrigation facility (AICC, 2011/12). Several planned and unplanned programs have been launched to increase production and productivity of agriculture crops but potential agriculture and economic growth has not been yet achieved (Regmi, 1999) and after the 1990, the share of agriculture to GDP is in declining trend, which can be seen in figure-1. There is urgent need of commercialization in agriculture through the market oriented production plan according to the geophysical situation of the country.

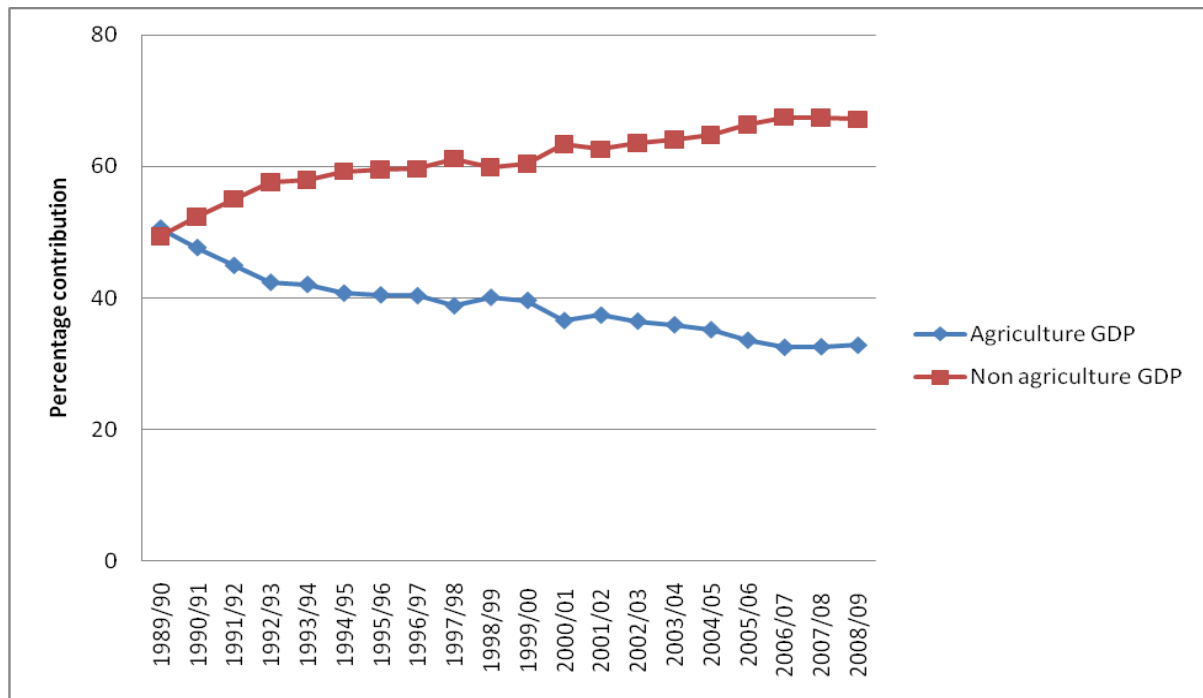
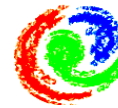


Figure 1. Gross Domestic Products contribution by sector in different year

Source: MOAC, 2010

1.1.3 Fruits in Nepalese agriculture

Fruits contribute about 7 % of total Agriculture Gross Domestic Product (AGDP, MOAC, 2010). The major fruits grown in Nepal are mango, banana, papaya, guava, litchi in tropical climate, citrus, peach and pear in sub-tropical climate and apple, walnut in temperate climate. The area under fruits in Nepal is increasing day by day but the productivity is not increased, the production is increased due to increase in area. Figure-2 shows the total area, productive area, production and productivity of fruits in different years in Nepal.

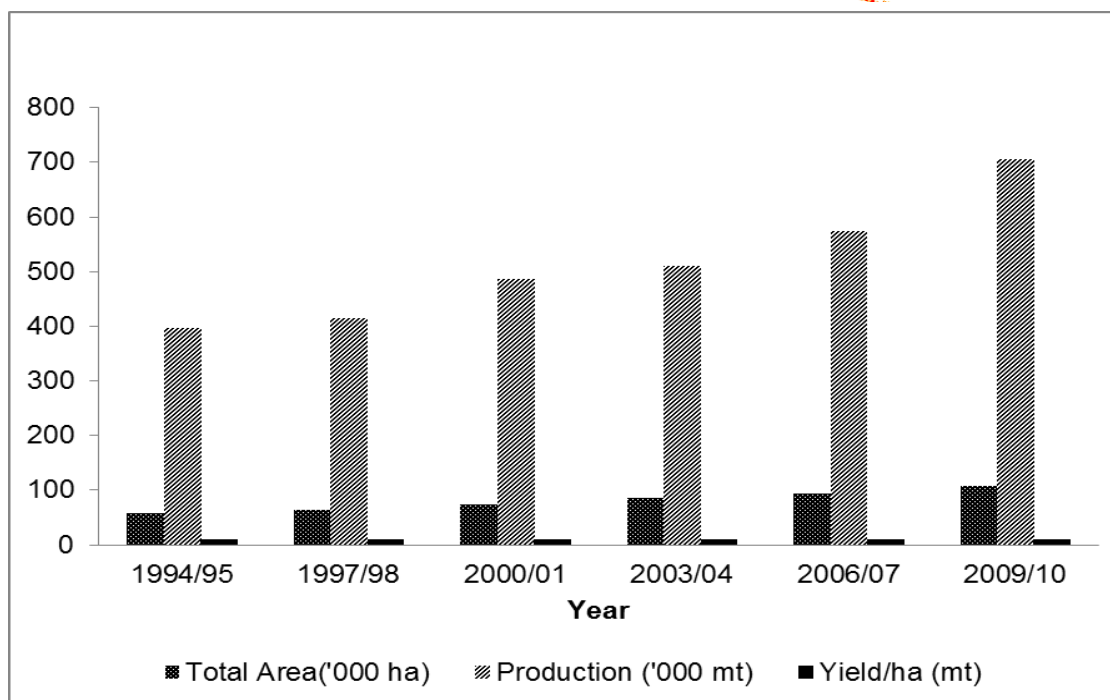


Figure 2. Area, production and productivity of fruits in Nepal

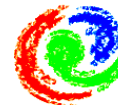
Source: MOAC (2010)

1.1.4 Citrus in Nepalese agriculture

The term citrus fruit covers large range of fruits of family Rutaceae including mandarin orange (*Citrus reticulata*). Citrus fruits are cultivated all over the world in tropical and sub-tropical region where there are suitable soil and climatic condition. In Nepal, the climatic condition of mid-hill regions having altitude range of 800m to 1400 m from east to west of the country are considered favourable for all types of citrus fruit cultivation. Pumilo, acid lime and lemon can also be cultivated successfully in up-land condition of Terai; inner Terai, foothills and river basin region of Nepal. The three most important species on citriculture in Nepal are mandarin (*Citrus reticulata*), sweet orange (*Citrus sinensis*) and Acid lime (*Citrus aurantifolia*). Among them mandarin takes 1st rank, sweet orange 2nd rank and Acid lime 3rd rank in term of area coverage and production. Citrus crops are potential exportable commodity particularly to India, Bangladesh and China. The history of citrus fruit cultivation in Nepal is not well documented but the description of fruits in old scriptures about their importance in religious ceremonies and medicinal values indicates that citrus farming must have been traditional practices since ancient period. But commercial cultivation of citrus in Nepal started only after 1970 (NCRP, 2010).

At present major citrus producing district of Nepal are Ilam, Panchthar, Terathum, Dhankuta, Bhojpur, Sindhuli, Ramechap, Kavre, Dhanding, Gorkha, Lamjung, Tanahun, Kaski, Shayanja, Gulmi, Arghakhanchi, Dailakh, Dadeldhura, Baitadi and Darchula.

Since last ten years area and production of citrus fruits has increased by more than 2 folds whereas increase in productivity is very slow. The productivity of citrus fruits in Nepal is very low (10.8 Mt/ha) as compared to 20-50 Mt/ha in most citrus growing countries of the world. Thus the increase in total production of citrus in Nepal is primarily attributed to the increase in area under cultivation. So there is enormous scope of increasing productivity of citrus fruits crops in Nepal, which can be achieved by utilizing better varieties along with improved orchard management practices (NCRP, 2010).



In mid- hills, citrus is one of the dominating fruits and grown across the country in marginal land and terraces. It has occupied an important place in national horticulture sector. About 34 thousand ha of land is covered by citrus, which accounts about 32 % of the total fruit area of the country (MOAC, 2009/10). Therefore citrus based farming system could be one of the possible options for mid-hills for commercialization. It is the major prioritized fruit crop for commercialization in the hilly areas (APROSC, 1995).

The expected growth rate in the promotion of production of mandarin orange, as targeted by Agriculture Perspective Plan (APP) is still insignificant due to several technological constraints. Although various plans and policies like national agriculture policy 2004 and Agribusiness promotion policy, 2007 have been implemented to increase production and productivity, through the development of commercial agriculture, their efficiency is still below the target level in the sector of mandarin orange.

Citrus accounts about 25 % of the total fruit production and is expanding due to favourable government policy, suitable climate and market demand but it is still challenging due to wrong and traditional management practice (Kaini, 2004).

APP has targeted to increase the citrus production area by 130 % by the year 2015. For this, it is necessary to develop efficient production and marketing mechanism which provides good incentive for the farmers of mid-hill areas. Citrus cultivation is economically sustainable farming system in the mid-hills of Nepal. Citrus cultivation is profitable with the economic internal rate of return of about 29 % (APROSC, 1989).



Table 1. Total area production and productivity of citrus fruits in Nepal

| Year | Total Area(ha) | Productive Area (ha) | Production (Mt) | Yield/ha (Mt) |
|---------|----------------|----------------------|-----------------|---------------|
| 1993/94 | 13544 | 7899 | 76471 | 9.68 |
| 1994/95 | 14629 | 8488 | 83375 | 9.82 |
| 1995/96 | 15244 | 8977 | 88635 | 9.87 |
| 1996/97 | 15924 | 9330 | 92994 | 9.97 |
| 1997/98 | 17026 | 10034 | 100352 | 10 |
| 1998/99 | 18007 | 10592 | 107250 | 10.13 |
| 1999/00 | 19018 | 11277 | 115067 | 10.2 |
| 2000/01 | 20673 | 11892 | 121665 | 10.23 |
| 2001/02 | 22423 | 12615 | 130928 | 10.38 |
| 2002/03 | 23663 | 13312 | 139110 | 10.45 |
| 2003/04 | 24799 | 13931 | 148010 | 10.62 |
| 2004/05 | 25910 | 14606 | 156956 | 10.75 |
| 2005/06 | 26681 | 15206 | 164075 | 10.79 |
| 2006/07 | 27980 | 15832 | 171875 | 10.86 |
| 2007/08 | 30790 | 19915 | 226404 | 11.37 |
| 2008/09 | 32322 | 22482 | 253766 | 11.29 |
| 2009/10 | 33898 | 22903 | 259191 | 11.3 |

Source: MOAC (2010)

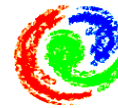
1.2 Problem statement

“Marketing of horticultural crops in general and fruits and vegetables in particular, is more complex and risky unlike cereal because of the special characteristic like highly perishable nature, seasonality, bulkiness and needs special care and immediate disposal”(Gandhi and Namboodiri, 2002). As a result, the supply of fruits and vegetables is subjected to various problems including wide fluctuating in prices.

The government of Nepal has emphasized the commercialization of fruit and vegetable in each fifth year plan. In spite of the great potential of production in the mid-hill region of the country and continuous effort from the government, citrus farmers are facing problems such as poor marketing infrastructures like market information, physical facilities, marketing extension services, price uncertainty and small scale of production. Furthermore, farmers are not organized. “Due to poor or no access to information on market price of their products to farmer, intermediaries easily manipulate the information on market prices of agricultural product in the pursuit of increasing their profit margin as a result farmer receives low prices while middlemen and broker gets highest proportion of share” (Sharma, 2006).

Empirical studies conducted by MDD (2001) found that mountain farmer of Nepal losing interest in mandarin production due to low income attributed to an inefficient marketing system. Thus it is essential to know the existing cost of production, how much marketing margin is found in mandarin marketing? In addition, it is essential to know, what is the gross margin and is the mandarin farming profitable?

One non-governmental organization named Dhaulagiri Community Resources Development Center (DCRDC), with head office in the Baglung district, wants to improve the socio-economic position of mandarin farmer by promoting the citrus sub-sector in its working areas. However, due to the lack of sufficient information, the organization is still not able to intervene in this sub sector. No study has been carried out on market chain of mandarin orange to identify the key constraints and potentiality of improvement on the sector in



Lamjung district. This research is designed to analyse the citrus market chain and identify the problems and contribute to better implementation of future program for development of fruit enterprise in the district.

1.3 Objectives

The objective of this study is to identify the major constraints of the mandarin farmer by analysing mandarin market chain and suggest to DCRDC the possible interventions to improve the socio-economic position of the producer in the district.

1.4 Main research Questions and sub-questions

- 1) What is the situation of production of mandarin orange in Lamjung district?
 - i) What is the productivity and size of mandarin orchard in the two different locations?
 - ii) What is the cost of production of mandarin orange?
 - iii) What are the major problems faced by the producers' for production of mandarin?
- 2) What is the market chain of mandarin orange in Lamjung district?
 - i) What are the existing marketing channels of mandarin?
 - ii) What is the marketing margin and value share of the different chain actors in mandarin market chain?
 - iii) How does the information flow take place? What kind of information the chain actors are using/sharing currently?
 - iv) What are the major problems of marketing of mandarin?
 - v) What intervention can be made in existing chain to maximize the economic benefit of the mandarin producers?

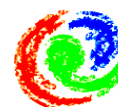
1.5 Scope and limitation of the study

Mandarin orange cultivation is one of the most economically viable fruit of the mid-hills as it has potentiality of export in the international market. Despite this fact farmers are unable to get proper price. So production and marketing aspect of mandarin orange should be given due consideration. This study is mainly focused on the major mandarin growing VDCs; Chitti and Udipur concerning on different aspect of production and marketing of the commodity. The interpretations drawn from the research can be generalized in the area having similar situation of the country. The survey time was not the time of mandarin marketing so the data collected on recall basis may lead some response errors. The sample size taken may not be adequate due to monetary and time constraints.

The finding from this study may be useful for the stakeholders involved in mandarin business and formulation of policies related to the commercial development of citrus industry in the mid-hills areas of Nepal. Due to the perennial nature of the plant only variable cost items were included in the analysis.

1.6 Organization of the thesis

Including the introduction, this thesis report consists of 5 chapters. The first chapter deals about the background information, statement of the problem, research objective, research questions and scope and the limitation of the study. The chapter 2 describes on different literatures reviewed for the study of mandarin orange. The chapter 3 focuses on the research design and methodology applied in writing report. The chapter 4 deals about the result and discussion. Finally chapter 5 describes on conclusions and recommendations.



CHAPTER 2: LITERATURE REVIEW

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

2.1 Mandarin orange

Mandarin orange (*Citrus reticulata* Blanco) cultivation is one of the major economic activities in the mid-hills (550-1300 m) of the western development region (Lohar, 1995).

The mid-hill region of Nepal lying between 26° 45' to 29° 40' north latitude and 80° 15' to 88° 12' east longitude is quite suitable for mandarin cultivation (Shrestha and Verma, 1999).

Mandarin orange cultivation provides nutrition, employment to the people, acts as source of income and maintains environmental harmony (Gurung, 1993; Tomiyashu et al., 1998; Shrestha and Verma, 1999).

The total area under mandarin in Nepal is 21,122 ha with the productive area of 14,449 ha and production of 172,068 Mt.. Mandarin growing district along with productive area, productive area and production in 2008/09 as well as imports and exports figure of last three years has also been presented in annex-A, B and C. Lamjung, the mid-hill district of western development region is the one of the important mandarin orange growing area of Nepal. The total area, productive area, and production in Lamjung district were 1,221 ha, 900 ha and 10,956 Mt during the year 2009/10 (MOAC, 2009/10).

It is the most important income generating fruit of Lamjung. District earned 100 million rupees by selling 4,120 Mt mandarins in 2009/10 (DADO, 2010/11).

2.2 Marketing, agricultural marketing and horticultural marketing

2.2.1 Marketing

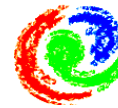
Marketing is the performance of all business activities involved in the flow of products and services from the point of initial production until they are in the hands of consumers (Kohls and Uhl, 1985).

Marketing is a major function after production. Acharya and Agrawal (1999) state 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.

2.2.2 Agricultural marketing

Agricultural marketing comprises buying selling, storage, processing, standardization, certification and distribution of farm products. In the process of transfer from farmer to consumers, agro-products pass through a channel involving a sequence of change in their forms and prices and numerous intermediaries play a significant role in getting products transferred from farm gate to the consumer (Ellis, 1996, cited in Pokhrel and Thapa 2005).

According to MDD (2001) agricultural marketing encompasses of all the activities from production to consumption such as harvesting, grading, packaging, storing, price fixation, selling and buying. In performing these actions, it adds value to the produce in terms of time, place and farm utilities. It also covers marketing cost, organizational structures, rules and regulation, market Competition.



According to Acharya and Agrawal (1999), agricultural marketing is a process, which includes farmer's decision to produce a saleable farm commodity and various aspects of marketing structures both functional and economic consideration including products assembling, preparation of market distribution and use by final consumer. Thus, marketing starts with the decision to plant unlike to the conventional way of thinking.

Rayamajhi (2005), state that development of agriculture sector requires a balance improvement in the production and marketing. It is inefficient to improve the production side and neglect marketing side as the former's improvement is dependent on the latter's development. Production may be the door to economic growth but marketing is the key that turns the lock. Marketing is also the most important multiplier of economic development.

2.2.3 Horticultural marketing

Horticulture marketing is one of the important branches of agricultural marketing and deals with the marketing of horticultural commodities (fruits, vegetables and flower). 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. In present scenario, it is observed that the producers do not pay proper attention for various components of marketing. The producers usually spend whole of the year on production and part with the produce to the pre-harvest contractors, that results in low share in consumer's price.

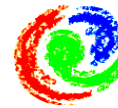
2.3 Marketing system and practices

Marketing system includes procedures farmers, traders, transporter, wholesalers, retailers and consumer as the main actors to carrying out different activities (MDD, 2001).

Marketing system consisted the understanding of three aspects which are market channel to understand product flow and outlet of cultivars, marketing margin to understand margin and profit signal and market price to understand market price signal (Gauchan et al., 2005). According to Joshi (2004), an efficient marketing system is essential for timely delivery at reduced marketing and the efficiency of market is influenced by number of external functions such as policy, regulatory framework and infrastructure.

As marketing system involves wide range of activities, firms and mechanism of delivering goods from one hand to other hand, an understanding of the system is essentially important for the identification of bottlenecks in the system with a view to providing efficient services in the continuum of production-consumption chain. It is because; an efficient marketing system minimizes cost, and benefits all the section of the society (Acharya and Agrawal, 1999).

Marketing system creates time, space and form utilities of the farm produce for the consumers. Marketing system operates to transport produce to where consumer wish to take delivery of it, at times they find more convenient and in the form desirable. These functions add values of the farm produce for the consumers and reflected in marketing margin. If these marketing functions are performed in an efficient way, there are low marketing margin and higher producer's share on consumer rupee. Thus, the price farmers receive and quantities they can sell are very much dependent upon the performance of functionaries in marketing chain. As marketing margin provides an indication of efficiency of existing marketing system consideration of it in economic analysis of marketing system of particular crop enterprises is sensible. The retail price of the commodity is determined by the intersection of derived supply (or retail level supply) and primary demand (or retail level demand). Likewise, farm-gate price of the commodity is determined by the intersection of primary supply (or farm level



supply) and derived demand (or farm level demand). Marketing margin reflect the economics of supply and demand for marketing services, and it is important to acknowledge that such margins reflect the provision of 'marketing utilities' to consumers and that they are not excess profits to 'middleman' in the market chain.

It is not usual to encounter the view that the farmers' share of the retail price of agricultural commodities is too small, and that retail-farm-gate margin are excessive and include elements of excess profit. In many instance this charge has been judged to be unsupported since a careful analysis of the profits of 'middleman' and processing firms shows them to be commensurate with the business risk involved. Generally, a higher farm retail margin is associated with the demand of marketing services and the cost incurred for these. In developing countries like Nepal, marketing margins tends to be high. This is highly affected by the accessibility condition of production sites. Generally, higher marketing margin is linked with exploitation of middlemen. However, the higher marketing margin may not necessarily be due to innate efficiency and excess profit of the middlemen.

What is certain however is that producers as well as consumers are likely to benefit from any improvements in the transport and marketing system which reduce distribution costs. The benefit of the reduction in marketing costs is shared between producers and consumers, with the relative shares depending on the slopes of the supply and demand curves. This underlines the importance to producers of having an efficient marketing system (Colman and Young 1995).

It is clear from this relationship that producers' welfare depends on efficiency of marketing system. Lower marketing margin and higher producers' share on retail price of their produce ensures producers' welfare. Considering that, one of the major determinants of marketing margin is the transportation facility, which affect on efficiency of marketing system the extent could be estimated by using accessibility condition as a proxy for transportation facility.

An efficient marketing system is that which has lower marketing margin (Pun and Karmacharya, 1988). Marketing is complex process that involves assembling, processing, value addition and distribution of surplus from the production. A well planned and developed marketing system is essential for the overall development of nation that provides efficiency in products distribution (Gurung et al., 1996)

2.4 Marketing channel

Marketing channel refers to the route through which products flow from the producers to the ultimate consumers. During the marketing process agriculture produce undergo a change in time, place, form and ownership, which add their values. The chain through which various produce pass between producers and consumers constitute their marketing channel. Mostly marketing channel refers to an inter-organizational system made up of a set of inter dependent institution and agencies involved in the task of moving products from the point to the point of production to the point of consumption (Acharya and Agrawal, 1999).

Pandey et al. (2011) studied marketing of sweet orange in Kumaon of Uttarakhand of India and found six types of marketing channels.

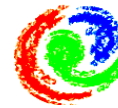
Channel I: Producer-village traders- primary wholesaler-Secondary wholesaler- retailer-consumer

Channel II: Producer- village trader- wholesaler- retailer- consumer

Channel III: Producer- wholesaler- retailer- consumer

Channel IV: Producer- wholesaler-consumer

Channel V: Producer- retailer- consumer



Channel VI: Producer- consumer

Long marketing channels are one of the reasons for increased marketing cost and bring inefficiency in marketing which results the loss in the consumers' welfare and producers' share (Heque et al, 1996).

Producers, traders, transporters, wholesalers, retailers, and consumers are the main actors of marketing system (MDD, 1999).

Dhakal et al. (2005) found following four types of marketing channel in the market survey of acid lime and hill lemon in Nepal.

Channel 1. Producers- Retailers- Consumers

Channel 2. Producers- Wholesalers-Retailers-Consumers

Channel 3. Producers- - Commission agent- Wholesaler- Retailers-Consumers

Channel 4. Producers- Collectors -wholesalers- Retailers- Consumers

2.5 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 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 per unit basis, that is, per unit area and/or per unit of production. Gross margin gives an idea about farm planning as it help decide whether or not to continue existing farm practices or substitute by others.

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 difference in the scale is important factor to be considered in the study of enterprise.

2.6 Marketing margin and producers' share:

The marketing margin is known as the retail farm gate margin is the difference between the retail price of products and the price received by farmer for its products (Colman and Young), 1995).

In the marketing of agricultural commodities, the difference between the price paid by consumer and the price received by the producer for an equivalent quantity of farm produce is often known as price spread (Acharya and Agrawal, 1999). In the marketing system, product has to pass through various functions to reach the consumers in the form of their interest. These functions add value to the farm produce for the consumers and reflected in marketing margin. If these marketing functions are performed in an efficient way these are lower marketing costs resulting in to lower marketing margin and higher producers' share in consumers' rupees.

Marketing margin indicates efficiency of marketing system as it refers to the efficiency of intermediaries between the producer and consumer in respect of the service rendered and the remuneration received by them. It also helps to formulates and implement appropriate price and marketing policies. Excessive margin points the need for public intervention in



marketing system (Acharya and Agarwal, 1999). As marketing margin provides an indication of the efficiency of existing marketing systems, consideration of it in economic analysis of marketing system of particular crop enterprise is sensible because the price farmer receive and the quantity they can sell are very much dependent.

Subedi (1993) have pointed that major share of consumers' price goes on pocket of retailers due to higher marketing margin. Similarly, Shrivastava (2002) highlighted that the producers' share was inversely related to consumers' price. He also pointed out that share of the producers and retailers were directly affected by the consumers' price.

The producers' share in the consumers' rupees is the price received by farmers expressed as percentage of retail price (the price paid by consumer). It is the part of rupees paid by consumer, which actually goes to the producer and is expressed as percentage.

2.7 Profitability

Citrus based farming system is profitable enterprise that can bring increased income of hilly people in the marginal land. Up to 10-16% higher income than existing cropping pattern can be obtain through the integration of mandarin in the farming system, as suggested by Gauchan,(1994). The mandarin orange farming was the profitable agribusiness in the mid-hills of Nepal. The *bari* land should be cultivated by mandarin orange replacing maize, millet and ghaiya in order to get higher return from the available land resources (Aryal, 2001).citrus cultivation in the hill farming system is more profitable compared to crops like maize and wheat and its promotion helps to import substitution and export promotion (APROSC, 1989).

2.8 Mode of selling

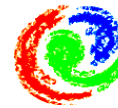
Various types of contractual arrangement in case of production and marketing are prevailing in the country in the case of fruit and vegetables. Due to the perennial nature and difficulty in controlling volume of production pre-harvest contract is the most common marketing practice followed (Bastakoti, 2002). Generally price is determined by the joint negotiations by the traders and farmers. The most important mode of selling of mandarin orange followed by the Nepalese farmer is pre-harvest contract. Likely petty collectors (*doke*) are the next important source which collects mandarin orange from production sites. They purchase mandarin orange on the basis of number of fruits from the middle and small categories of farmer while innovative leader farmers sell orange directly to the wholesale market (Shrestha et al., 1998).

Contractors are the major players of the marketing of mandarin orange in Nepal (Shrestha et al., 1998). Pre-harvest contract is the risk free option for the selling of mandarin but the actual profit is reduced and large scale production is hampered (Shah and Narayanmoorthy, 1998).Farmers preference towards pre-harvest contract system is more because it transform burden of marketing risk to the contractors as well as provides the money in time but it gives lowest share to the consumers' rupees to the growers (Malliswari, 1998).

Mostly for contract arrangements, the contractors visit the production sites few months prior to production season and purchase the orchard in lump sum basis. During harvesting season they make necessary arrangements. Generally the contractors are the wholesalers and commission agents. They sold the purchased mandarin in to the wholesale market (Shrestha et al., 1998).

2.9 Production and marketing problems

There are various aspects of production and marketing problems reported by the different authors. Generally main governing factors of agriculture marketing problems are poor market infrastructure development, legal and institutional mechanisms (Thapa et al., 1995). Lack of marketing infrastructure and facilities caused slow pace of transformation in agricultural production system. Access to market is expensive due to lack of infrastructure like



transportation that caused inaccessibility of locally produced commodity to domestic market. The right has been encroached especially on marketing issues (Sedhain *et al.*, 2002).

Lack of proper storage and post-harvest processing facilities are the leading problems due to this farmer are getting low price and consumer have to pay more for the orange beyond normal season (Gautam and Adhikari, 1989). Thus it is necessary to conduct research on the demand and supply part in the major production pockets for the identification of problem and sustainable development of this industry in the western mid-hills of Nepal (LARC, 1997). Fluctuation in the market price and market availability resulted heavy exploitation of the grower by the businessman (Gurung *et al.*, 2004). Due to poor bargaining power and economic condition marketing intermediaries are getting more advantage from the mandarin orange growers (Pokhrel and Thapa, 2005)

Farmers with limited technical knowledge have ever managed mandarin orchards, as mandarin orange needs better management for the proper production (Pant, 2002).

Bastakoti (2002) has reported disease, insects, lack of technical Knowledge, input supply and Irrigation as the major production problem and low product price, transportation and unorganized market structure as the major marketing problem of the western mid-hills of Nepal. Similarly, Aryal (2001) has reported disease as major problems followed by insect/pest and other physical problems in mandarin production.

Appropriate policies regarding emphasis on citrus based farming system and support in extension and marketing is utmost for the protection of deteriorating ecology and economy of the mid-hills of Nepal (Gauchan, 1994).

2.10 Marketing information

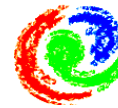
The links in the market chain (production, post-harvest management, marketing, and business development services) are often disjointed in agricultural markets, generating an inefficient flow of information along the market chain. This lack of marketing information and coordination along the market chain 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).

2.11 Value Chain Analysis

Value chain analysis is a tool that we use to define development opportunity, 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 focussing 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).

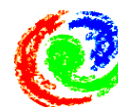


The value chain explains the full range of activities which are necessary to bring product/service from conception, through the different stages of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use. As can be seen from this, production is only one of a no. of value added links. Moreover, there are ranges of activities within each link of the chain. Although often represents 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 influenced by the constraints in these downstream links in the chain (Kaplinsky & Morris) (<http://www.globalvaluechains.org/docs/VchNov01.pdf>)

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). 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).



CHAPTER 3: RESEARCH METHODOLOGY

The details of different tools and techniques of research procedures such as site selection, sample size and sampling techniques, sources of information, method and techniques of data collection and analysis techniques for collected data are dealt in this chapter.

3.1 Research framework

A research framework is a schematic representation of the research objective and includes the appropriate steps that need to achieve it. To have the direction and carrying out this study, a research design was developed (figure 3) to guide the research method through the different steps necessary for the successful completion of the research (Verschuren and Doorewaard, 2005). The research employed both qualitative and quantitative approach and were based on empirical data, literatures and documents. Data were collected through survey, field observation and case study.

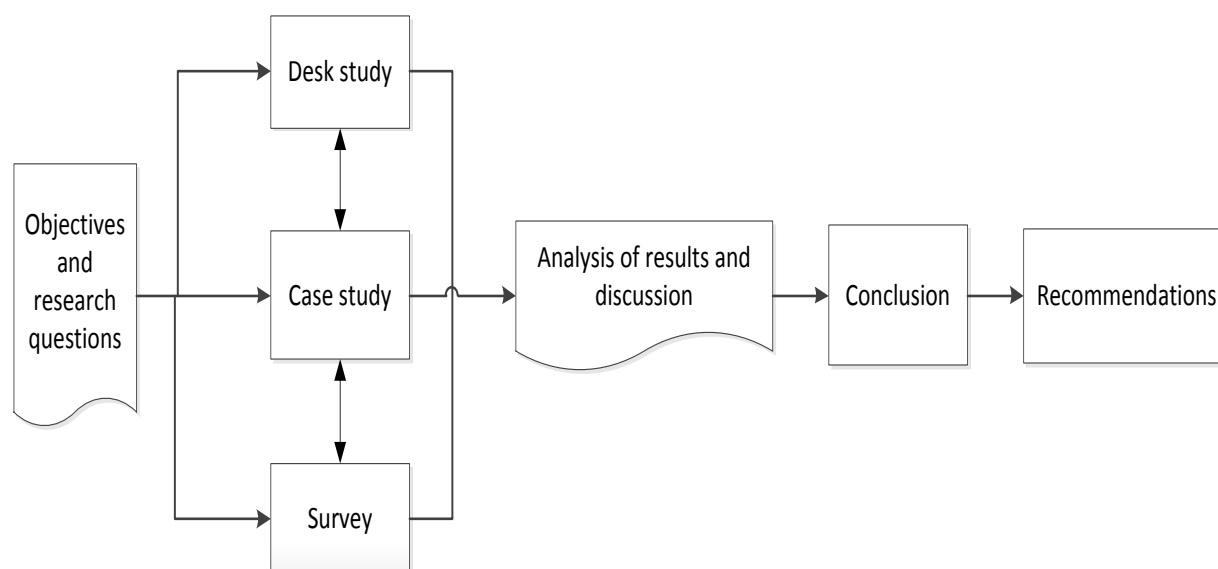


Figure 3. Research design adopted by Verschuren and Doorewaard (2005)

3.2 Selection of study area

The research was conducted in western hill of Nepal, which is the most potential region for mandarin production in term of area and production of the country. Lamjung district was purposively selected for the study. The reason behind the selection of the Lamjung district was that this district ranks no second in term of area and production of mandarin in Nepal with the total productive area 830 and production 10956 metric tons (MOAC, 2010). This district represents typical mandarin growing area and has enormous potential for it. Similarly, two Village Development Committees (VDCs) namely Chitti and Udipur were selected as these VDCs were some of the pocket area of mandarin production in this district (DADO, 2010). The map of Nepal and map of district showing research areas has been presented in figure four and five.

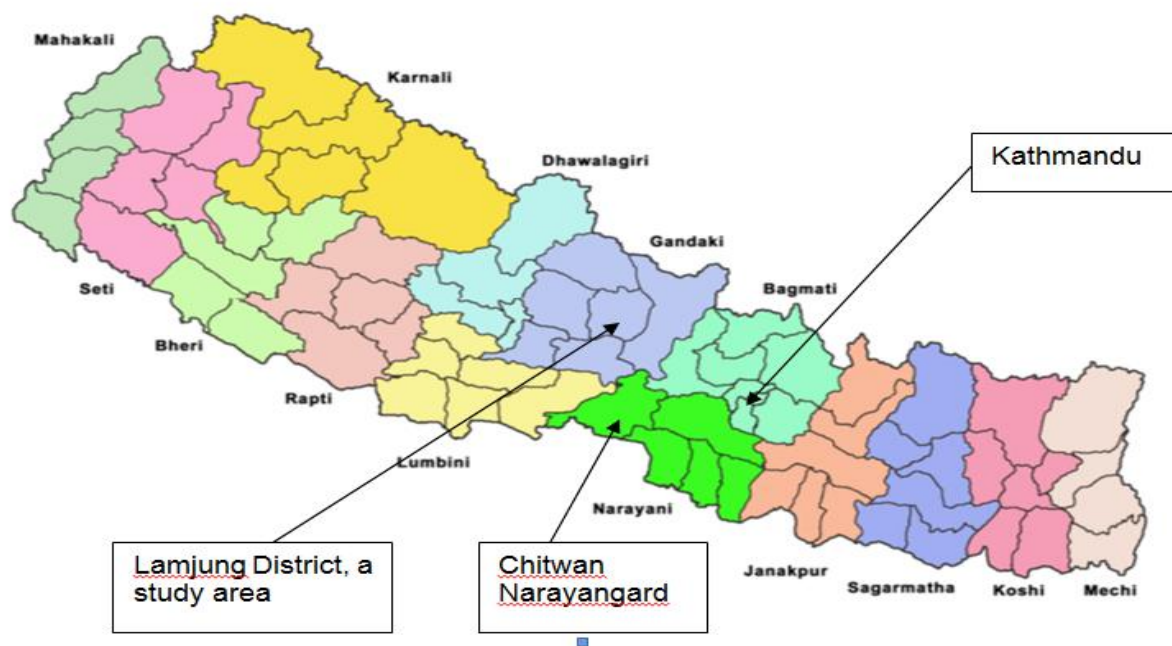
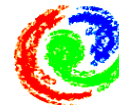


Figure 4. Map of Nepal showing study areas

Source: Shrestha, (2009)

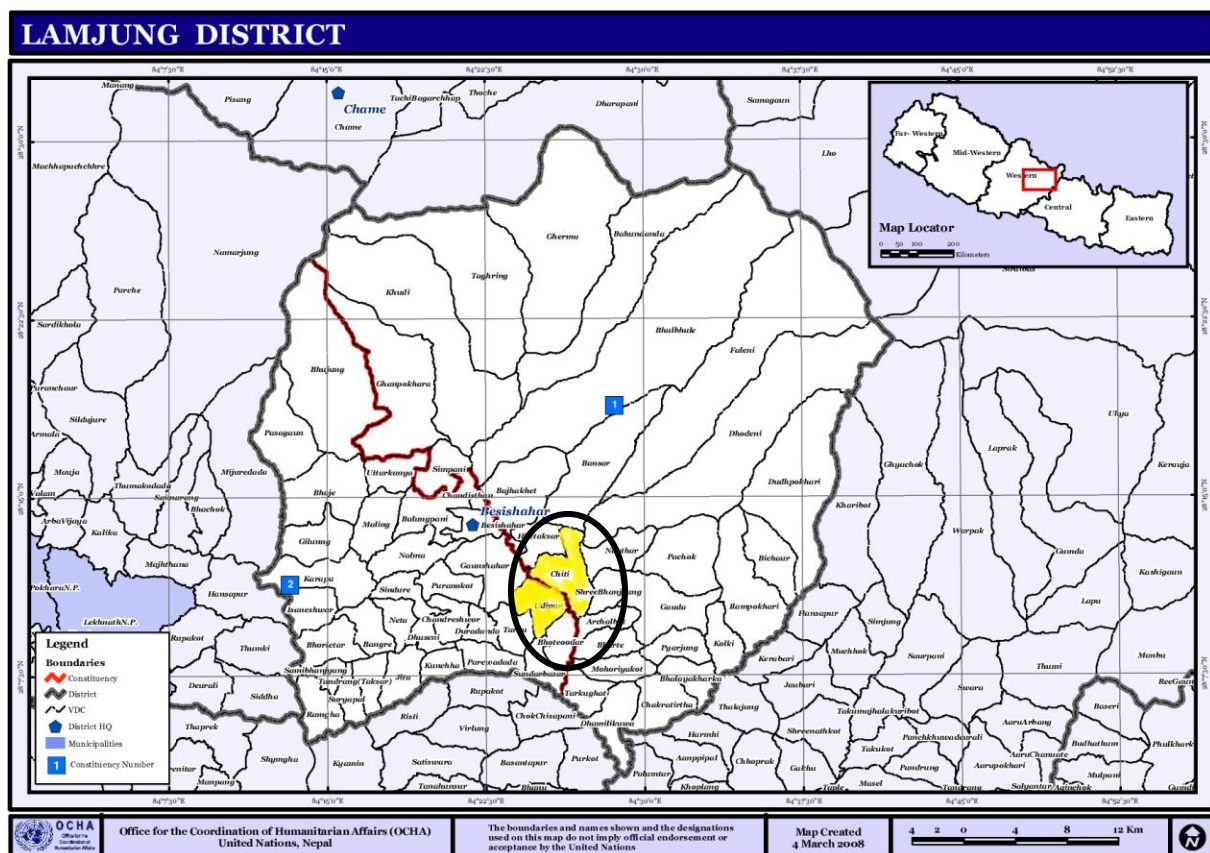


Figure 5. Study area encircled Udipur and Chiti VDCs in Lamjung district, Nepal

Source: Wikipedia (2010)



3.3 Sample size and sampling procedure

Sample plays an important role in research. Without a sound sampling plan and a suitable sample size, the data will be collected from neither proper respondents nor the appropriate number of them. The sample size determination and sampling procedure used in this study are discussed here under.

3.3.1 Selection of mandarin producer

Mandarin producer of the selected VDCs were the target population for the study. Most of the farmer of some wards of these VDCs grow mandarin thus were included in sampling frame for the study. The list of mandarin growers in the district was not recorded formally by DADO but informal list of mandarin grower across the study sites were prepared with the help of local key informants of respective sites. Careful attention was paid to make the list more inclusive (i.e inclusion of producers from different wealth categories, different ethnic groups and different agro-ecological domains). Altogether 20 producers from each VDCs were selected by applying simple random sampling method. Altogether 40 respondents were randomly selected for this study.

Table 2. Sample size distribution by VDC in the study area (2011)

| Name of VDC | Sample size |
|-------------|-------------|
| Chitti | 20 |
| Udipur | 20 |
| Total | 40 |

3.3.2 Selection of mandarin traders

Pre-harvest contractors, wholesalers and retailers were selected for the interview. From both sites one contractor from each VDC were selected. Similarly two retailers and two wholesalers from Kalimati fruit and vegetable wholesale market of Kathmandu were also selected.

3.4 Method of data collection

Various sources and techniques were used for collection of necessary information. In this study, both the primary and secondary data were collected and analysed.

3.4.1 Sources of information

Commercial and semi-commercial mandarin orange cultivators and traders (collector, wholesalers and retailers) were the major sources of primary information. Beside these information obtained through observations, group discussion and key informant survey were also used in order to understand production and marketing system, marketing channels, marketing margin, value share, production and marketing problems.

The secondary data were obtained through the publications from the different organizations. They are Fruit development directorate, Market development directorate, Ministry of agriculture and co-operatives, Agro-enterprise centre, Central Bureau of Statistics, Regional Agriculture Research Station, Lumle, Agri-business Promotion and Market Development Directorate and District Agriculture Development Office, Lamjung.

3.4.2 Technique of primary data collection

3.4.2.1 Interview

Interview schedule was used to collect the primary data. The information like production situation cost of production, marketing system, marketing channel, mode of selling, quality, grading and packaging, income from mandarin, price determination system, information sharing system, supporting organization, means of market information and production and



marketing problems related data were collected from the mandarin farmer using a structured questionnaire (annex-D).

3.4.2.2 Case study

Case study was conducted to collect data from the traders (Two collectors, four wholesalers), six retailers and two subject matter specialist (one economist and one horticulturist from DADO, Lamjung). Two collectors, four wholesalers (two from Kathmandu and two from Narayangard), six retailers (two from Kathmandu, two from Bensishahar and two from Narayangard) and two SMS were selected purposively and data were collected by using a checklist (annex- E).

The data on price and quantity buying and selling, pricing system, means of packaging, transportation, storage facility, marketing margin and marketing cost and marketing constraints were collected from the trader (collector, wholesalers and retailers).

Information regarding the implementing program by DADO for mandarin farmer, actors and supporters in the district and existing problems and possible solutions of the problems were taken from SMS.

3.4.2.3 Observation

Direct field observation were done at the time of field survey to know the number of bearing trees, distance between the plant to plant and row to row and other management condition of orchard.

3.5 Survey design and data collection procedure

This section deals with designing of interview schedule and data collection procedure employed during study period.

3.5.1 Interview schedule design

An interview schedule was designed for primary data collection. Four set of data collection instruments were prepared for collection of primary data. First set includes interview schedule, which was prepared to collect information from producer and second set was prepared for collector and third set was prepared for wholesalers and retailers. The fourth set was used to collect the information from subject matter specialists working in the district agriculture development office, Lamjung.

3.5.2 Pre-testing

The interview schedule and checklists were pre-tested prior to administering to the actual respondents for checking reliability and validity of interview schedule. The pre-testing was done 5 respondents near to the study area. The suggestion given during the pre-testing was incorporated in the final interview schedule.

3.5.3 Field survey

The field survey was conducted in the month of July and August, 2011. The respondents were interviewed by visiting their homes. The interview time was fixed as per the farmers' convenience. Regular checking and validation were done immediately after filling the interview schedule. The trader and subject matter specialist were also interviewed in the same manner.

3.6 Method and technique of data analysis

After collection of necessary information it was coded and entered in to the computer for analysis. Data entry and analysis were done by using Statistical Package for Social



Sciences (SPSS) and Microsoft Excel software package. The following analysis has been done.

3.6.1 Socio-demographic and farm characteristics

For the descriptive analysis of the study area and population, different variables like size of family, economically active population, education level, caste, size of holdings were included. They were analyzed by using descriptive tools such as frequencies, percentage and mean as per the need.

3.6.2 Cost of production

Variable cost items were included for analyzing cost of production. The variable cost included was fertilizer cost, manure cost, labor cost, insecticide and pesticide cost and copper sulphate and lime cost for different production activities. Total cost was calculated by summing all the variable cost items.

3.6.3 Gross margin analysis

The gross margin is a simple and fast way of planning in activities or analyzing a farm business. The gross margin of a particular enterprise is the difference between the gross revenue received and the variable cost incurred.

For a farm undertaking different enterprises, the total gross margin equals the sum of gross margin of each enterprise. The gross margin analysis is used to justify that the selected projects are technically and financially viable to the need of the target beneficiaries (Ghimire, 2003).

For our analysis, only the gross revenue and the variable costs incurred are taken into consideration. It will be worthwhile to describe the terms gross revenue and variable costs. Gross revenue refers to the value of production of main product and by-products at market price, while variable cost includes those costs that vary with the level of production and are not incurred when there is no production. For example, cost of fertilizer, cost of seed, cost of pesticides, wage for temporary laborers. The gross margin was calculated as:

Gross margin = Gross return – Total variable cost

Where,

Gross return = Price of mandarin * total quantity sold

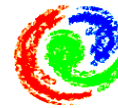
Total variable cost = Summation of all the cost of variable items

3.6.4 Marketing margin and producer's share

Marketing margin is the difference between the net price received by the farmer and the price paid by the consumer. This was calculated by the farm gate price from the retail price.

Marketing margin = Retailer price (Pr) – Farm-gate price (Pf)

Marketing margin shows the effectiveness of marketing system because it indicates to the efficiency of intermediaries between the grower and consumer in respect of the services delivered and the remuneration received by them (Sapkota, 2008). It also helps to identify the reasons of high marketing costs and the possible ways of reducing them, and to formulate and implement appropriate pricing and marketing policies.



Similarly, producer's share is the price received by the farmer expressed as a percentage of the retail price that is price paid by the consumer. Mathematically, we can express as follows.

$$P_s = (P_f/P_r) \times 100.$$

Where,

P_s = producers' share

P_f = farm gate price

P_r = retailer's price

An increase in the share of producer is the sign of rise in the efficiency of marketing system in the favour of producer/farmers, and vice-verse. A reduction in the share of producer indicates that the middlemen are gaining the larger share.

3.6.5 Value share

Value share is the percentage of the final, retail price that the actor earns and can be calculated by dividing the added value by the final price and then multiplying with hundred to express percentage. Mathematically, we can express as follows.

$$\text{Value share (VS)} = (\text{Added value} / \text{final retail price}) \times 100$$

Added value

It is the amount of value that each actor in the chain adds. It is the difference between the price the actor pays for the produce, and the price s/he sells for it.

3.6.6 Indexing of production and marketing problems

Scaling method gives the way and attitude of the respondents towards propositions. Farmers opinion on the importance given to the different production and marketing constraints/problems were analyzed by using 5 point scale of constraint/problems comprising the least serious, a little bit, moderate, serious and the most serious by using 1,2,3,4, and 5, respectively (Figure 6).

The index of importance was computed by using the following formula:

$$\text{Iimp} = \sum (s_i f_i / N)$$

Where,

Iimp = Index of importance

\sum = Summation

S_i = Scale value

f_i = Frequency of importance given by the respondents

N = Total numbers of respondents

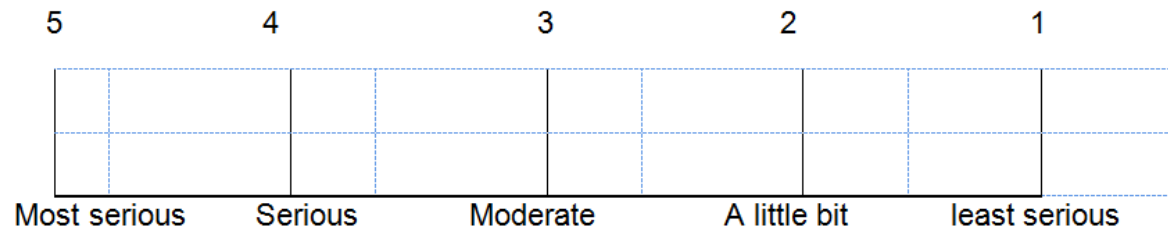
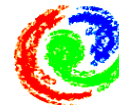


Figure 6. Scale of rating

Formula source: Shrestha, (2009)

3.6.7 SWOT analysis

The SWOT analysis tool was used to find out the strength, weakness, opportunity and threat of mandarin market chain.



CHAPTER 4: RESULTS AND DISCUSSION

This chapter explains the findings of the study that were achieved from the analysis of data. These findings include explanation of the study area, landholding size, farmers' experiences, cost of production and gross margin, marketing channels, marketing margin, producer share, mode of selling. In addition, this chapter also describes about the market information, analysis of marketing practices and problems related to production and marketing. These findings are presented in the following sub-headings.

4.1 Research area

Lamjung district is situated at mid-hill region of Nepal. It is located in mid-part of Gandaki zone. On the basis of natural geography this district can be divided in to three part viz. high mountain region (18.3%), high hilly region and mid-hill (39.2%), and river basin (42.5%). Climatically the district is featured by temperate climate found in high mountain region (up to 8,163 m) and warm sub-tropical climate found in mid-hill, and river basin (up to 450 m). The average annual temperature of the district is 26.67⁰ C; average rainfall is 2,914 mm. The total area of the Lamjung district is 1,692 square km (169,220 ha). with estimated 45,294 hectare fertile lands.

The geography and climate is very suitable for orange/citrus cultivation (DADO, 2010/11).

The total population living in the district is 201,239, among them the economically active population is 80,990. Agriculture is the main source of livelihood for the population. About 80.42 % of the economically active population is dependent on agriculture and forest sector.

There are 61 Village Development Committees (VDCs) in the district. The main crops grown in the district are cereals, vegetables and fruits. Duradanda, Chitti, Kuncha, Udipur, Bhorletar, Ishneshwor, Mohoriakot, Tarkughat, Simpani and Bhulbhule VDCs are citrus growing VDCs in the district. Total area, production and productivity in the district in last three year is presented in table three and four.

Table 3. Citrus production area from 2008 to 2010 in Lamjung

| Year | Mandarin area | Sweet orange area | Lime (ha) | Lemon (ha) | Other (ha) | Total |
|------|---------------|-------------------|-----------|------------|------------|-------|
| 2008 | 1200 | 100 | 200 | 300 | 240 | 2040 |
| 2009 | 1214 | 101 | 200 | 300 | 240 | 2055 |
| 2010 | 1221 | 104 | 202 | 300 | 240 | 2066 |

Source: MOAC (2010/11)

Note: Other includes sweet lime, citron, pumiloos, area includes area of bearing and non-bearing trees



Table 4. Total productive area and production of citrus fruits in the Lamjung district

| Year | Mandarin | | Sweet orange | | Lime | Lemon | | Other | | Total | | |
|------|-----------|-----------------|--------------|-----------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|
| | Area (ha) | Production (Mt) | Area (ha) | Production (Mt) | Area (ha) | Production (Mt) | Area (ha) | Production (Mt) | Area (ha) | Production (Mt) | Area (ha) | Production (Mt) |
| 2008 | 900 | 11700 | 70 | 761 | 8 | 720 | 260 | 1854 | 240 | 1711 | 1550 | 16746 |
| 2009 | 826 | 10814 | 78 | 863 | 120 | 1104 | 270 | 1925 | 240 | 1711 | 1533 | 16418 |
| 2010 | 830 | 10956 | 80 | 889 | 123 | 1133 | 270 | 1925 | 240 | 1711 | 1543 | 16613 |

Source: MOAC (2010/11)

4.2 Household and farm characteristics

The household and farm characteristics include total population, gender, education, land holding and caste.

4.2.1 Population distribution

Altogether 257 numbers of people from the 40-sampled household were listed. Among them 48 % were from Chitti and 52 % were from Udipur VDC, respectively. In terms of gender wise distribution the 53% were male and 47% were female in Chitti and 45 % were male and 53 % were female in Udipur VDC respectively which were close to the national figures (Table 5).

Table 5. Distribution of population of the respondents by gender and VDC in 2011

| Gender | Chitti | Udipur | Total |
|--------|----------|----------|-----------|
| Male | 65(53%) | 60(45%) | 125(49%) |
| Female | 58(47%) | 74(53%) | 132(51%) |
| Total | 123(48%) | 134(52%) | 257(100%) |

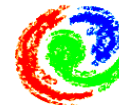
Source: Own field work (2011)

4.2.2 Economically active population

Mainly the economically active populations are the population belonging to the age group of 15-59 years that have productive capacity as defined by the government of Nepal. It indicated that 62% of population was economically active. The percentage of economically active population was higher in Chitti VDC (67%). The people of age below 15 were higher in Udipur VDC (38 %) (Table 6). Due to availability of more economically active population in Chitti the area under mandarin and production was high (Table 9).

Table 6. Distribution of economically active population by VDC

| Age group | Chitti | Udipur | Total |
|-------------|------------|------------|------------|
| <15 Years | 33 (27%) | 51 (38%) | 84 (33%) |
| 15-59 Years | 82 (67%) | 76 (57%) | 158 (62 %) |
| >59 Years | 8 (6%) | 7 (5%) | 15 (6%) |
| Total | 123 (100%) | 134 (100%) | 257 (100%) |



4.2.3 Literacy status of mandarin farmer

The literacy levels of the surveyed households were categorized into five groups. Illiterate are those who cannot read and write. Primary level refers to the schooling up to five years of schooling. Secondary level refers to the ten years of schooling. Intermediate refers class up to 12 while university level refers to the class above 12. The large proportions of farmer (32.5 %) were illiterate.

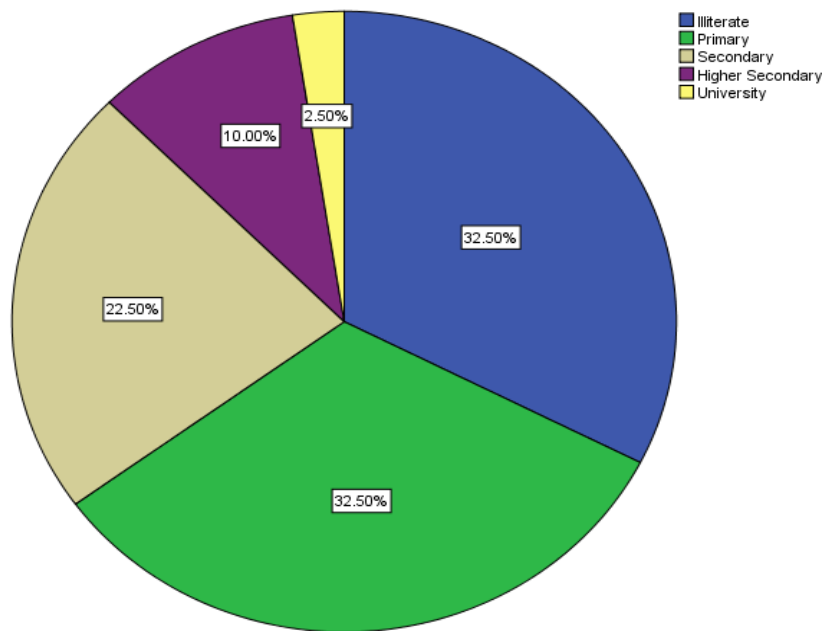


Figure 7. Level of education of mandarin farmer

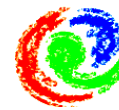
4.2.4 Social Classes

Majority of the respondents were Brahmins (26) followed by Chhetris (7) and Dallit (7). The percent of Brahmins were highest in (65), while Chhetris and dallit were equal. Brahmins were the dominating cast of the surveyed VDC, which is shown below.

Table 7. Distribution of the respondents by caste group

| Caste | Frequency | Percent |
|---------|-----------|---------|
| Brahmin | 26 | 65.0 |
| Chettri | 7 | 17.5 |
| Dallit | 7 | 17.5 |
| Total | 40 | 100.0 |

Source: Own field work (2011)



4.2.5 Farming experiences

Experience of farmer in farming is an important variable in determining the quality and quantity of products as well as adoption of new technologies. In this study, it was found that majority (55 %) of farmers have been cultivating mandarin for last fifteen years. It shows that mandarin farming is not a new business for farmers in that location.

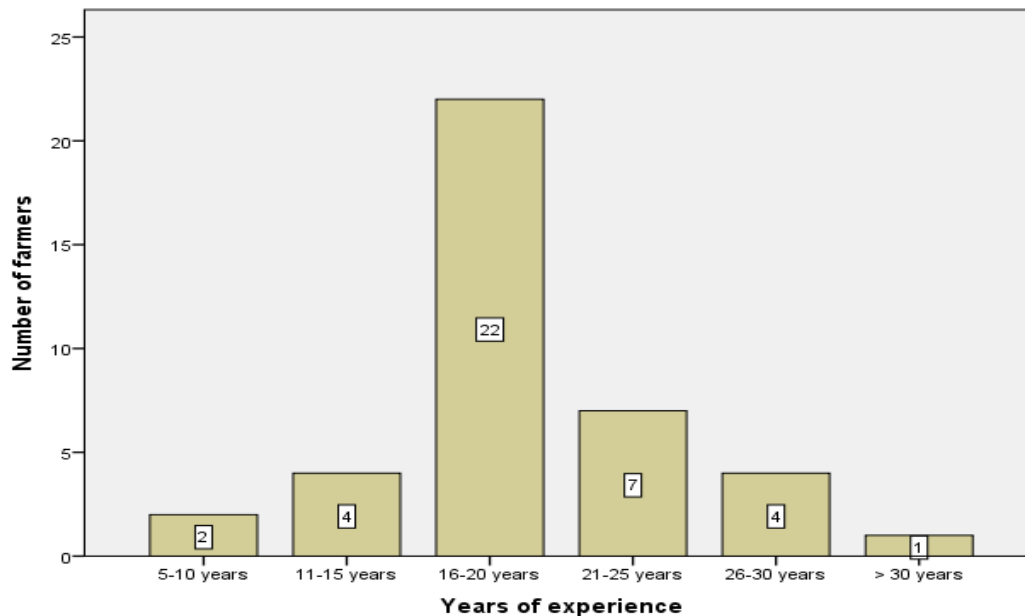


Figure 8. Farmers' experience in mandarin farming

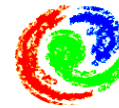
4.2.6 Land holding

The average landholding was found different in two VDCs Chitti and Udipur, 0.89 and 0.97 hectares, respectively. The larger difference in landholding in Udipur VDC is due to larger area of land ownership by the high caste farmers (Brahmin) compared to lower caste ones (Figure 9).

Table 8. Land holding pattern sampled household by VDC in 2011

| VDCs | Land in <i>hectare</i> | | | |
|---------------|------------------------|---------|---------|--------------------|
| | Average | Minimum | Maximum | Standard deviation |
| Chitti (n=20) | 0.89 | 0.65 | 1.4 | 0.23261 |
| Udipur (n=20) | 0.97 | 0.35 | 3.25 | 0.66933 |
| Total (n=40) | 0.93 | 0.5 | 2.3 | 0.49624 |

Source: Own field work (2011)



4.2.6.1 Caste wise size of land holding and caste wise land for mandarin

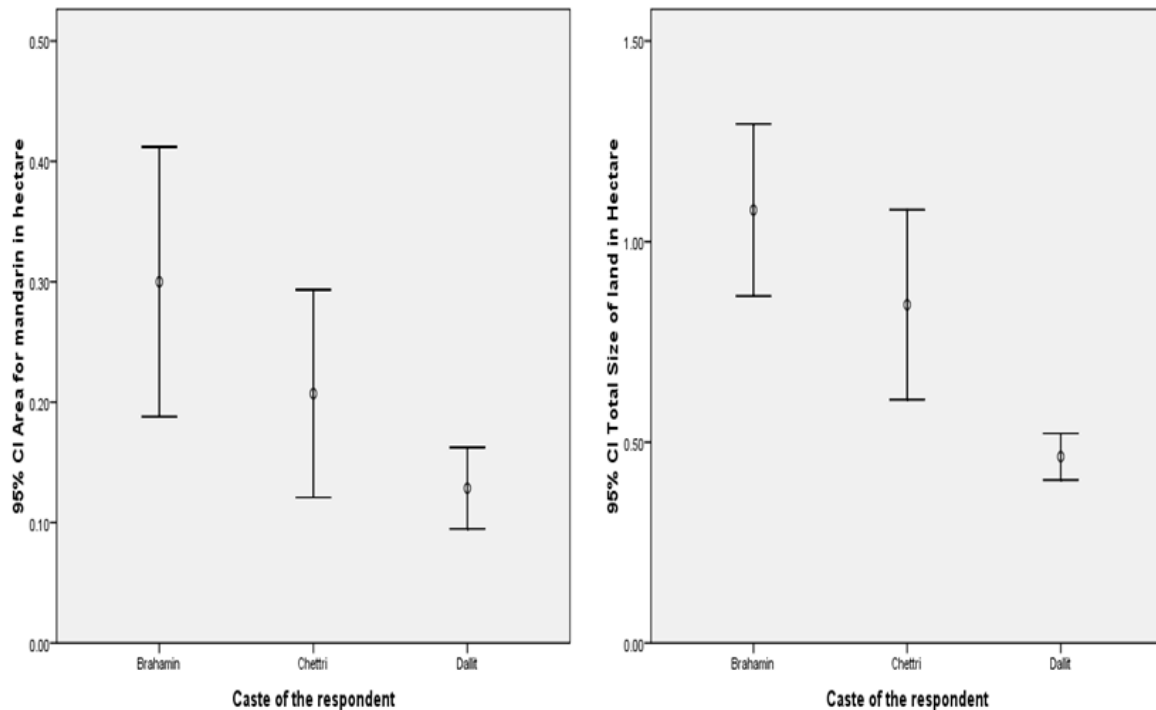


Figure 9. Caste wise size of land (right) and caste wise land for mandarin (left)

From the figure above, big difference in both size of total land and size of land for mandarin among the three different castes were observed. Majority of the Brahmin owned average 1.1 hectares and Chettri has 0.9 hectares and Dallit has 0.5 hectares.

One-way ANOVA analysis result showed that there is significance difference between three caste in total size of land ($P = 0.009$) (Annex- F). Difference in landholding between Dallit and Brahmin, and between Chettri and Dallit was significant. In regard to total land allocated for mandarin the result showed that there was no significant difference ($P = 0.2$) (Annex-G).



4.2.6.2 Mandarin farming

The chi-square test showed reliable ($P = 0.3$) (Annex-H). There was difference between two types of farmer having the mandarin main business and that farmer having the other farming main business but the difference was insignificant.

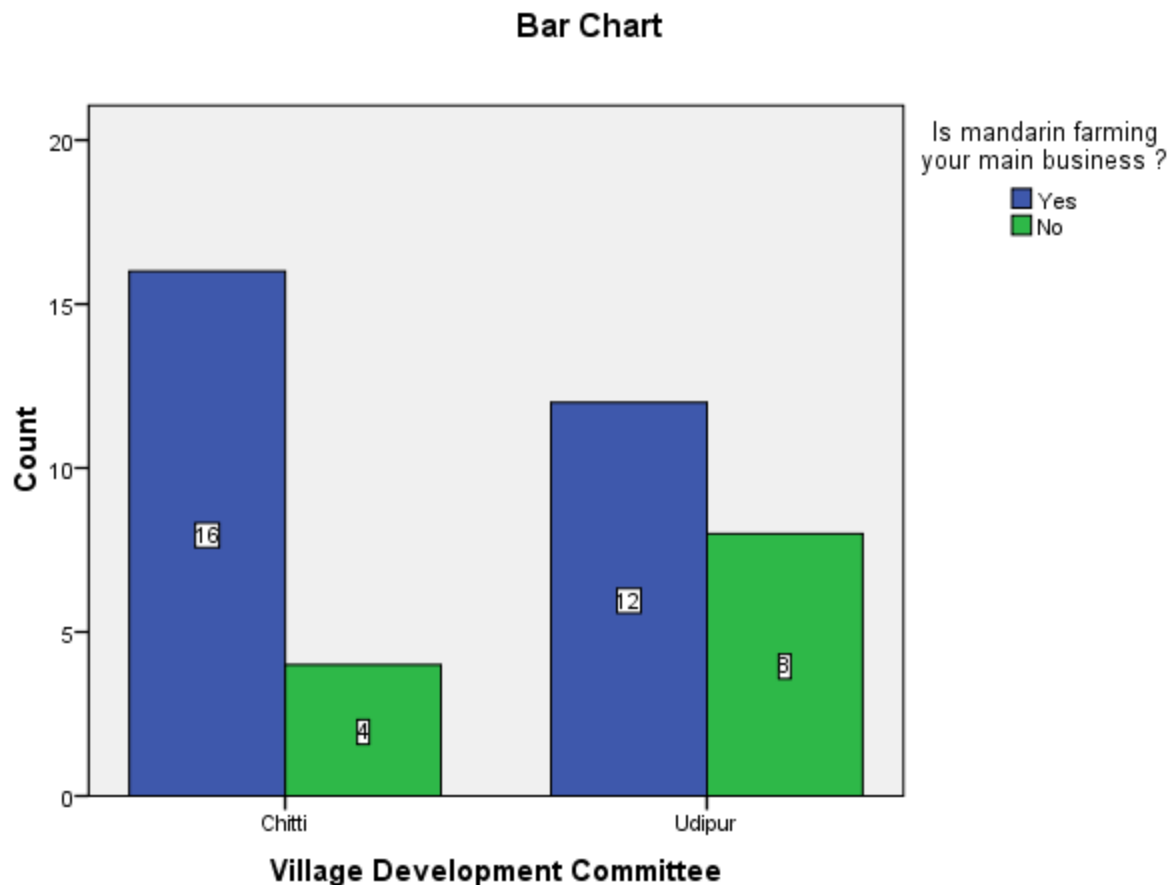


Figure 10. Mandarin farmer response in relation to business type

From the above figure we can say that Chitti VDC has more number of farmers having mandarin their main business and Udipur have less number having mandarin farming their main business. Udipur has more number of farmer they have other business as a main. This might be due to the small land size allocated to mandarin as compare to Chitti and availability of dallit caste only in Udipur in surveyed farmer.

4.2.6.3 Variety grown

The figure 11 showed that most of the farmer (80%) in the research area are growing local variety of mandarin. Only 2.5 % farmers were growing high yielding murkett variety. It showed that most of the farmers were not aware about the different variety of mandarin. NARC, (2011) has identified both early and late variety of mandarin which are Okitsuwase, a early season variety which can harvest in Ashwin to Kartik (October- November) and Khoku, a mid-season variety that can be harvested in Mangsir to Magh (November to January) and late season variety Murkott (a cross between mandarin and sweet orange) which can be harvested in Falgun-Chaitra (February to March). Introducing these varieties could solve the seasonal glut by extending harvesting time to get more income.

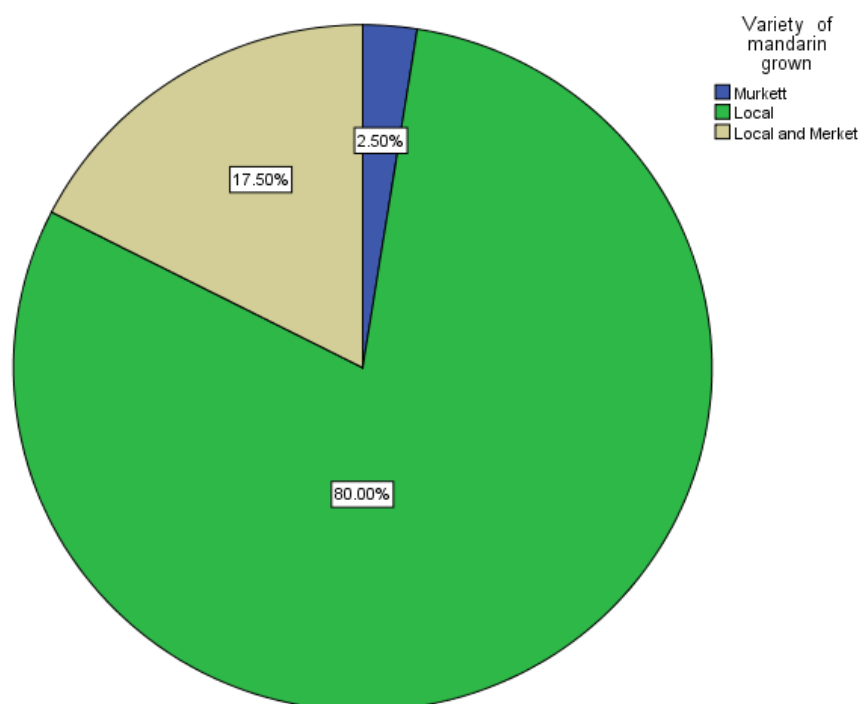
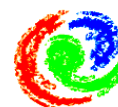


Figure 11. Variety grown in study area

4.3 Economics of mandarin orange production

Mandarin orange cultivation is the dominating and important part of farming system in the mid-hill agriculture. Commercially farmers are cultivating this fruit near about 32 years back. This part deals with the production situation, cost, return and gross margin analysis.

4.3.1 Situation of production and productivity of mandarin orange

The *Bari* land was covered by the mandarin orange in the most of the hills of Lamjung district. The average number of trees per household were higher in Chitti VDC (166 trees) as compared to Udipur VDC (141 trees) that may be due to the awareness about fruit cultivation as well as climatic and edaphic suitability for the mandarin cultivation.

Table 9. Distribution of mandarin trees in land of respondents by VDCs

| VDC (n=20) | | No of plants | Mandarin area (ha) |
|------------|----------------|--------------|--------------------|
| Chitti | Std. Deviation | 83 | 0.14 |
| | Mean | 166 | 0.26 |
| Udipur | Std. Deviation | 132 | 0.31 |
| | Mean | 141 | 0.24 |
| Total | Std. Deviation | 110 | 0.24 |
| | Mean | 153 | 0.25 |

Source: Own field work (2011)

In an average the farmers allocated 0.24 hectares of land from their total size of land which accounted about 26% in Udipur VDCs whereas in Chitti VDC farmers allocated on an average 0.26 hectares (27%) of their total land for mandarin production. The productivity of



mandarin was very much difference among these two VDC, productivity was 15 tons/hectare and 9.5 tons/hectare in Chitti and Udipur respectively. The latter VDC productivity was lower than national figure (i.e 11.3 tons/ha). The reason behind the difference might be fertility status of the soil and micro-climatic variation of the location.

Table 10. Caste-wise average production of mandarin in quintal

| Caste | 95% Confidence Interval for Mean | | | | | | | |
|---------|-------------------------------------|-------|-------------------|------------|----------------|----------------|-------------|-------------|
| | N | Mean | Std. Deviation | Std. Error | Lower Bound | Upper Bound | Minimu m | Maximu m |
| Brahmin | 26 | 37.64 | 33.11 | 6.49 | 24.27 | 51.01 | 4.50 | 140.00 |
| Chettri | 7 | 29.24 | 16.413 | 6.20 | 14.06 | 44.42 | 13.80 | 55.00 |
| Dallit | 7 | 13.25 | 3.90 | 1.47 | 9.65 | 16.85 | 10.50 | 21.00 |
| Total | 40 | 31.90 | 28.84 | 4.56 | 22.68 | 41.13 | 4.50 | 140.00 |

Source: Own field work (2011)

From the above table we can say that there was significance difference between the caste categories in the production of mandarin. Among three groups Brahmins have higher average production (37.6 quintal) followed by Chettri (29.2) and Dallit (13.25). This might be low size of land holding and less area allocated for mandarin by Dallit.

The result showed after analysing the one way ANOVA, the P value was higher than 0.05 (0.161, Annex-I). So we can say that there is difference in production among the three caste category but not a significant difference.

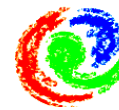
4.3.2 Cost of production and return

The production of mandarin orange depended on the levels of inputs like manure, fertilizers, labor, chemicals and irrigation used. The average cost of production per *hectare* was Rupees 115,779. The cost of production was higher in Chitti VDC (Rs. 122,988). The benefit cost ratio analysis showed that the mandarin orange cultivation was profitable enterprise with the B/C ratio greater than one i.e.2.1 for Udipur and 2.6 for Chitti VDC. This evidence was also supported by Gupta and George (2004) as they found B/c ratio ranging from 1.85 to 2.64 in Indian condition depending on the size of orchard. The benefit cost ratio was higher in Chitti VDC (Table 9). The higher cost of production and return in Chitti VDC might be due to the higher amount of inputs used for producing the mandarin orange than Udipur VDC. The slightly higher benefit cost ratio might be due to only consideration of variable cost while calculating cost of production.

Table 11. Cost of production and return from mandarin orange by VDCs

| VDC | Cost (Rs/Ha) | Return (Rs/Ha) | B/C ratio |
|--------|---------------|-----------------|-----------|
| Chitti | 122,988 | 319,800 | 2.6 |
| Udipur | 108,570 | 225,150 | 2.1 |
| Total | 115,779 | 272,475 | 2.35 |

Source: Own field work (2011)



Comparative analysis of cost of production

Per unit cost of production was found to be less in Chitti VDC (Rs 8.19/kg), whereas in Udipur production cost was Rs 11.42/kg. The benefit cost ratio was also higher in Chitti indicating profitability of the enterprise. The comparative analysis of cost of production on different item is presented in figure 12 and 13 for Chitti and Udipur respectively.

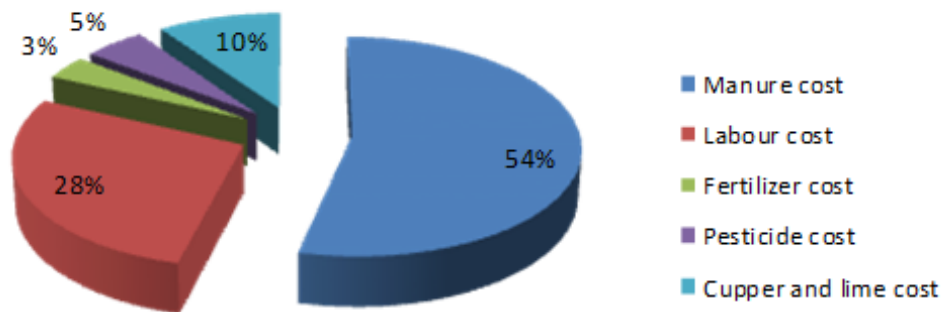


Figure 12. Variable cost of production of mandarin orange in Chitti VDC

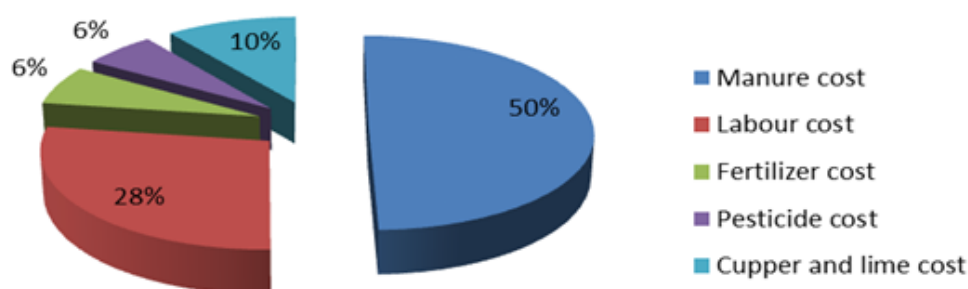
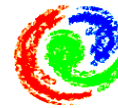


Figure 13. Variable cost of production of mandarin orange in Udipur VDC

The analysis of per *hectare* cost of production showed that the production cost implied in manure was more in Chitti which might be due to better management practice followed for getting higher return. The fertilizer cost was higher in Udipur VDC, as the area was easily accessible to market (Annex J).



The comparative analysis of cost of production showed that there were improper allocation in the cost incurred for the production of mandarin orange and required amount of input was not properly used by the farmers for the production of mandarin orange though the mandarin orange cultivation was profitable in both of the VDCs.

4.3.3 Comparative analysis of mandarin income

4.3.3.1 Comparison of mandarin income by VDCs

The figure below shows that the average farmer of Chitti earned an average annual income around Rs 90,000 but only around NRs. 55,000 in Udipur. The lowest income in Udipur was around Rs. 18,000 and whereas in Chitti it was NRs. 60,000. It was clear that income by selling mandarin was more in Chitti VDC than Udipur VDC. It was due to more fertile soil and high production in Chitti than Udipur VDC.

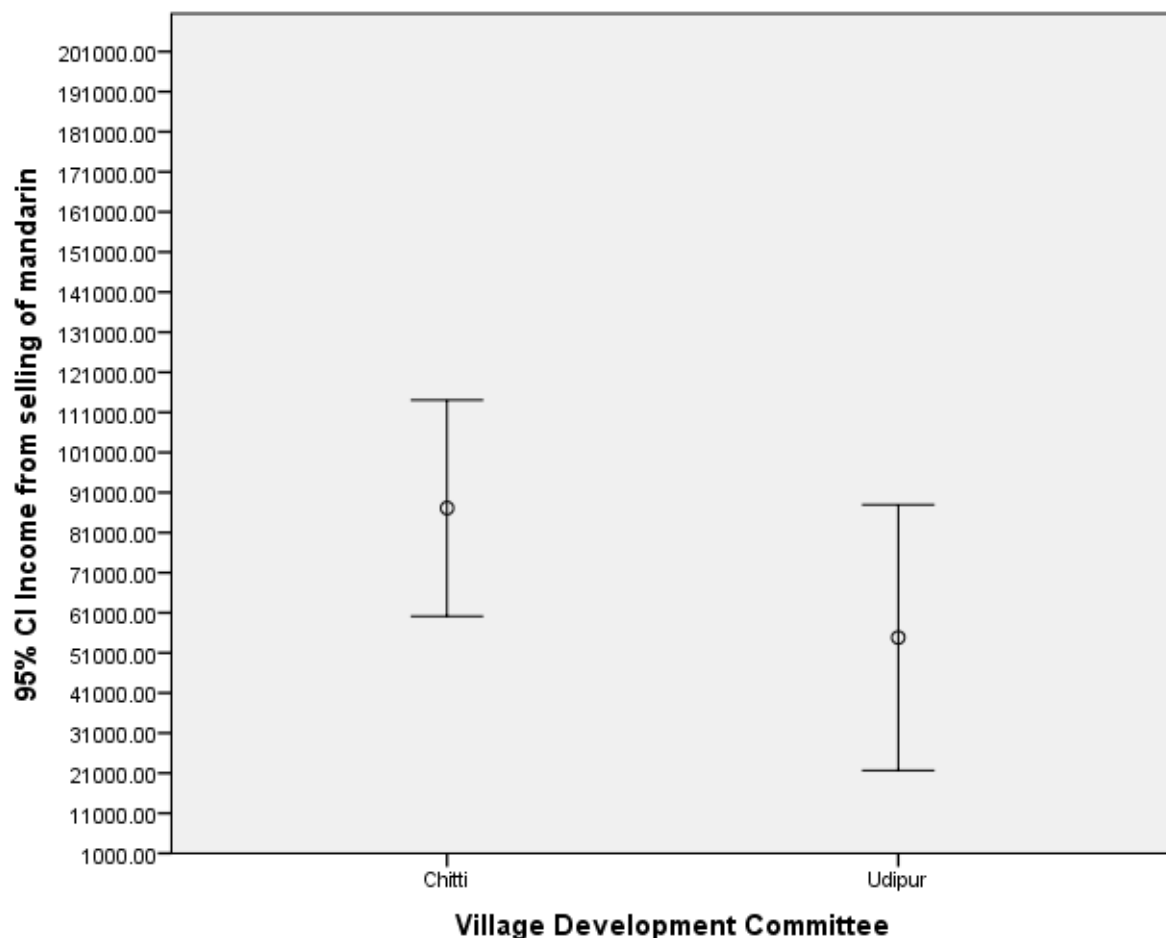


Figure 14. Mandarin income in two different VDCs

4.3.3.2 Comparison of mandarin income by caste

From the analysis of income differences from mandarin farming in three different castes, ($P = 0.134$) (Annex-K) so there was no significant difference between these caste categories.

4.3.3.3 Contribution of mandarin to household economy

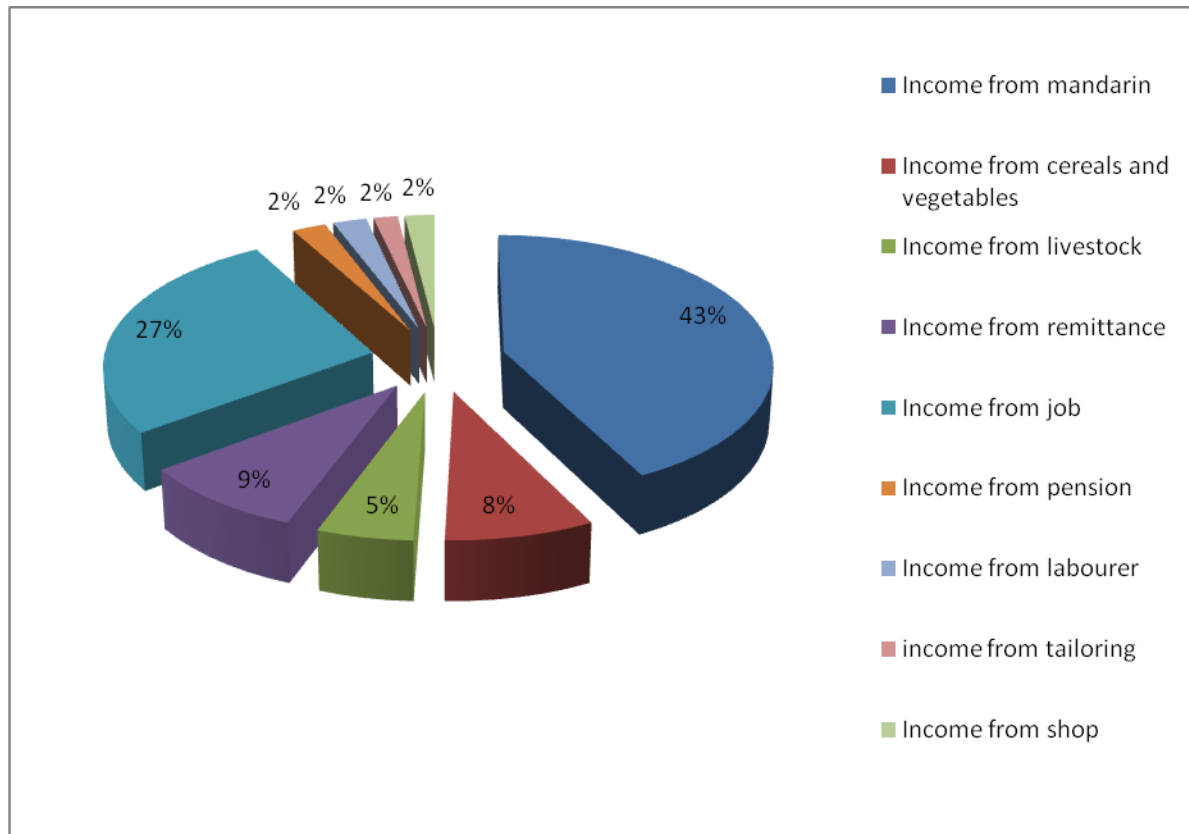


Figure 15. Sources of household income

Above figure showed that the contribution of mandarin in household income was 43%. About 27% income of the total house hold is obtained from job which is the second contributors of the household income followed by remittance (9%) as a third contributor. And income from livestock and cereals and vegetables was lesser as compare to mandarin income. Income from other sources was very less than 10%. Therefore we can conclude that mandarin farming was the highly significant contributor of household income.

4.3.3.4 Comparison of mandarin income by gender

The figure below showed that the average female member's income was higher than average male member. The highest income and lowest income can also be seen in female member. We can conclude that the female members were more successful to earned income from selling mandarin. Dhital (2008) also found high income earned by women than men from vegetable farming in Parbat district of Nepal.

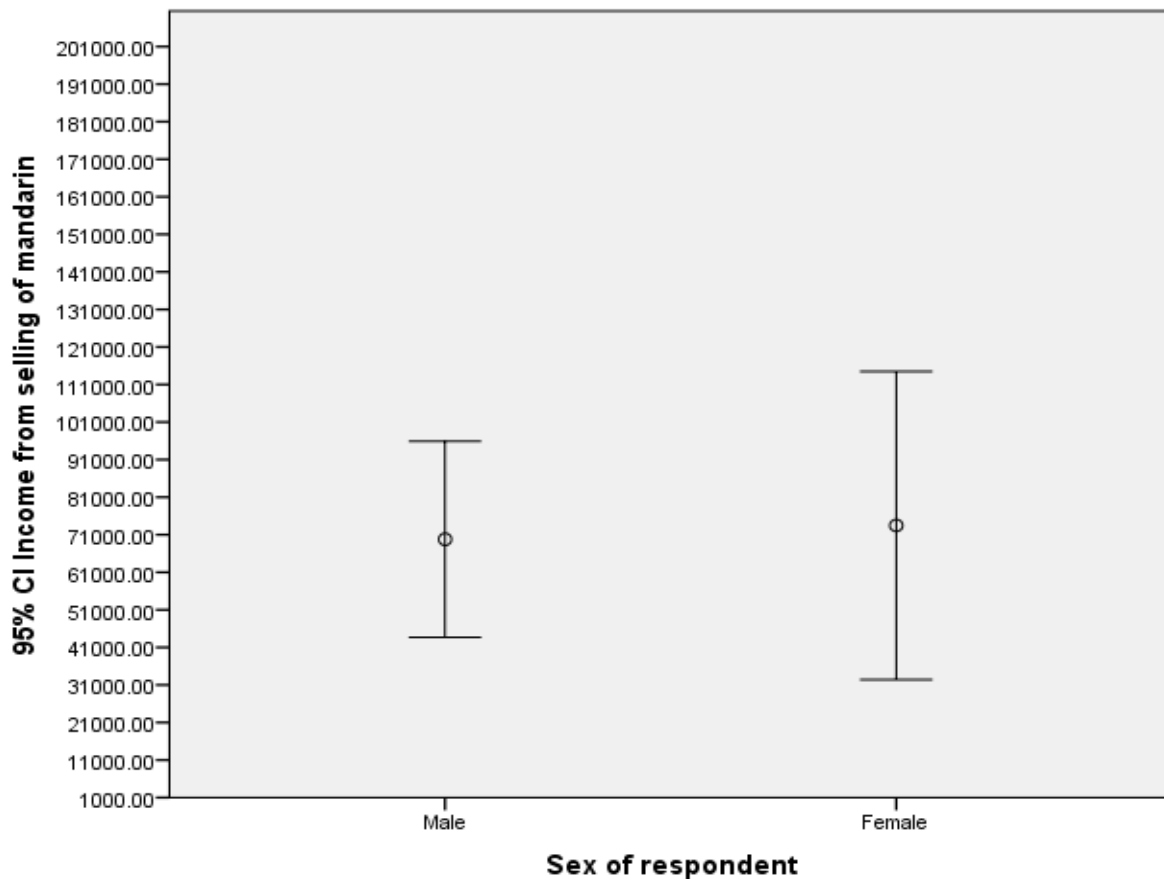
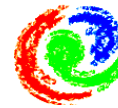


Figure 16. Income of mandarin by gender

The independent sample t-test result showed that there was no significant difference on income from selling mandarin with in gender ($P = 0.87$) (annex-L).

4.3.4 Gross margin analysis

Gross margins were analyzed for growers of each VDC. The overall gross margin per *hectare* from mandarin orange was higher in Chitti VDC (Rs 196,812) as compared to Udipur (Rs 116,812) that might be due to the higher amount of production of mandarin orange in Chitti.

The analysis of gross margin showed that mandarin orange cultivation was the profitable enterprise. This was also supported by Aryal (2001) as he found that the gross margin of the mandarin was higher than maize, millet and ghaiya and profitability was also higher.

Table 12. Gross margin by VDC

| VDCs | Gross margin (Rs./ha.) |
|--------|------------------------|
| Chitti | 196,812 |
| Udipur | 116,580 |
| Total | 156,696 |

Source: Own field work (2011)



4.3.5 Marketing system of mandarin orange

Marketing system is the chain from production to the consumptions that involves different actors like producers, traders, transporters, wholesalers, retailers and reaches ultimately to the consumers.

Mainly the mandarin producers and the pre-harvest contractors were the main persons involved in the marketing. Mainly buying, assembling, grading, transporting activities were done by the traders while producers were involved in the selling activities. The marketing system is described as follows:

Marketing channel in study area

The route through which goods from producers to the consumers are marketed is called marketing channel. The main chain actors and their functions have been described below shortly.

Input suppliers: The main supplier in the study area was local agro-vet and nursery owner. Local agro-vet supplies the chemicals and fertilizer to the grower. We found only one nursery owner in the study areas and nursery owner supplies saplings required to the farmer but number of saplings in the nursery was limited.

Mandarin growers: Producers produce mandarin in the study VDC. Most of them sold mandarin directly to the pre-harvest contractors and some of them sold mandarin to the wholesaler and retailers. Those who sold mandarin to the pre-harvest contractors they did not need the harvesting function but those who sold to the wholesaler and retailers, they did harvesting function but no grading and packaging functions.

Pre-harvest contractors: They usually visited the farmer in October/November and negotiate the total value of whole orchard with the producer. Contracts were done based on the number of fruiting tree, tentative fruit per tree counted on sampling basis regardless of size and other quality factors. The main functions of Pre-harvest collectors were to visit orchard of the farmer and fix price and make contract with them by giving 5-10 percent amount of total sales and latter the agreed amount paid in instalments after the harvesting and selling of the fruits. Pre-harvest contractor of that location do harvesting, grading, packaging and transporting of the fruit from production site to Kathmandu.

Wholesalers: The main function of the wholesaler is transporting, assembling, and sorting grading, storage and dissemination of the mandarin.

Retailor: Purchasing mandarin from the wholesaler and transport and sold to the consumer. Some retailers were also purchasing mandarin directly from the producers and selling to the consumers.

Consumers: People living in the Lamjung, Chitwan and Kathmandu were the consumers of mandarin. They buy it from the wholesale as well as from the retail market.

Supporters: The main supporter in Lamjung for mandarin sector was only District agriculture Development Office Lamjung. It provided training to the few selected elite farmer and sometimes distributes sapling in 50% subsidy to these selected farmer.

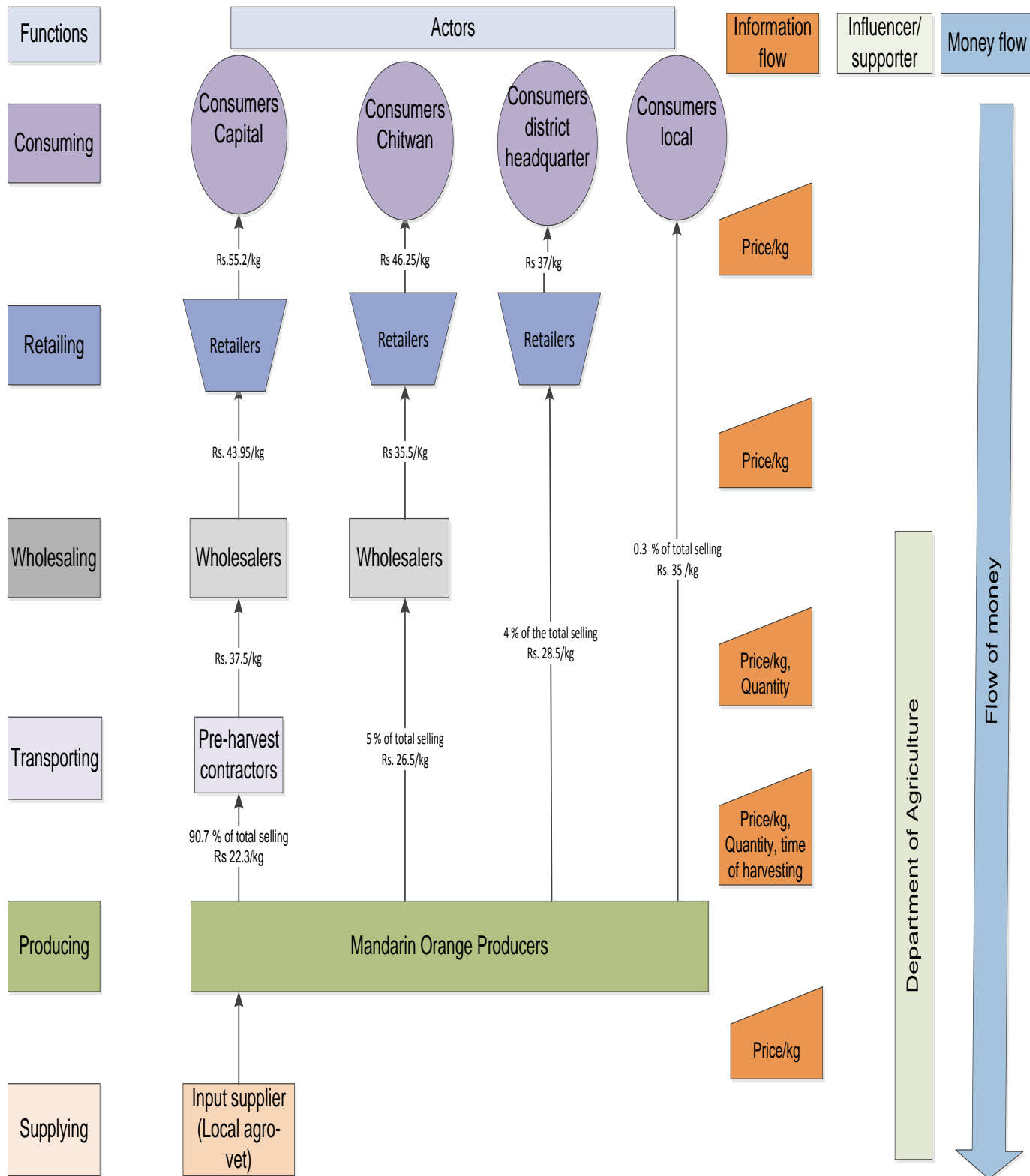
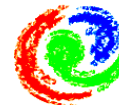


Figure 17. Market chain map of mandarin of Lamjung district

4.3.6 Mode of selling

Generally two types of selling practice i.e. selling to the wholesaler, retailer without contract and pre-harvest contract practices were followed by the farmers of the respective VDCs (Figure 18 and annex-M). The pre-harvest contract was the most commonly preferred system of selling. Farmers preferred pre-harvest contract because of the low risk associated as well as easy way of getting money without harvesting and transportation burden. The pre-harvest contract starts in October (after Dashain). Pre-harvest collector mostly 5-10 % of the contracted value of the fruits is advanced to the farmer. In turn collector secures exclusive right to the purchase of mandarin.

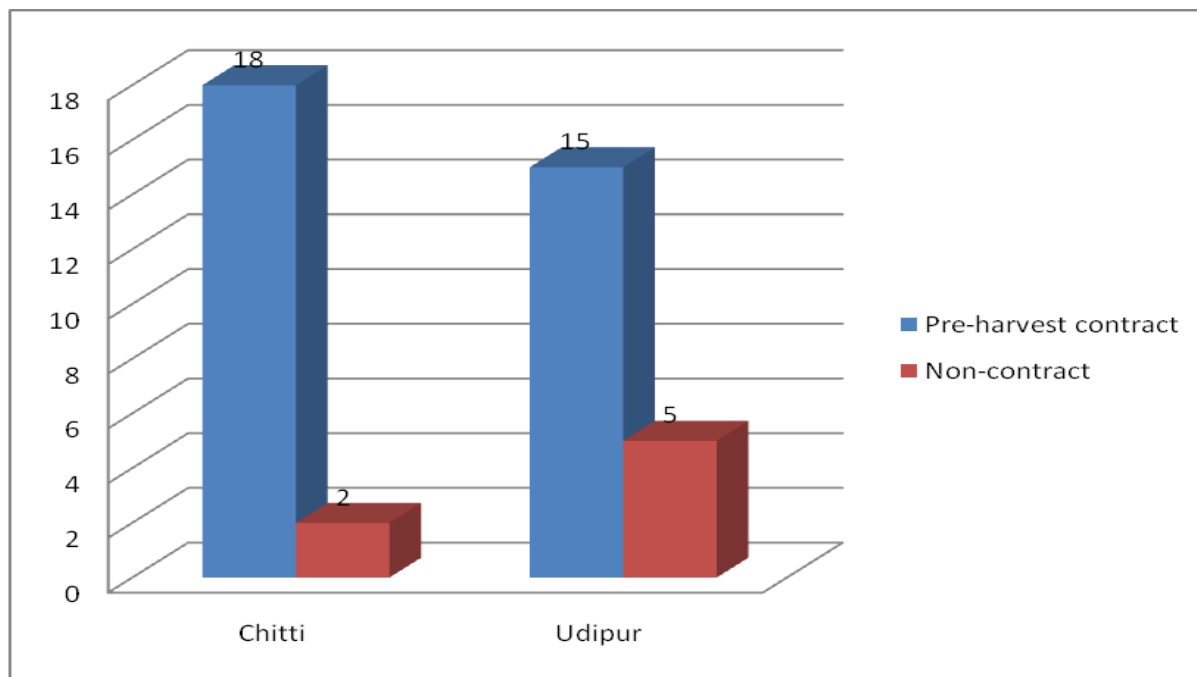
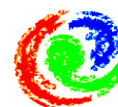


Figure 18. Selling practice of mandarin orange in the study area

The Pre-harvest contract selling was more common in Chitti VDC as compared to Udipur VDC which might be due to the higher quantity of mandarin orange produced in the as well as remoteness of the location as compare to Udipur VDC. While the figure 18 indicates that the numbers of people following non-contractual system were more in Udipur VDC because of easy accessibility of road than Chitti VDC. Three sampled household from Udipur were sold their produce to the wholesaler, two sampled household from Chitti and one sampled household from Udipur sold their produce to the retailer coming from district headquarter Besisahar, Lamjung and one sampled household from Udipur was sold directly to the consumer of district headquarter Lamjung. In non-contractual system farmer harvested and sold their mandarin to buyer but they did not grading their mandarin. The same result was found by GOI/MOA, 2009, according to it majority of producers sold mandarins to pre-harvest contractors, while a few sold the fruits to the wholesalers in India. From the informal conversation we found that the buyers have upper hand in fixing the price of the whole fruiting orchard even the price determination system is negotiation.

4.3.7 Marketing margin and producers share

Simply marketing margin is the difference between price paid by the consumer and received by the producer. While producers share is the percentage share of producers on consumer's rupees. Lower marketing margin and higher producers share on the consumer's rupees is the indication of the marketing efficiency.



The overall marketing margin of the study area was found to be Rs 32.9 per kg in long chain and Rs 19.75 per kg in short chain whereas the producers' share was 40 percent in long chain and 56 percent in short chain. Kafle (2007) found 55 % producer's share in consumer's rupees in mandarin orange marketing in Kaski district of Nepal. Gangwar and Singh (1998) found 55 percent producers' share on the consumers' rupees in mandarin orange in Indian condition. Sharif et al. (2005) found that 44 percent producer's share in early season of citrus marketing in Pakistan. Therefore, in comparisons with these two countries, Nepalese farmer were getting fewer shares in consumer rupees.

The value share of different chain actor in long chain and short chain is shown in figure 19.

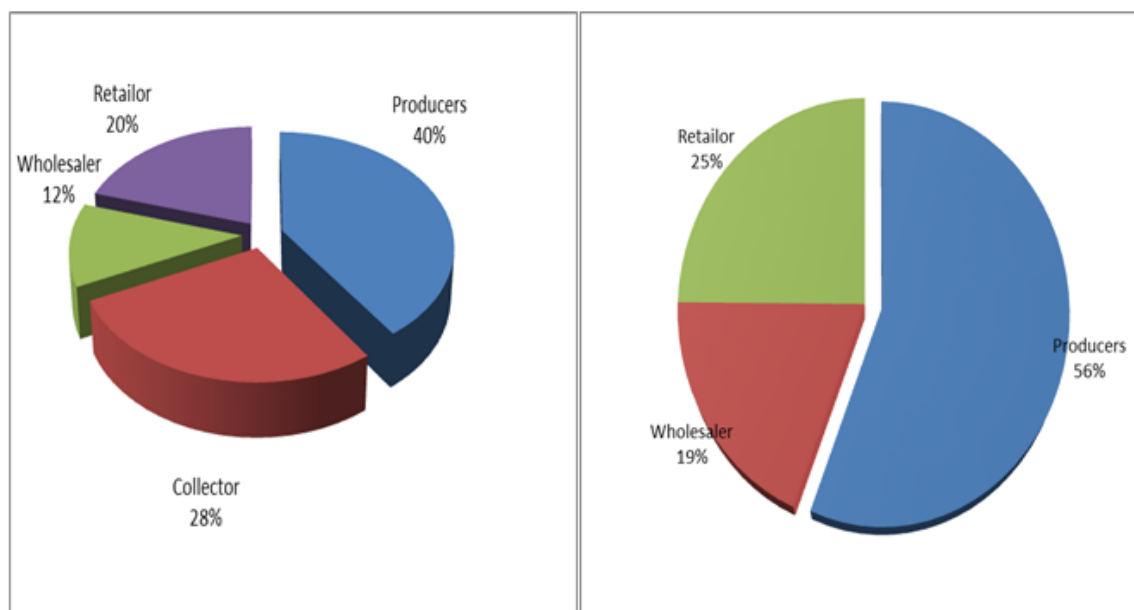
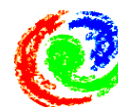


Figure 19. Value share in long chain (left) and short chain (right)

Table 13. Marketing cost and profits of mandarin from production site to Kathmandu

| S.N. | Item | NRs per quintal (100 Kg) |
|------|--|-----------------------------|
| 1 | Selling price of producer/Purchased price of pre-harvest collector | 2230 |
| 2 | Total marketing cost incurred by pre-harvest collector | 675 |
| | Marketing margin of pre-harvest collector | 1520 |
| | Profit of Pre-harvest collector | 845 |
| | Selling price of pre-harvest collector/Purchased price of wholesaler | 3750 |
| 3 | Total marketing cost incurred by wholesaler | 332 |
| | Selling price of wholesaler/purchased price of retailer | 4395 |
| | Marketing margin of Wholesaler | 645 |
| | Profit of wholesaler | 313 |
| 4 | Total marketing cost incurred by retailer | 484 |
| | Selling price of Retailer/Purchased price of Consumer | 5520 |
| | Marketing margin of Retailer | 1125 |
| | Profit of Retailer | 641 |

Source: Own field work (2011)



The above and below tables show that the initial value of the mandarin changed at different steps depending upon the number of intermediaries involved. In the production process, producer contracted to the pre-harvest contractor to sell the mandarin. The producer sold the fruits at Rs 2230/kg. The selling price of the producer became purchase price of pre-harvest contractor. Later on contractor starts picking and grading and transporting and the cost incurred to bring the mandarin from production site to wholesale market was Rs 6.75/kg. The detail of marketing cost has been presented in annex-N. Likewise the value has added in the products and finally the consumer price was Rs 55.20/kg which was more than two times with producers' price in long chain. But in short chain the final price (consumers' price) is less than two times.

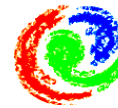
Table 14. Marketing cost and profits of mandarin from production site to Narayangard

| S.N. | Item | NRs per quintal (100 Kg) |
|------|--|-----------------------------|
| 1 | Selling price of producer/Purchased price of wholesaler | 2650 |
| 2 | Total marketing cost incurred by wholesaler | 585 |
| | Marketing margin of wholesaler | 900 |
| | Profit of wholesaler | 315 |
| | Selling price of wholesaler /Purchased price of retailer | 3550 |
| 3 | Total marketing cost incurred by retailer | 334 |
| | Selling price of Retailer/Purchased price of Consumer | 4625 |
| | Marketing margin of Retailer | 1175 |
| | Profit of Retailer | 841 |

Source: Own field work (2011)

By comparing above two tables we can say farmer were receiving high income and consumer were paying less price due to less number of intermediaries in short chain and farmer were getting low income and consumer were paying more price in long chain having more number of intermediaries. In market margin study of mandarin in Pakistan, Sabir et al. (2010) concluded that by reducing the number of intermediaries in the chain not only the purchased price of consumer decreased but also the producer receives high price.

The calculation showed that traders were taking more profit within a short period of time. Pre-harvest collector was getting profit Rs 845 from one quintal of mandarin while mandarin farmer were getting Rs 1243 profit from one quintal of mandarin (referring table-12, GM/ha=156,696 and average production per ha is 12.3 Mt) within the period of one year and also ignoring the fixed cost. Therefore we can conclude that trader mainly pre-harvest collector was taking more profit from the mandarin marketing. Therefore it is better to do a collective marketing as a result farmer groups/cooperative can directly sell their mandarin to the wholesaler and there will be efficient marketing system.



4.3.8 Market information

Market information comprises information on price, product demand and supply, seller and buyers. It is very important to have up to date knowledge and access to timely marketing information in order to decrease the risk of losing money on a market transaction (Teka, 2009).

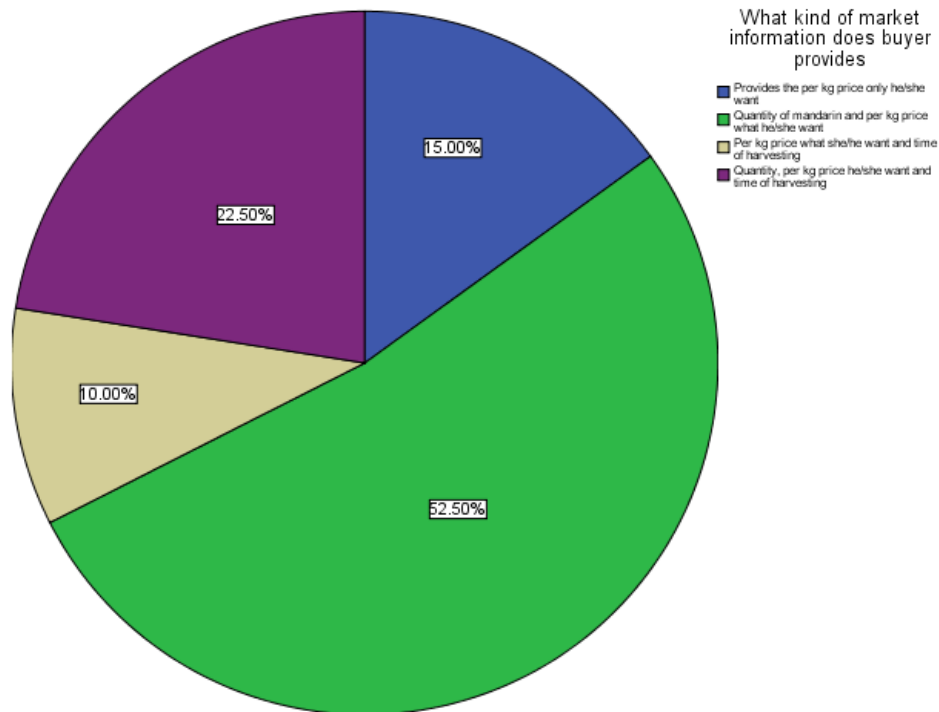


Figure 20. Market information sharing among the trader and producer

In response to the kind of market information sharing between the trader and producer the study showed that more than fifty percent of the surveyed farmer received per kg price what trader wanted to provide and quantity of buying, 22.5 percent of farmer received price per kg, quantity required and time of harvesting. There was no clear information sharing in between trader and producer, the trader provides per kg price of their interest, quantity of requirement and harvesting time only. Sharma (2007) also says that due to poor or no access to information on market price of their produce to farmer, intermediaries easily manipulate the information on market prices of agricultural product in the pursuit of increasing their profit margin as a result farmer receives low prices.

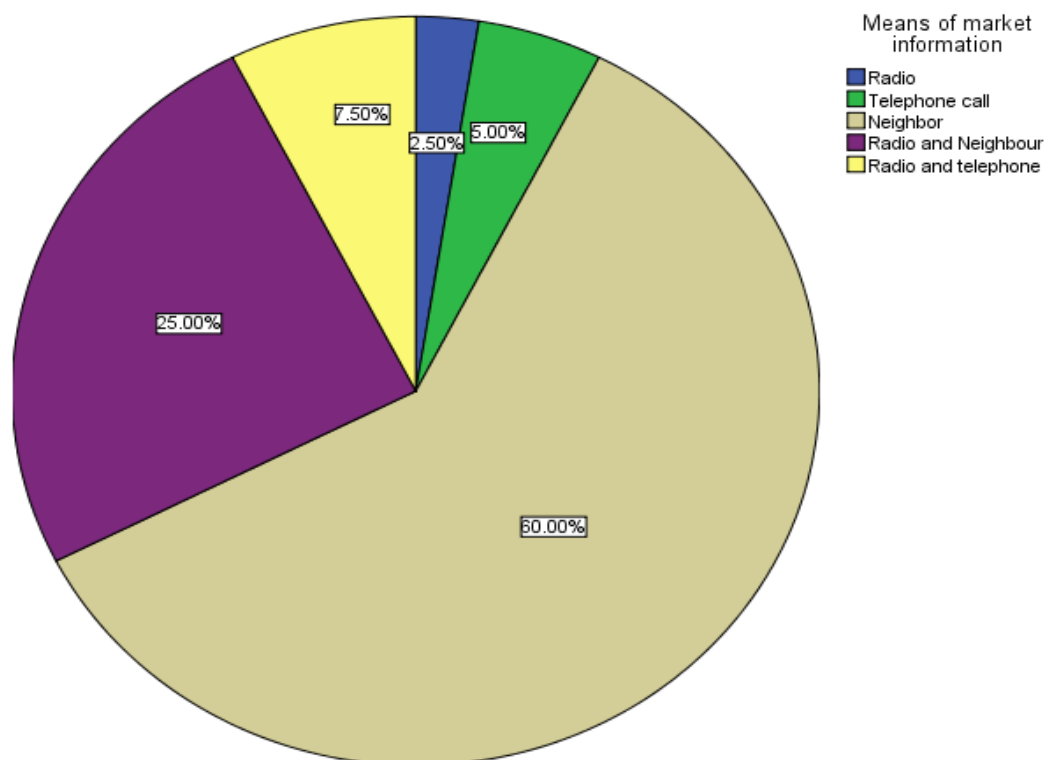


Figure 21. Means of market information used by survey farmer

Most of the farmer (60 %) in the study area received market information through friends/neighbours and followed by neighbour and radio (25%), radio and telephone call (7.5%), through telephone call 5 % and only radio call 2.5 %. They were not using the news paper as a source of market information it was due to inaccessibility of newspaper in the village.

For collector and wholesaler telephone call was the most reliable source of market information and for retailers radio and telephone calls and information from friend were the main source of market information. Milagrosa (2007) reported that 35 percent farmers receive vegetable price information from other farmers (friends) only followed by other farmers and radio (31 percent) in the Philippines.

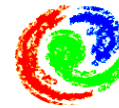
4.4. Analysis of marketing practices

4.4.1 Grading

Most of the farmers of the research area sold their mandarin to the collector before harvesting. Those farmers who did not sold to the collector before harvesting, they harvested themselves and the grading practices were not applied. Pre-harvest collector practised the grading system; they graded the mandarin in three category, i.e. big, medium and small. Wholesaler also graded the mandarin in to four groups i.e. extra big, big, medium and small. Retailers graded in to two groups only big and small. They were aware about the importance of grading.

4.4.2 Packaging

Packaging is most important for keeping quality of mandarin. All collectors and wholesaler were using plastic crates for packaging of mandarin in the study area. Retailers of Lamjung were still using traditional method of packaging such doko (bamboo basket). The raitailers of Kathmandu and Narayangard found to use plastic crates and wooden boxes. Plastic crates



were expensive but it reduced the losses during handling (loading, unloading and transportation).

4.4.3 Transportation

There were no any specialized refrigerated vehicles for the transportation of fruits and vegetables in Nepal. Mostly fruits and vegetables were transported from production area to markets mainly on trucks and bus. In research area most of the farmers were selling their mandarin to the pre-harvest contractors. Mandarin from study area to market was transported on delivery van (pick up) by the collector. Wholesalers were also found using rented pick up van and sometimes truck for the transportation of mandarins from the study area. Retailers were using rickshaw and roof of the bus as well as bicycles for the transportation of mandarin from wholesale market to retail shop. In case of Lamjung, retailers were transported mandarin from production site to shop by self head load and sometimes on the roof of bus.

4.5 Quality response of the producer

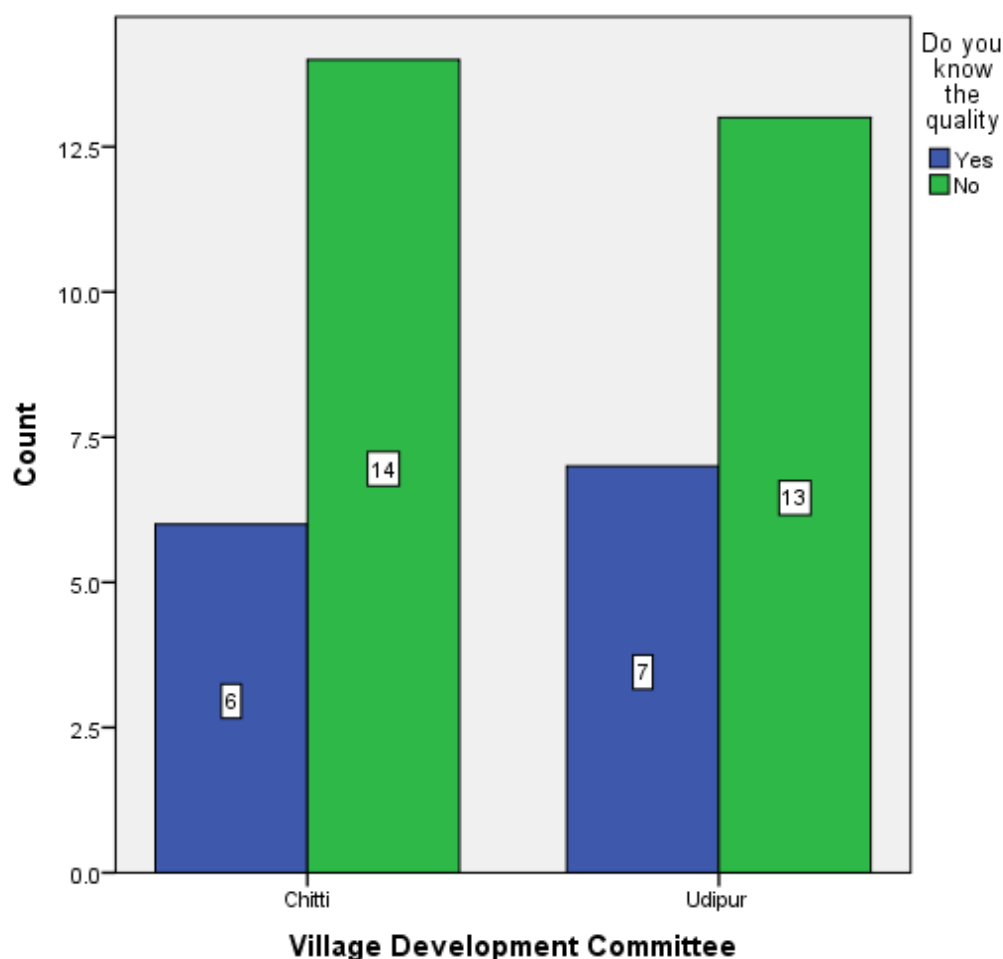
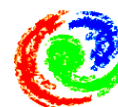


Figure 22. Respondent response to quality

In response to quality the result showed that 65 % and 70 % of the respondents did not know the word meaning of quality in Udipur and Chitti respectively. About 35% respondents from Udipur and 30% respondents from Chitti knew quality and the quality that their mandarin has good taste, thin skin, attractive colour and size.



4.5 Respondent response to price offered by trader

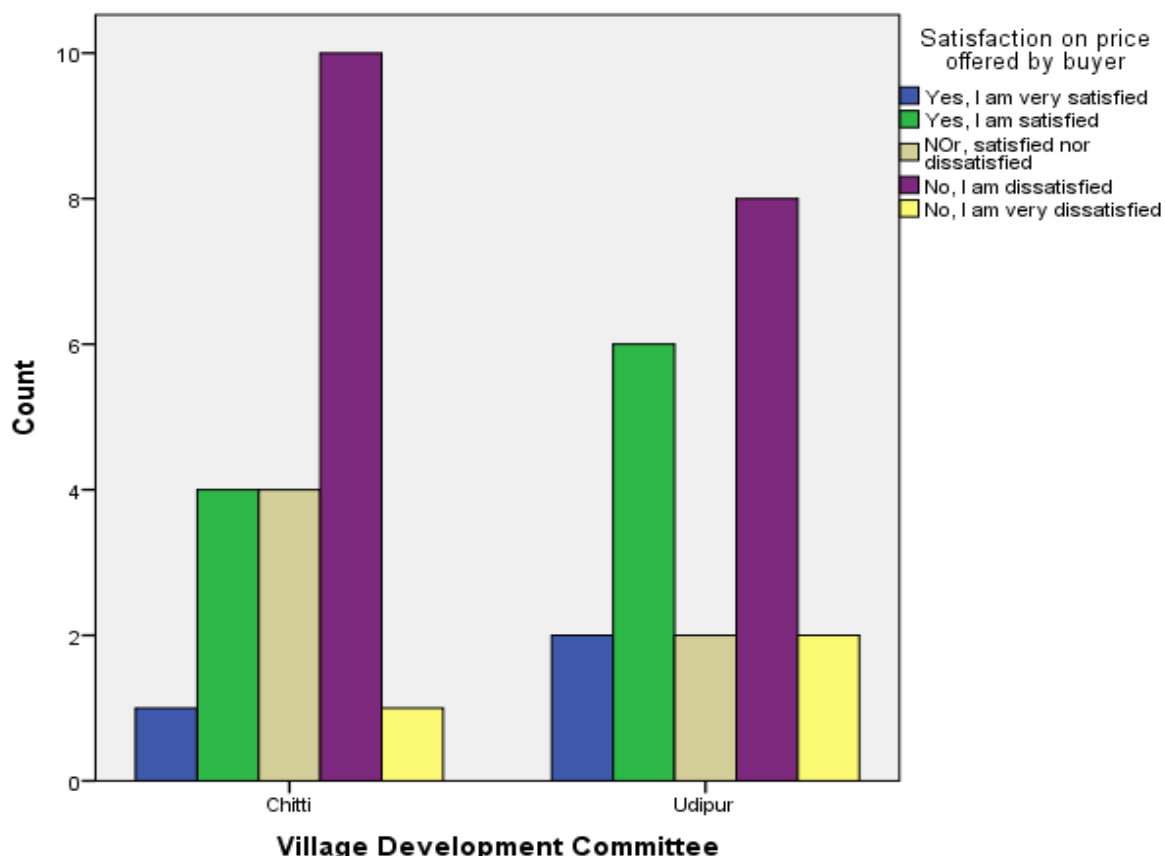


Figure 23. Respondent response to price offered by trader

The above figure showed that most of the respondent farmers 10 respondents out of 20 and 8 out of 20 in Chitti and Udipur respectively were dissatisfied with the price offered by trader. High differences in two VDCs were due to less price offered by trader to the respondent due to remoteness and the average price is also little bit less in Chitti. Happy with price offered by trader were more in Udipur (6) than Chitti (4). Nor satisfied, nor dissatisfied were higher in Chitti (4) and 2 in Udipur..

4.6 Problems of mandarin orange cultivation

The farmers of respective area faced several production and marketing problems. It deals with the production and marketing problems of mandarin orange.

4.6.1 Production problems of mandarin orange

Nepalese agriculture is subsistence in nature and facing several production related problems. Different production problems were listed according to the farmers' perception on the given problems and ranked according to the scoring value from the specific problems. In Chitti VDC lack of irrigation facility, disease and insect got the highest rank followed by lack of technical knowledge, high price of input whereas in Udipur VDC disease got the highest rank followed by the lack of technical knowledge, insect, lack of irrigation facility and credit facility. Bastakoti (2002) mentioned lack of technical knowledge, lack of irrigation facility, disease and insect as problems in the production of mandarin orange. Kafle and Rana (2003) found that lack of irrigation facility, not well managed nutrient system, problems of insect and diseases as production problems of citrus in Gorkha district. Farmers' perception on the different problems of production of surveyed VDC is given on table 15 and 16.

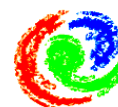


Table 15. Index of production constraints of Chitti VDC

| Problems | Scores | | | | | total | Index | Rank |
|---|--------|----|----|---|---|-------|-------|------|
| | 5 | 4 | 3 | 2 | 1 | | | |
| Lack of Irrigation facility | 18 | 1 | 1 | 0 | 0 | 20 | 4.85 | I |
| Disease | 13 | 2 | 4 | 1 | 0 | 20 | 4.35 | II |
| Insect | 12 | 4 | 2 | 3 | 0 | 20 | 4.25 | III |
| Lack of technical knowledge | 4 | 15 | 1 | 0 | 0 | 20 | 4.15 | IV |
| High price of input | 0 | 9 | 8 | 2 | 1 | 20 | 3.25 | V |
| Lack of good quality of sapling | 0 | 5 | 9 | 4 | 2 | 20 | 2.85 | VI |
| Poor variety of mandarin | 0 | 4 | 10 | 5 | 1 | 20 | 2.85 | VI |
| Lack of credit facility | 0 | 0 | 14 | 5 | 1 | 20 | 2.65 | VII |
| Hailstone | 0 | 0 | 15 | 5 | 1 | 20 | 2.65 | VII |
| Farmer not able to form producer organization | 0 | 4 | 7 | 4 | 5 | 20 | 2.5 | VIII |
| Unavailability of input in time | 0 | 1 | 5 | 6 | 8 | 20 | 1.95 | IX |

Source: Own field work (2011)

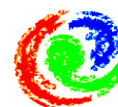
Table 16. Index of production problems of Udipur VDC

| Problems | Scores | | | | | total | Index | Rank |
|---|--------|---|----|----|----|-------|-------|------|
| | 5 | 4 | 3 | 2 | 1 | | | |
| Disease | 14 | 2 | 2 | 2 | 0 | 20 | 4.4 | I |
| Lack of technical knowledge | 10 | 6 | 4 | 0 | 0 | 20 | 4.3 | II |
| Insect | 11 | 4 | 4 | 1 | 0 | 20 | 4.25 | III |
| Lack of irrigation facility | 10 | 6 | 2 | 2 | 0 | 20 | 4.2 | IV |
| Lack of credit facility | 5 | 3 | 9 | 2 | 1 | 20 | 3.45 | V |
| Farmer not able to form producer organization | 4 | 6 | 4 | 3 | 3 | 20 | 3.25 | VI |
| High price of input | 0 | 3 | 11 | 6 | 0 | 20 | 2.85 | VII |
| Lack of good quality sapling | 0 | 4 | 10 | 3 | 3 | 20 | 2.75 | VIII |
| Hailstone | 0 | 0 | 7 | 12 | 1 | 20 | 2.3 | IX |
| Poor variety of mandarin | 1 | 0 | 4 | 10 | 5 | 20 | 2.1 | X |
| Unavailability of input in time | 0 | 0 | 3 | 6 | 11 | 20 | 1.6 | XI |

Source: Own field work (2011)

In the study area unavailability of input in time was the least serious production problem in both VDCs this is due to very less use of chemical fertilizer and pesticide. Growers were using organic manures more for cultivation of mandarin. Lack of credit facility was within top five problems in Udipur VDC that might be availability of lower caste, which were economically weak.

Budhathoki (2004), suggested drip irrigation system where water was scarce. It was easy to handle and also cheap for producer. Water use efficiency was very high in this system and small volume of water can irrigate large area.



4.6.2 Marketing problems

Marketing plays important role for the easy disposal of the product from producer ultimately to the consumer. Due to low storage life in ordinary condition easy and safe disposal of the commodity after harvesting was utmost.

According to the farmer's perception on the specified marketing problems, problem ranking was done. Lack of market information, unorganized marketing, low price offered by the trader, high transportation cost and lack of storage facility were the top five marketing problems in Chitti VDC and unorganized marketing, lack of market information, low price offered by trader, lack of storage facility and high transportation cost were the top five marketing problems in Udipur VDCs (table 16 and 17). Kandel (2007) has also identified lack of market information, unorganized marketing, high transportation cost, and lack of storage facility as constraints in marketing of guava in Tanahun. Likewise, Kafle and Rana (2003) also found that lack of market information, lack of farmers' net works and lack of collection centres and market places as marketing problems of citrus in Gorkha district. Shrestha (2009) says collective marketing is the best way of marketing which have strong bargaining power on price determination and the increase profit from the enterprise to the small holder farmer.

Table 17. Index of marketing constraints of Chitti VDC

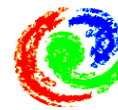
| Problems | Scores | | | | | total | Index | Rank |
|--------------------------------|--------|----|---|---|----|-------|-------|------|
| | 5 | 4 | 3 | 2 | 1 | | | |
| Lack of market information | 13 | 6 | 1 | 0 | 0 | 20 | 4.6 | I |
| Unorganized marketing | 13 | 4 | 3 | 0 | 0 | 20 | 4.5 | II |
| Low price offered by trader | 8 | 9 | 2 | 0 | 1 | 20 | 4.15 | III |
| High transportation cost | 6 | 10 | 4 | 0 | 0 | 20 | 4.1 | IV |
| Lack of storage facility | 3 | 3 | 9 | 4 | 1 | 20 | 3.15 | V |
| Lack of good moterable road | 3 | 3 | 7 | 5 | 2 | 20 | 3 | VI |
| Lack of processing knowledge | 0 | 6 | 7 | 4 | 3 | 20 | 2.85 | VII |
| Frequent transport obstruction | 0 | 0 | 6 | 4 | 10 | 20 | 1.8 | VIII |

Source: Own field work (2011)

Table 18. Index of marketing constraints of Udipur VDC

| Problems | Scores | | | | | total | Index | Rank |
|--------------------------------|--------|----|---|----|----|-------|-------|------|
| | 5 | 4 | 3 | 2 | 1 | | | |
| Unorganized marketing | 12 | 6 | 2 | 0 | 0 | 20 | 4.5 | I |
| Lack of market information | 9 | 10 | 1 | 0 | 0 | 20 | 4.4 | II |
| Low price offered by trader | 6 | 10 | 4 | 0 | 0 | 20 | 4.1 | III |
| Lack of storage facility | 6 | 10 | 4 | 0 | 0 | 20 | 3.8 | IV |
| High transportation cost | 0 | 0 | 2 | 12 | 0 | 6 | 2.5 | V |
| Lack of processing knowledge | 0 | 0 | 7 | 12 | 1 | 20 | 2.3 | VI |
| Frequent transport obstruction | 0 | 3 | 2 | 0 | 15 | 20 | 1.65 | VII |
| Lack of good moterable road | 0 | 0 | 2 | 5 | 13 | 20 | 1.45 | VIII |

Source: Own field work (2011)



4.7 Respondent suggestion to improve the production and market chain

To address the facing production and marketing problems respondent were asked to provide the suggestion to solve the facing problems. All most all farmer (100%) gave suggestion to provide disease and pest management training, 95 % of the respondent suggested to provide good cultivation knowledge, 75% farmer suggested to facilitate to form producer organization/cooperatives and 28 % farmer suggested for easily provision of credit with low interest rate because some farmer were taking loan with the neighbour with high interest rate (i.e. 24 %) and 10 % farmer were suggested timely availability of input. Likewise, 12.5 % farmers suggested to provide technical person in the mandarin growing VDCs to minimize the production problems. Some of them also requested to provide insect and disease free saplings in subsidy.

Furthermore, respondent were also asked to provide the suggestion to solve the marketing problems, for that, 90 % farmer suggested to provide a marketing information to the mandarin farmer through local FM radios and establishing notice board and providing marketing information daily at the time of mandarin harvesting in the centre of the VDC and provision of storage facility during peak harvesting season for 2-3 months. About 90% farmers suggestion was facilitation of marketing as group will be better options, 25 % farmer were asking to provide processing knowledge through any concern governmental and non-governmental organization.

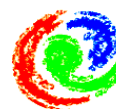
From the side of traders most of them expressed frequent strikes organized by different parties and pressure group, high transportations cost and levies taken by government body are the main problems and suggested these problems should be addressed by the concern authority.



4.8 SWOT analysis

Mandarin production and marketing sector in Lamjung district has following strength, weakness, opportunity and Threats.

| Internal factor | External factor |
|---|---|
| Strength | Opportunity |
| <ul style="list-style-type: none"> ➤ Availability of highly suitable climatic condition for mandarin production. ➤ Good image of mandarin in the market of that location due to good taste. ➤ Government's different plan and policies has prioritized mandarin as high value crop in 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 of the urban areas of the country. | <ul style="list-style-type: none"> ➤ High demand of that region's mandarin in Kathmandu. ➤ Better export potential to India and Bangladesh. ➤ Diversified climate. ➤ Utilization and conservation of sloppy land. ➤ Employment opportunity ➤ Government of Nepal is emphasizing commercial cultivation of mandarin orange. |
| Weakness | Threat |
| <ul style="list-style-type: none"> ➤ Growers are scattered, low production mainly due to low use of external input. ➤ Use of low quality input. ➤ Poor transportation facility. ➤ Lack of storage and processing facility. ➤ Lack of technical know-how. ➤ Lack of credit. ➤ Low government subsidy. ➤ Lack of suitable variety to prolonged harvesting time. ➤ Seasonality of the fruit. ➤ Lack of irrigation facility. ➤ Very less research on mandarin sectors ➤ Limited number of buyer ➤ High postharvest losses. ➤ Lack of collection centre. | <ul style="list-style-type: none"> ➤ Bad weather. (Long drought or heavy rainfall) ➤ Incidence of citrus decline ➤ Attack of many insect. ➤ Political instability. ➤ Frequent strike. ➤ High cost of input. ➤ Increasing of labour cost. ➤ Increasing cost of input. ➤ Lack of coordination between production and marketing. ➤ Highly consumption markets are situated far, farmer not satisfied with the price they receive. ➤ Farmer has inadequate information on marketing of orange. ➤ The orchard selling on contractual system not good due to low price offered by contractor and sometime uncertainty of payment. ➤ Increase supply of Indian mandarin in Nepalese market. |



Box-1. Success story

“Mandarin farming gave me a new life”



I am Bishnu Panta and I am 37 years old. I am a smallholder mandarin farmer in Dhimire village ward no-2 of Udipur Village Development Committee. I am married and I have two children. I started mandarin farming in 1996. Mr. Tilak Raj Panta, a progressive farmer of this village inspired me for mandarin cultivation. At the beginning I planted 100 saplings in three ropanies of land (0.15 ha) and when it started to give returns after 4 years of transplantation I earned Rs 7,000 at the first harvest of mandarin. Initially my wife was unhappy but when I started to take income from mandarin then my wife became happy. Then I added 210 sapling in 6 ropanies (0.3 ha) of land. Now I have 300 plants in my 9 ropanies (0.45 ha) of land. Besides that I have 20 bee-hives, last year I earned Rs 10,000 by selling honey. Last year the cost for cultivation of mandarin in one ropanies was Rs

4,420 (cost for manure, labour, fertilizer, pesticide, lime and copper sulphate) I sold mandarin Rs 13,378 from one ropanies of land total profit was Rs. 8,958 from the whole area I gained Rs 80,622 profit.

From the income of mandarin farming I have opened small grocery shop in the village and my children are going to boarding school. Mandarin farming gave me a new life to me. My wife helps me for the cultivation of mandarin and selling goods from small grocery shop.

I generally sell my mandarin to the pre-harvest contractor. When asked about problems in mandarin farming, then he replied disease, lack of technical knowledge, insect, lack of irrigation facility, high price of input, unorganized markets, low price given by trader, lack of storage facility are the main problems of marketing, further he also added we don't know the actual price of mandarin in the market, without knowing the actual price of mandarin we are selling mandarin to collector. We have needed improved technology for mandarin production, if the government and other organization is really want to improve our situation they have to address above mentioned problems.



CHAPTER 5: CONCLUSION AND RECOMMENDATION

This chapter describes with the conclusions based on findings. Also, this chapter describes some recommendations made for mandarin chain improvements.

5.1 Conclusions

Chitti and Udipur VDCs are the potential production area of mandarin orange due to soil and climatic condition and to some extent link to road. The descriptive analysis showed that the number of population was higher in Udipur (134) VDC than Chitti (123). The numbers of economically active population were higher in Chitti. Bramhins were the dominating cast in both of the VDCs. Dallit caste was also growing mandarin in Udipur VDC but not found in Chitti VDC. The average landholding was slightly higher in Udipur VDC, which were 0.97 hectare in Udipur and 0.89 hectare in Chitti. The average land under mandarin orange cultivation was 0.26 hectare in Chitti and 0.24 hectare in Udipur VDC. The productivity of the mandarin in Chitti was 15 Mt/hectare and in Udipur was 9.5 Mt/hectare, which is higher than national average figure (11.3 Mt/ha.) in Chitti that was due to high use of organic manure in the orchard and more fertile soil. The production cost of mandarin orange in Chitti was Rs. 122,988 per hectare and Udipur was Rs 108,570 per hectare and the average cost was Rs 115,779 per hectare. Per hectare returns from mandarin was higher in Chitti (Rs 319,800) than Udipur (Rs 225,150). From the analysis we found that average female farmers were earning more than male from mandarin farming.

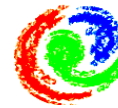
Mainly producers were selling mandarin in two ways in contractual system and non-contractual system. Contractual system was found more common. Four types of marketing channel were found in the study area. About 91 % of the production was found to reach consumers through pre-harvest contractors, wholesalers and retailers. More commonly used material for packaging mandarin was plastic crates and means of transportation was delivery van. Some retailers were also using rickshaw and bicycles.

From the study we found that producers and traders (pre-harvest contractors, wholesalers and retailers) and consumers were the main actors of the marketing system. Producers were involved to sell the mandarin in the farm and traders were found to be involved in buying, harvesting, collecting, packaging, transporting and selling of the mandarin.

Gross margin analysis showed that mandarin orange cultivation was profitable and best option for small holder farmer. The producers share is high (40%) among all actors in the value chain of mandarin but if we compare other district with in the country and outside neighboring country India and Pakistan farmer of that area were getting low value share in the consumer rupee. If we analyze the profit gained by selling one quintal mandarin traders were getting significant amount of profit within short duration.

Pre-harvest contractors were sharing the market information with farmer on price per kg what the collectors want to provide and quantity required and time of harvesting. There was no clear information sharing in between trader and producer, the trader provides per kg price on their interest. Information sharing among the traders was per kg price, quantity and time of delivery. Means of marketing information was mostly neighbour for producer and telephone call for other traders. We can conclude that there was no fair information sharing among the chain actors.

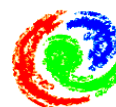
Farmers were found to be facing several productions and marketing problems The major production problems were lack of irrigation facility, diseases, insect, lack of technical knowledge, high price of input and the major marketing problems were lack of marketing information, unorganized marketing, high transportation cost and the low price offered by the traders



From the research, we found that mandarin orange cultivation was found to be significant source of household economy. To achieve more income through mandarin business mandarin growers should unite in producer organization then should start the group approach of mandarin marketing directly with wholesaler by omitting pre-harvest contractor in the chain. Group approach of marketing can give more benefit to the farmer by reducing the profit taken by pre-harvest contractors as well as can reduce the price of consumer to some extent.

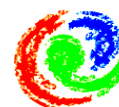
5.2 Recommendations

- Nepalese orange are available for 3 (15th of November to 15th of February) months of the year in the market. During peak harvesting season the price of mandarin gets low; whereas after February Nepalese market is covered by Indian Nagpure mandarin which cost more but not good taste as Nepalese mandarin. Therefore to fetch the good price of mandarin there should be the facility of storage, oranges can be stored in cellar stores for 3 months. So that for the storage of mandarin low cost cellar store should be constructed at the farmer field as a demonstration. Then farmer can adopt the technology by making cellar store themselves.
- Efficient method of irrigation technologies (like drip irrigation) should be introduced to that location to minimize the irrigation problems. Drip irrigation is easy to handle and cheap to buy and maximum utilization of water.
- Farmers in this area lacking market information, which could improve their knowledge to bargain with traders on prices of their commodities. So there is need to strengthen the market information services by broadcasting daily rate of mandarin of different market through Local FM radio and establishing price notice board in the centre of the location.
- Production and plant protection training to farmer is must for technology transfer for meeting their practical needs of increasing productivity and quality of mandarin.
- There should be formed producer's organization/ cooperative for marketing of mandarin fruits because the advantage of cooperative marketing includes: economies of scale, through joint purchasing of inputs and joint marketing of products, collective bargaining power, low transaction cost (for producers and traders) and improves access to finance where credit organizations favours 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.
- Due to lack of knowledge about variety (high yielding, early and late variety) most of the farmers were growing local variety therefore it will be better to provide information about variety.

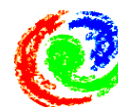


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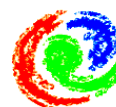
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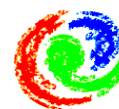


APPENDIXES

Annex A. Mandarin production district based on the total area productive area and production in 2008/09

| S. N | District | Total area (ha) | Productive area (ha) | Production (Mt) | S. N | District | Total area (ha) | Productive area (ha) | Production (Mt) |
|------|---------------------|-----------------|----------------------|-----------------|------|---------------|-----------------|----------------------|-----------------|
| 1 | Syangjha | 1304 | 889 | 11732 | 28 | Myagdi | 254 | 173 | 2004 |
| 2 | Lamjung | 1214 | 826 | 10814 | 29 | Udayapur | 228 | 155 | 1954 |
| 3 | Tanahun | 1057 | 719 | 9631 | 30 | Dolakha | 260 | 177 | 1822 |
| 4 | Salyan | 1160 | 789 | 8598 | 31 | Kathmandu | 201 | 137 | 1655 |
| 5 | Kavrepalanc howk | 890 | 605 | 7565 | 32 | Sinduli | 180 | 122 | 1501 |
| 6 | Terathum | 820 | 558 | 7193 | 33 | Kailali | 195 | 195 | 1500 |
| 7 | Gorkha | 787 | 535 | 7011 | 34 | Okhaldhunga | 266 | 181 | 1483 |
| 8 | Dhading | 763 | 519 | 6341 | 35 | Solukhumbu | 190 | 129 | 1446 |
| 9 | Dhankuta | 671 | 457 | 5935 | 36 | Chitwan | 207 | 141 | 1391 |
| 10 | Arghakanchi | 704 | 479 | 5649 | 37 | Sindhupalchok | 195 | 132 | 1362 |
| 11 | Kaski | 660 | 449 | 5341 | 38 | Kalikot | 187 | 127 | 1358 |
| 12 | Khotang | 613 | 417 | 5252 | 39 | Lalitpur | 163 | 111 | 1341 |
| 13 | Panchthar | 600 | 408 | 5100 | 40 | Jajarkot | 178 | 121 | 1313 |
| 14 | Dailekh | 649 | 441 | 4943 | 41 | Nuwakot | 157 | 107 | 1279 |
| 15 | Bhojpur | 526 | 358 | 4652 | 42 | Pyuthan | 165 | 112 | 1233 |
| 16 | Palpa | 534 | 363 | 4285 | 43 | Dadeldhura | 131 | 89 | 1194 |
| 17 | Baglung | 456 | 310 | 3659 | 44 | Bhaktapur | 115 | 78 | 942 |
| 18 | Rolpa | 476 | 324 | 3557 | 45 | Surkhet | 122 | 83 | 882 |
| 19 | Gulmi | 410 | 279 | 3290 | 46 | Darchula | 141 | 96 | 863 |
| 20 | Baitadi | 410 | 279 | 3178 | 47 | Dang | 90 | 78 | 707 |
| 21 | Achham | 411 | 280 | 3161 | 48 | Bajhang | 106 | 72 | 619 |
| 22 | Taplejung | 384 | 261 | 2925 | 49 | Makwanpur | 58 | 40 | 475 |
| 23 | Parbat | 358 | 243 | 2873 | 50 | Bajura | 83 | 57 | 354 |
| 24 | Ilam | 333 | 227 | 2832 | 51 | Ramechhap | 19 | 13 | 160 |
| 25 | Rukum | 372 | 253 | 2778 | 52 | Nawalparasi | 23 | 16 | 150 |
| 26 | Doti | 305 | 207 | 2341 | 53 | Rasuwa | 19 | 13 | 117 |
| 27 | Sankhuwasa ba | 306 | 208 | 2327 | 54 | Mugu | 16 | 11 | 0 |

Source: MOAC, (2009)


Annex B. Mandarin imports amount (Mt.) by month in Nepal from 2006/07 to 2008/09

| Year | Annual Amount (Mt) | Jul/Aug | Aug/Sept | Sept/Oct | Oct/Nov | Nov/Dec | Dec/Jan | Jan/Feb | Feb/Mar | Mar/Apr | Apr/May | May/June | June/July |
|--------|--------------------|---------|----------|----------|---------|---------|---------|---------|---------|---------|---------|----------|-----------|
| 006/07 | 1817.1 | 0 | 0.04 | 29.26 | 64.5 | 2 | 14.9 | 60.1 | 661.3 | 911 | 74 | 0 | 0 |
| 007/08 | 1817.2 | 0 | 0 | 29.3 | 64.5 | 1.9 | 14.9 | 60.1 | 661.3 | 911.1 | 74. | 0 | 0 |
| 008/09 | 74.2 | 0 | 0 | 0 | 0 | 0 | 0 | 9.1 | 51.7 | 11.6 | 1.8 | 0 | 0 |

Source: MOAC, (2009)

Annex C. Mandarin export amount (Mt) by month in Nepal from 2006/07 to 1008/09

| Year | Annual Amount (Mt) | Jul/Aug | Aug/Sept | Sept/Oct | Oct/Nov | Nov/Dec | Dec/Jan | Jan/Feb | Feb/Mar | Mar/Apr | Apr/May | May/June | June/July |
|---------|--------------------|---------|----------|----------|---------|---------|---------|---------|---------|---------|---------|----------|-----------|
| 2006/07 | 3.1 | 0 | 0 | 0 | 1.7 | 0.7 | 0.4 | 0.3 | 0 | 0 | 0 | 0 | 0 |
| 2007/08 | 2.9 | 0 | 0 | 0 | 1.6 | 0.7 | 0.4 | 0.2 | 0 | 0 | 0 | 0 | 0 |
| 2008/09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Source: MOAC, (2009)

Annex D Survey questionnaire for mandarin farmers

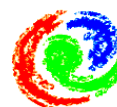
Questionnaire No:

- Name of the farmer:..... Age:..... Sex: Male/female
VDC:..... District:
- What is your level of education?
() Illiterate () Primary () Secondary () Higher secondary () University
- Family size:

| Age groups | Male | Female | Total |
|------------|------|--------|-------|
| <15 Yrs | | | |
| 15 -59 yrs | | | |
| >60 yrs | | | |
| Total | | | |
- What is the total size of Land in Ropani?

| Khet (Low land irrigated) | Pakho (Upland un-irrigated or rainfed) | Total |
|---------------------------|--|-------|
| | | |
- How long have you been in the business of mandarin farming? From.....
- Which variety of mandarin are you growing?
() Khoku () Okitsuwase () Murkett () Local
- Area for mandarin

| Area (Ropani) | No of plant | Bearing plant | Production (2010) (Doko/Kg/ Quintal/crate) |
|---------------|-------------|---------------|--|
| | | | |



- 8) Household consumption and selling based on last year (2010):

| Home consumption (Kg/Doko) | Selling amount (Doko/quintal) | Price per Kg/quintal/Doko | Total Income from selling(NRs.) |
|----------------------------|-------------------------------|---------------------------|---------------------------------|
| | | | |

- 9) Is mandarin business your main business? Yes () No ()
- 10) What are the sources of income? (In NRs.):
 i) Agriculture (excluding mandarin) () ii) Livestock () iii) Job ()
 iv) Pension () v) Other.....
- 11) What is the cost of production of mandarin orange per ropani per year?

| Particular | Amount | Unit cost | Total cost |
|--|--------|-----------|------------|
| Sapling | | | |
| Rent of the land/Cost of the land (Ropani) | | | |
| Manure | | | |
| Labour | | | |
| Fertilizer | | | |
| Pesticide/chemical | | | |
| Copper Sulphate | | | |
| Lime | | | |
| Irrigation | | | |
| Other/specify..... | | | |

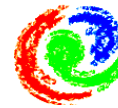
- 12) Do you have any constraint in mandarin production? () Yes () No

- 13) If yes, what constraints do you have?

| Problems/constraints | Rank* |
|--|-------|
| High price of input | |
| Lack of irrigation | |
| Unavailability of input in time | |
| Insect | |
| Diseases | |
| Lack of good quality sapling | |
| Hail stone | |
| Lack of credit | |
| Poor variety of mandarin | |
| Lack of good cultivation skill | |
| Mandarin farmer not able to form producers' organization | |
| Others..... | |

*Give the rank as: 5- more serious, 4- Serious, 3-moderate, 2-a little bit, 1-the least serious

- 14) What suggestion do you think to solve those problems?
 () Disease and pest control training () Provision of credit
 () Good cultivation practices training () Formation of producer organization
 () timely input () Others
- 15) Who harvest the mandarin when it is ready to harvest?
 () Myself () Buyers () Others.....
- 16) What are the criteria of harvesting of fruit?
 () Size () Colour () Sweetness () Others
- 17) How much money is needed to harvest one quintal mandarin? Rs.....
- 18) What is the method of harvesting?
 () Hand picking () Shaking of the tree () Using picking tool () Other...
- 19) Do you grade and package your mandarin?



- () Yes () No
- 20) If yes, how many grades do you used to make?
() Two grade (big and small size) () Three (big, medium and small size)
- 21) Do you know the quality of your mandarin? () Yes () No
- 22) If yes, what are the qualities that your mandarin has?
() Good size () Attractive colour () Sweetness
() Free from insect and pest damage () Less number of seed () Others.....
- 23) Who is your main buyer of the mandarin among followings?
- | Trader category | Farmer response | Kg/Quintal sold (in 2010) |
|----------------------|-----------------|---------------------------|
| Farmer collector | | |
| Road head collector | | |
| Wholesaler | | |
| Retailer | | |
| Consumer | | |
| Other (specify)..... | | |
- 24) Do you do contractual agreement? () Yes () No
- 25) If yes, with whom do you do contract? If no who was your buyer?
() Collectors () Wholesalers () Retailers () Others.....
- 26) If yes, when do you contract?
() Beginning of the season () Just before harvesting/pre-harvest contract
() Others.....
- 27) Who decides on the price of mandarin?
() Myself () Bargaining process between myself and buyer () Buyer
() Other.....
- 28) Are you satisfied with the price that is being offered by the buyer for your mandarin?
() Yes, I am very satisfied () Yes, I am satisfied () Nor, satisfied nor dissatisfied
() No, I am dissatisfied () No, I am very dissatisfied
- 29) In your opinion, who is getting highest profits from mandarin business?
() Farmer, () Collector, () wholesalers () Retailers () I don't know
- 30) Who provide you support/information about your mandarin business?
() DADO () NGO () Farmer to farmer () Mandarin trader () None of them
- 30) If any of them provides support, do you feel sufficient for improving your mandarin farming?
() Yes () No
- 31) What kind of market information does the buyer/trader provide to you at the time of buying?
() Quantity of the mandarin needed, () Price for 1 kg fruit in the market
() Provides the per kg price only what he/she want () Time of harvesting
- 32) Do you have access about the market information?
() Sufficient () Little bit () Completely unknown
- 33) If yes, what are the means of market information?
() Radio () Television () Newspaper () Telephone call () Neighbors
() Other.....



- 34) Among the following constraints, what are the major problems that you are facing while marketing of mandarin?

| Problems | Rank* |
|-------------------------------------|-------|
| Lack of marketing information | |
| Low price offered by trader | |
| Lack of good moterable road | |
| High transportation cost | |
| Unorganized market | |
| Lack of storage facilities | |
| Lack of processing knowledge | |
| Frequent transportation obstruction | |
| Others | |

*Give the rank as: 5- more serious, 4- Serious, 3-moderate, 2-a little bit, 1-the least serious

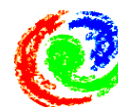
- 35) What suggestion do you think to solve those problems?
- () Marketing as a group () Good Marketing Information System
- () Provision of storage facilities () Provision of processing knowledge
- () Others.....

Annex E. Check list for case study

Check list for Pre-harvest contractors:

Name of the trader:..... Age:..... Sex: Male/ female
Education..... Address:.....

- 1) How long have you been in the business of mandarin?
- 2) From where do you buy mandarin?
- 3) Do you have contract with them?
- 4) What types of information do you convey to grower?
- 5) Do you harvest the mandarin yourself or take harvested by farmers?
- 6) If yes, how much cost do you need to harvest one quintal mandarin?
- 7) Do you sort and grade the mandarin? If yes, why you sort and grade the mandarin?
- 8) How much price did you pay per kg/quintal to the farmer last year?
- 9) Did you pay money immediately after taking mandarin from farmer to them or paid after selling the products?
- 10) How much money do you need for sorting and grading?
- 11) What is the packaging material for mandarin?
() Doko (Bamboo basket) () Plastic crate () Wooden box () Plastic bag
() Others.....
- 12) What is the means of transport of mandarin and how much money do you need per quintal for transportation of the mandarin?

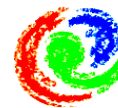


- 13) Where and to whom do you sell the mandarin and how much price per quintal?
- 14) What means of transport do you use for transportation to market?
 () Bus () Truck () Delivery van/Jeep () Porter () Self head load
 () Other.....
- 15) How many kilograms generally losses during transportation of the products from farm gate to your destination place per quintal?
- 16) In your opinion what are the main problem of mandarin marketing?
- 17) What suggestions do you think to solve those marketing problems?

Check list for wholesalers and retailers:

Name:..... Age:..... Sex: Male/female
 Education:..... Address:.....

- 1) How long have you been in the business of mandarin?
- 2) What kind of fruit do you buy and sell?
- 3) From where do you buy mandarin?
- 4) Do you have contract with them?
- 5) What types of information do you convey to them?
- 6) What means of transport do you use for transportation of mandarin?
 () Bus () Truck () Delivery van/Jeep () Porter () Self head load
 () Other.....
- 7) What is the packaging material for mandarin?
 () Doko (Bamboo basket) () Plastic crate () Wooden box () Plastic bag
 () Others.....
- 8) Cost involved and revenue received?
 (Purchasing price, transportation cost,)
- 9) What do you think about the quality of mandarin of that location?
 (Your own view and consumers' reaction with you about quality)
- 10) What types of problems are you facing?
- 11) What suggestions do you think to solve those marketing problems?


Check list for government officials (Horticulturist and Economist):

Name:

Position:

Office:

Address:

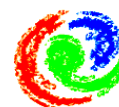
- 1) What types of program do you provide related to mandarin production and marketing?
- 2) Do you think these programs are sufficient to improve the production and marketing of mandarin sector?
- 3) Who are the actors and supporters in the mandarin sector in the district?
- 4) Do you feel there is necessity of other supporter/NGOs to improve the mandarin sectors in the district? If yes/no explain.
- 5) What are the problems/constraints faced by mandarin farmers and traders?
- 6) What are the possible solutions of those problems?
- 7) What support do the farmers need to improve their bargaining position in the chain?

Annex F. Caste wise total land ANOVA test

| ANOVA Total Size of land in Hectare | | | | | | |
|--|---------|----|--------|-----|----|------|
| | Sum of | df | Mean | | F | Sig. |
| | Squares | | Square | | | |
| Between | 2.147 | 2 | 1.074 | 328 | 5. | .009 |
| Groups | | | | | | |
| Within | 7.457 | 37 | .202 | | | |
| Groups | | | | | | |
| Total | 9.604 | 39 | | | | |

Annex G. Caste wise land for mandarin ANOVA test

| ANOVA Area for mandarin in hectare | | | | | | |
|---------------------------------------|---------|----|--------|-----|----|------|
| | Sum of | df | Mean | | F | Sig. |
| | Squares | | Square | | | |
| Between | .181 | 2 | .090 | 683 | 1. | .200 |
| Groups | | | | | | |
| Within | 1.984 | 37 | .054 | | | |
| Groups | | | | | | |
| Total | 2.164 | 39 | | | | |


Annex H. Mandarin farming is your main business or not, Chi-square test

Crosstabulation

| | | Mandarin farming is main business or not | | |
|-------------------------------|----------------|--|------|-------|
| Village Development Committee | | Yes | No | Total |
| Chitti | Count | 16 | 4 | 20 |
| | Expected Count | 14.0 | 6.0 | 20.0 |
| Udipur | Count | 12 | 8 | 20 |
| | Expected Count | 14.0 | 6.0 | 20.0 |
| Total | Count | 28 | 12 | 40 |
| | Expected Count | 28.0 | 12.0 | 40.0 |

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|------------------------------------|--------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 1.905 ^a | 1 | .168 | | |
| Continuity Correction ^b | 1.071 | 1 | .301 | | |
| Likelihood Ratio | 1.933 | 1 | .164 | | |
| Fisher's Exact Test | | | | .301 | .150 |
| Linear-by-Linear Association | 1.857 | 1 | .173 | | |
| N of Valid Cases ^b | 40 | | | | |

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.00.

b. Computed only for a 2x2 table

Annex I. Caste wise mandarin production ANOVA test

ANOVA

Income from selling of mandarin

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 1.586E10 | 2 | 7.931E9 | 1.919 | .161 |
| Within Groups | 1.529E11 | 37 | 4.132E9 | | |
| Total | 1.687E11 | 39 | | | |


Annex J. Cost of mandarin production calculation
Average cost of production in Chitti (per hectare)

| Particulars | Unit | Quantity | Rate | Total |
|---------------------------|---------|----------|-------|--------|
| Manure cost | Doko | 788 | 70 | 55160 |
| Labour cost | Man day | 115 | 250 | 28715 |
| Fertilizer cost | | | | |
| DAP | Kg | 55 | 35 | 1925 |
| Urea | Kg | 65 | 26 | 1690 |
| Pesticide cost | Time | 1 | 5000 | 5000 |
| Copper and lime cost | Time | 1 | 10000 | 10000 |
| Sub-total | | | | 102490 |
| Interest on variable cost | Rs | | | 20498 |
| Total variable cost | | | | 122988 |
| Gross revenue | Rs | | | 319800 |
| Production | Quintal | 150 | 2132 | 319800 |
| Gross margin | Rs | | | 196812 |
| Cost per Kg | Rs | | | 8.19 |
| Benefit cost ratio | | | | 2.6 |

1 Doko = 25 Kg

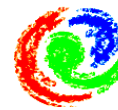
Source: Own field work (2011)

Average cost of production in Udupur (per hectare)

| Particulars | Unit | Quantity | Rate | Total |
|---------------------------|---------|----------|------|--------------|
| Manure cost | Doko | 642 | 70 | 44940 |
| Labour cost | Man day | 100 | 250 | 25000 |
| Fertilizer cost | | | | |
| DAP | Kg | 95 | 33 | 3135 |
| Urea | Kg | 110 | 25 | 2750 |
| Pesticide cost | Time | 1 | 5250 | 5250 |
| Copper and lime cost | Time | 1 | 9400 | 9400 |
| Sub-total | | | | 90475 |
| Interest on variable cost | Rs | | | 18095 |
| Total variable cost | | | | 108570 |
| Gross revenue | Rs | | | 225150 |
| Production | Quintal | 95 | 2370 | 225150 |
| Gross margin | Rs | | | 116580 |
| Cost per Kg | Rs | | | 11.42 |
| Benefit cost ratio | | | | 2.1 |

1 Doko = 25 Kg

Source: Own field work (2011)


Annex K. One way ANOVA test on mandarin Income by Social classes

ANOVA

Production in quintal

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 3340.359 | 2 | 1670.179 | 2.123 | .134 |
| Within Groups | 29105.524 | 37 | 786.636 | | |
| Total | 32445.882 | 39 | | | |

Annex L. Mandarin Income by gender Independent sample t-test

Group Statistics

| | Sex of respondent | N | Mean | Std. Deviation | Std. Error Mean |
|---------------------------------|-------------------|----|------------|----------------|-----------------|
| Income from selling of mandarin | Male | 27 | 69778.9630 | 66017.56548 | 12705.08640 |
| | Female | 13 | 73463.0769 | 67889.19568 | 18829.07508 |

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | |
|---------------------------------|-----------------------------|---|------|------------------------------|--------|-----------------|-----------------|-----------------------|--|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference Lower Upper |
| Income from selling of mandarin | Equal variances assumed | .122 | .729 | -.164 | 38 | .871 | -3684.11396 | 22487.63726 | -49207.95558 41839.72766 |
| | Equal variances not assumed | | | -.162 | 23.196 | .873 | -3684.11396 | 22714.60519 | -50650.94886 43282.72094 |

Annex M. Mode of selling of mandarin

| VDC Name | Pre-harvest contract | Non-contract | Total |
|----------|----------------------|--------------|----------|
| Chitti | 18(90) | 2(10) | 20 (100) |
| Udipur | 15 (75) | 5 (25) | 20 (100) |
| Total | 33 (82.5) | 7 (17.5) | 40(100) |


Annex N. Marketing cost of traders from production site to Kathmandu & Narayangard
**Marketing cost of traders from production site to Kathmandu
Marketing cost of Pre-harvest contractors**

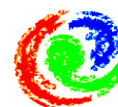
| S.N. | Cost items | Cost Rs/100 kg |
|-------------------|--|-----------------------|
| i | Cost for harvesting | 110 |
| ii | Cost for grading | 25 |
| iii | Cost for packing | 30 |
| iv | Damaged fruit/losses during transportation | 25 |
| v | Storage | 20 |
| vi | Sales tax/levies at different places | 20 |
| vii | Loading and unloading | 30 |
| viii | Transportation cost | 350 |
| ix | Packaging material cost/charge | 10 |
| x | Own management cost | 50 |
| xi | Communication | 5 |
| Total cost | | 675 |

Marketing cost of Wholesaler

| | | |
|-------------------|--------------------------------|------------|
| i | Labour cost | 32 |
| ii | Transportation cost | 10 |
| iii | Own management cost | 50 |
| iv | Membership, fee donation | 10 |
| v | Loading and handling loss | 30 |
| vi | Rental /electricity | 150 |
| vii | Packing material | 40 |
| viii | Miscellaneous (Stamp Pad.....) | 10 |
| Total cost | | 332 |

Marketing cost of retailers

| | | |
|-------------------|---------------------|------------|
| i | Labout cost | 33 |
| ii | Transportation cost | 85 |
| iii | Rental/electricity | 200 |
| iv | Packing material | 50 |
| v | Handling losses | 50 |
| vi | Own management cost | 60 |
| vii | Miscellaneous | 6 |
| Total cost | | 484 |


Marketing cost of traders from production site to Narayangard

| Marketing cost of wholesaler | | |
|-------------------------------------|--|-----------------------|
| S.N. | Cost item | Cost Rs/100 Kg |
| i | Cost for harvesting | 0 |
| ii | Cost for grading | 35 |
| iii | Cost for packing | 20 |
| iv | Damaged fruit/losses during transportation | 25 |
| v | Storage | 50 |
| vi | Sales tax/levies at different places | 20 |
| vii | Loading and unloading | 30 |
| viii | Transportation cost | 300 |
| ix | Packaging cost | 20 |
| x | Packaging material cost/charge | 50 |
| xi | Own management cost | 25 |
| xii | Communication | 10 |
| | Total cost | 585 |
| Marketing cost of retailer | | |
| i | Labout cost | 28 |
| ii | Transportation cost | 20 |
| iii | Rental/electricity | 120 |
| iv | Packing material | 70 |
| v | Handling losses | 40 |
| vi | Own management cost | 50 |
| vii | Miscellaneous | 6 |
| | Total cost | 334 |

Source: Own field work (2011)



Annex O. Minutes of interview

Collector:

Main mandarin collection areas are Chitti, Bhotewodar, Kunchha,, Sundar Bazzar of Lamjung district and Bakrang, Gaikhur of Gorkha district, Purkkot, Kalimati of the Tanahun district and the collected mandarin are transported to Kathmandu. Farmer prefer to sell their mandarin without harvesting. Mostly harvesting, sorting, grading, packing and transporting are the marketing activity of trader. Mainly 3 types of grading are being practised (big, medium, small). Rs 100-115 requires for harvesting of one quintal mandarin. Including harvesting, transportation, storage, packaging, sales tax, packing material charges and communication cost requires about Rs. 640- 690 for one quintal mandarin as a marketing cost from Lamjung to Kathmandu. Income from one quintal mandarin will be Rs 700 to 900. The main transportation means are pick up van and plastic crates are packaging material. Main problems of marketing are Nepal Banda (strike) done by different parties, high sales tax/levies of the District Development Committee and high transportation cost. This charge should be avoid for the agricultural produce frequent strikes should be avoid.

Wholesalers:

Selling depends upon the season; Mainly in mandarin season around 80 % of the total sales is mandarin and other fruits sales banana, papaya. Mostly the information sharing with collector is require quantity, price per kg or quintal, time of delivery, and with retailer price per kilo/quintal, quality. Mainly truck and pick up van are the means of transportation and plastic crates are packaging material. Total cost incurred for marketing of one quintal mandarin are Rs 300 to 350 depend upon the situation. In an average selling is 10-15 quintal per day. Average purchasing price of mandarin last year was Rs 3,700 to 3,800 and selling price was Rs. 4,250 to 4,450 per quintal. The Main marketing problems are frequent Banda (strikes) done by different political parties, high rent of the install, demand of donation from different groups. There should be strict rules to check the donation. Membership fee should be minimized.

Retailers

Sells different kind of fruits. It depends upon the seasons. At the time of mandarin season mainly 80 percent of the total sales will mandarin and remaining. An average selling per day is 2 quintal. Total marketing cost for one quintal mandarin is Rs. 400 to 550. The average purchasing price per quintal last year was 4350 to 4450 and selling price per quintal was Rs 5430 to 5600. The quality mandarin of that location is good and consumers' response about the quality is also good. Main problems are frequent strikes, high transportation cost, and perishable nature of crops.

Government officials

The main program implemented in regard to mandarin program is sapling distribution for selected farmer in the pocket area of the district. To grow the virus free sapling we have supported to established one net house in Gaun Shahar VDC and Chitti VDC. The program of DADO is not sufficient for the development of mandarin sector. No any marketing support program in the district. Due to lack of sufficient resources (economic and human) the program is limited and only for few number of farmer. Here in this district no any other non-governmental organization for supporting mandarin farmer. The main actors in the district are producer, collector, retailers, no mandarin wholesaler in the district and consumers. Main problem of the mandarin sector are disease (citrus decline), declining productivity, unorganized marketing system. For the development of mandarin marketing group approach of marketing should be established.



Annex P Name list of respondents

a) Name list of respondent farmer

| S.N. | Name | Address | S.N. | Name | Address |
|------|----------------------|---------|------|--------------------|---------|
| 1 | Sannani panta | Chitti | 21 | Aite Damai | Udipur |
| 2 | Madhav Panta | Chitti | 22 | Laxmi Damai | Udipur |
| 3 | Nirmala Panta | Chitti | 23 | Bhairav Bdr Lihani | Udipur |
| 4 | Bibekala Panta | Chitti | 24 | Nur Bdr Lohani | Udipur |
| 5 | Krishna Prasad Panta | Chitti | 25 | Arjun Panta | Udipur |
| 6 | Ram Bdr Panta | Chitti | 26 | Padam nath Lohani | Udipur |
| 7 | Shanta Panta | Chitti | 27 | Tilak Panta | Udipur |
| 8 | Thag Raj Panta | Chitti | 28 | Shiva Ram Panta | Udipur |
| 9 | Chun Kumari Basaula | Chitti | 29 | Hum Nath Panta | Udipur |
| 10 | Toya Nidhi Lohani | Chitti | 30 | Hom Nath Panta | Udipur |
| 11 | Rameshwor Panta | Chitti | 31 | Basu Dev Panta | Udipur |
| 12 | Murali Panta | Chitti | 32 | Mekh Bdr Pariyar | Udipur |
| 13 | Ram Bdr Panta | Chitti | 33 | Bishnu Panta | Udipur |
| 14 | Daya Nidhi Panta | Chitti | 34 | Bishnu Bdr Pariyar | Udipur |
| 15 | Dinesh Raj Panta | Chitti | 35 | Sita Lohani | Udipur |
| 16 | Tuk Kumari Panta | Chitti | 36 | Kopila Pariyar | Udipur |
| 17 | Bhagwati Panta | Chitti | 37 | Mira Lohani | Udipur |
| 18 | Harikala Bhandari | Chitti | 38 | Buddman Pariyar | Udipur |
| 19 | Padam Bdr Bhandari | Chitti | 39 | Kashi Ram Pariyar | Udipur |
| 20 | Khag Raj Panta | Chitti | 40 | Ratna Kumari Panta | Udipur |

b) Name list of pre-harvest contractors

| S.N. | Name | Address |
|------|--------------------|-------------------|
| 1 | Kashi Datta Lohoni | Udipur-2, Dhimire |
| 2 | Lacchaman Panta | Chitti-1. Saut |

c) Name list of wholesaler

| S.N. | Name | Wholesale shop | Address |
|------|----------------------|----------------------|----------|
| 1 | Nir Kumar Timalisina | Kalimati, Kathmanda | Ramechap |
| 2 | Bharat Khanal | Kalimati, Kathmandu | Gorkha |
| 3 | Buddi Ram Chaudhary | Narayangard, Chitwan | Chitwan |
| 2 | Ram Narayan Yadav | Narayangard, chitwan | Rautahat |



d) Name list of retailers

| S.N. | Name | Retail shop | Address |
|------|-----------------------|-----------------------|-------------|
| 1 | Bidur Prasad Dhungana | Nayabazzar, Kathmandu | Okhuldhunga |
| 2 | Nava Raj Ghimire | Nayabazzar, Kathmandu | Kavre |
| 3 | Hari Kala Gurung | Bharatpur, Chitwan | Chitwan |
| 4 | Rama Thapa | Bharatpur, Chitwan | Dhading |
| 5 | Harka Bahadur Gurung | Bensisahar, Lamjung | Manang |
| 6 | Sirjana Karki | Bensisahar, Lamjung | Lamjung |

e) Name list of government officials

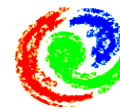
| S.N. | Name | Position | Organization |
|------|----------------------|-------------------------------------|---|
| 1 | Arjun Neupane | Horticulture Development Officer | District Agriculture Development Office, Lamjung |
| 2 | Indramani Lamichhane | Planning Officer | District Agriculture Development Office, Lamjung |

Annex Q. Nepali calendar and Gregorian calendar

| Nepali Calendar | Gregorian Calendar |
|-----------------|------------------------------|
| Baishakh | Mid-April to Mid-May |
| Jestha | Mid-May to Mid-June |
| Asadh | Mid-June to Mid-July |
| Shrawan | Mid-July to Mid-August |
| Bhadra | Mid-August to Mid-September |
| Ashwin | Mid-September to Mid-October |
| Kartik | Mid-October to Mid-November |
| Mangsir | Mid-November to Mid-December |
| Poush | Mid-December to Mid-January |
| Magh | Mid-January to Mid-February |
| Falgun | Mid-February to Mid-March |
| Chaitra | Mid-March to Mid-April |

YEAR

| Nepali Calendar | Gregorian calendar |
|-----------------|--------------------|
| Year (BS) | Year (AD) |
| 2061 | 2004/05 |
| 2062 | 2005/06 |
| 2063 | 2006/07 |
| 2064 | 2007/08 |
| 2065 | 2008/09 |
| 2066 | 2009/10 |
| 2067 | 2010/11 |
| 2068 | 2011/12 |



Annex R. Photographs



Photo 1: Interview with Horticulture Development Officer, DADO, Lamjung



Photo 2: Mandarin farmer in the orchard



Photo 3: Interview with farmer



Photo 4: Interview with pre-harvest



Photo 5: Disease infected mandarin in the orchard



Photo 6: Fruiting mandarin trees in orchard

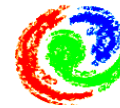


Photo7: Mandarin sapling in the nursery



Photo 8: Interview with retailer